

WATER CANADA



\$250 Billion Sink or Swim

How Canada Can Finance the Water Infrastructure Gap

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Financing** (page 18)

**Spending Wisely
with Big Data** (page 8)

**A Phosphorus
Market for
Lake Erie** (page 7)

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Climate Change Ranked the Top Threat to Our Freshwater

But three-quarters of Canadians do not believe they live in an area prone to drought or flood.

The ninth annual **RBC Canadian Water Attitudes Study** revealed that 21 per cent of respondents rank climate change as the number one threat to Canada's freshwater supply. This is up significantly from 2010 when just seven per cent rated climate change as a top threat.

"Awareness is important, but this study reinforces the fact that we need to re-assess our vulnerability and better prepare for how global warming will impact us all. What we've witnessed with various recent catastrophic events, is the powerful effect of temperature fluctuations on our local weather and water. Sadly, we are not immune to the ravages of climate disruption."

Bob Sandford, EPCOR chair,
Water & Climate Security, United Nations University

STUDY HIGHLIGHTS:

Canadians see freshwater as the country's most important natural resource

■ About half of Canadians (49 per cent) rank freshwater as Canada's most important natural resource, ahead of oil and gas (20 per cent), agricultural land (15 per cent), forests (12 per cent), and base metals and fisheries (each at one per cent).

One-in-four Canadians have experienced a boil water advisory

■ Nearly one-quarter of respondents have lived under a boil water advisory and 83 per cent are very or somewhat concerned about drinking water quality on First Nations reserves. Despite this, 84 per cent of Canadians report having confidence in the quality of their homes' tap water.

Infrastructure investment a priority to protect water quality

■ Increased government funding for infrastructure improvements is seen as a priority, with respondents identifying water treatment systems, drinking water supply, sewage collection and treatment and upgrades to existing infrastructure as being among the most important.



RBC has been polling Canadians about their attitudes towards water since 2008.

Want to learn more?

Download this year's full, complimentary report or view past reports at rbc.com/bluewater



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Only Fools Rush In

BY KATHERINE BALPATAKY

IN LATE AUGUST, The Globe and Mail published a front-page article concluding that one-third of First Nations people living on reserves who have access to a centralized treatment system (not all communities do) “use drinking water that might threaten their health.” This means that roughly 57,000 people living on 101 reserves across Canada obtain water from treatment plants and pipe networks the government deems to be “high risk.”

The evidence was drawn from an Indigenous and Northern Affairs (INAC) database that contains a decade's worth of risk assessments for individual First Nations water systems across the country. The reporter's aim was to determine whether the federal government might fall short of the Prime Minister's election promise to eliminate boil-water advisories on reserves within five years—and the evidence suggests that this will likely be the case.

In my personal opinion, the Prime Minister's passion and dedication to this issue is admirable. If you have read either of his biographies, you will know that this comes from a lifetime spent engaging with First Nations leaders and a deep appreciation for our heritage. However, I cannot say that I'm surprised that we will not hit the five-year target. In fact, I have always felt this was overly ambitious, if not unrealistic.

In the midst of this nation's largest push to invest in water infrastructure, it would be useful to pause and determine a governance approach that will democratize the decision-making process. Communities want their voices heard when it comes to infrastructure decisions that will impact them personally (*see Circle of Trust, page 12*). Ideally, we should aim to empower

communities while stimulating outside investment with a long-term vision. We need to modernize our existing assets to keep pace with the digital age (*see pages 8 and 20*) and to consider climate resilience requirements. In order to do this, decision-makers may need time to update procurement processes or rate-setting structures to improve the bottom line for municipalities in the long run.

Good asset management planning includes things such as operational, financial, and sustainability objectives; analysis of trade-offs for the available technology options; and a public engagement (in some cases, beyond what the Environmental Assessment process requires). Some of this may involve partnerships with other communities or non-traditional partners to help prioritize investments (e.g., we profile one new business model on page 34). And so, rigid central planning and timelines run the risk of failing to incentivize “best value” choices for municipalities and Canadians over the lifetime of those assets.

According to the Globe and Mail article, INAC said that it typically takes three years to move through the design, construction, and commissioning stages of new water treatment plants in First Nations communities. The reporter demanded more immediate results. While I would absolutely stand behind fast measures to aid those who are without basic water provisions, I stand firm on the need for a longer strategy for our water infrastructure. Let's establish a system that will lead to self-sustaining, community-driven success and give Canadians a chance to decide what constitutes the best value for their tax dollars. **WC**

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KIM STEPHENS

Kim is the executive director of Partnership for Water Sustainability in B.C.
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David is an associate with Isle Utilities.
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Kevin is a Member of the Legislative Assembly for Frame Lake in the Northwest Territories.
PG 42

ABOUT THE COVER

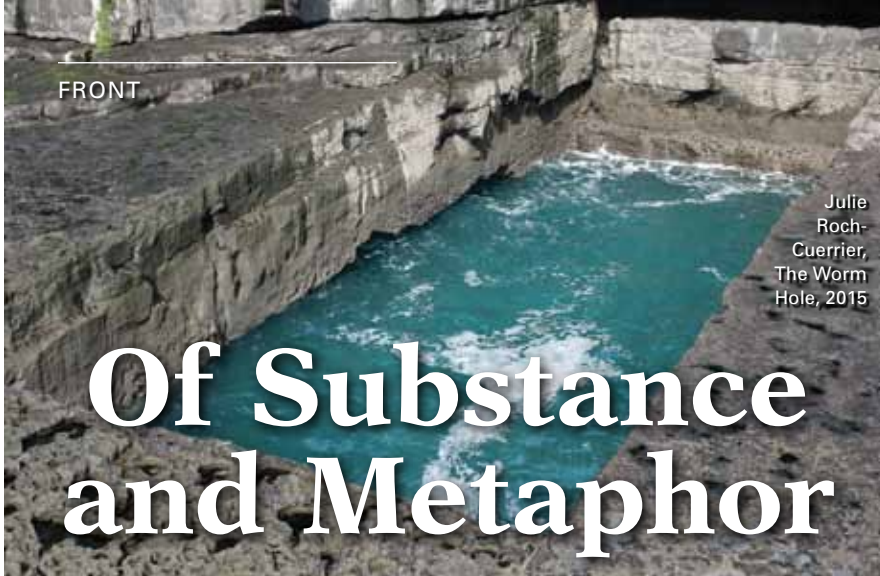
According to the 2016 Infrastructure Report Card*, there is an estimated \$250 billion gap for water infrastructure in Canada—and this number increases as assets deteriorate. However, the true scale of the infrastructure deficit in Canada is unknown precisely because there is no comprehensive set of asset management plans to draw from. Canada's drinking waters, wastewater, and stormwater infrastructure is essential for maintaining our quality of life, health, the environment, and is the backbone of the economy. And so—sink or swim. How do we close this gap? Where will the money come from? How can be self-sustaining? Ideas enclosed. *source: canadianinfrastructure.ca

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- **Winning the public's trust with biosolids management**
- **Pipelines for oil and gas across waterways**
- **Nestlé's position on Aberfoyle water permit**

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Julie Roch-Cuerrier, National Geographic Atlas of the World- World Atlas atlas pigments, each 7.5cm x 5cm, 2013



Water art exhibit explores our relationship with H2O.

IF YOU HAPPEN TO BE IN MONTREAL during the summer heat wave, it may be tempting to spend all your free time lazing under a tree in Mount Royal Park sipping pinos gris. However, if you can muster the energy to wander through the trendy Mile Ex neighbourhood, you will find a refreshing, cool reprieve in the Never Apart gallery

Never Apart is a relatively new gallery and social venue that features a private in-ground pool, Sun and Moon room installations for heliotherapy, in addition to 12,000 square feet of gallery space, complete with a 10,000-unit vinyl archive and sound system to complete the experience. The gallery alone is a must-see, but the real draw for water types is the current exhibit (July to October) that features three female artists and their explorations of water.

The multi-media collection includes photographs, videos, projections, and objects that offer up meditations on colour, light, and time. The plurality of

approaches taken by the artists reveals different layers of understanding of water's presence. The exhibit questions concepts of borders and edges and the relations between landscape and the body.

Julie Roch-Cuerrier, the artist and curator who coordinated the exhibit, told Water Canada, "Marie and I have known each other for almost 10 years now. We first met while studying in CEGEP (pre-university college in the Quebec), and have been collaborating ever since. She added, "I thought it would be interesting to bring together three women and their investigations about water.[...] I want the viewer to consider how ways of seeing water have shaped our relationship to water through history."

The exhibit will be at the Never Apart gallery until Oct.1, neverapart.com. The exhibit is scheduled to appear next at the Centaur Theatre (Oct. 19-29) to coincide with the presentation of the play Chlorine at 453 St. François-Xavier in Montreal. — Staff



Polluter Buys

A market-based system to reduce phosphorus in Lake Erie.

WHEN PREMIER KATHLEEN WYNNE and the governors of Michigan and Ohio met in 2015 and signed an agreement to reduce phosphorus level in Lake Erie by 40 per cent by 2025, the decision was applauded. But determining the best strategy to get there is proving more difficult. Given that diffuse nutrient runoff from rural and urban lands is a leading factor in eutrophication, there is no straightforward solution that promises the best “bang for the buck.”

Enter the Great Lakes Commission—an inter-state compact agency that promotes the orderly, integrated and comprehensive development, use, and conservation of the water in the Great Lakes Basin. The Commission has recently launched a two-year pilot project to see if a market-based solution can assist in providing direction. The idea is to design and establish a water quality trading program to reduce phosphorus in the Western Lake Erie Basin.

Nicole Zacharda, a project manager with the Great Lakes Commission, explained that the market would give industrial facilities and municipal wastewater treatment plants a choice about their pollution reduction investments. Under the market system, they could choose to upgrade existing facilities (for end-of-pipe impact), or in other conservation projects (e.g. wetland restoration) by trading permits, if it proved to be more impactful or cost-effective.

“Our multi-state project for Lake Erie-based trading is a little bit of an homage to an Ohio project that was led Victoria Pebbles our program director,” said Zacharda. “The Commission

did some preliminary research and submitted a funding proposal through a U.S. National Resources Conservation Service Innovation grant—which was accepted. The grant will fund the commission to do analysis in order to design a framework for the phosphorus market.”

Presently, Indiana, Michigan, Ohio, and Ontario are participating in the project, along with other key partners. While colleagues in Ontario are participating, their involvement is mainly to help shape the framework, as the actual trading will be restricted to the U.S. given the terms of the grant.

Zacharda explained that getting the framework right is a complicated undertaking. Given that the trading market is driven by models, there needs to be an understanding of how well those models reflect real-world conditions. As well, the trading agreements need to have appropriate verification and oversight, to ensure that trading terms are truly being achieved. So far, the Commission has completed the process of examining other existing trading protocols, and relevant legal authorities.

“Success for me would be to develop a framework for how trading could work across jurisdictional boundaries and binational boundaries—which really starts to get very interesting,” said Zacharda. “Essentially, we are setting up the playbook for how we will do this, and then in 2017, we intend to test it, so long as we are able to find willing buyers and sellers,” she said. “The big challenge for us will be whether there is a market of buyers that want to buy the credits.” — Staff

FRONT

Online at
WATERCANADA.NET



BLOG: Israel's Ambassador to Canada, Rafael Barak, talks about Israel's water miracle and opportunities for Canada-Israel collaboration.

bit.ly/IsrealWC



NEWS: Coca-Cola meets their aggressive 2020 water replenishment target for global operations.

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VIDEO: Unlike Matt Damon's “potty strike,” the I Don't Flush campaign explains how to use your potty responsibly.

bit.ly/IDontFlush



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How water utilities can recover millions of dollars of revenue using big data.

BY TREVOR HILL

CLIMATE CHANGE, drought, and increasing demand are creating a global water volatility crisis. As communities around the world find ways to use water more efficiently, counter-intuitively our water utilities suffer.

A 2007 study by the C.D. Howe Institute found that Canadian water agencies' revenue made up only 70 per cent of their expenditures—and that revenue for water utilities in Canada is continuing to fall. To sustainably manage our water supply, we need to find a balance between water conservation and new revenue recovery strategies to help utilities do more with diminishing resources.

When utilities lose revenue, the burden is often passed on to customers through rate increases. However, there is no established correlation between rate increase and revenue boost. High water prices often accelerate conservation as consumers tend to use less water when

the cost outweighs the benefit. The best way to keep revenues up while sustainably managing our water supply is to maximize the available revenue from existing resources such as utility meters and billing services. For water utilities, water is money, so minimizing apparent and real losses while streamlining customer service is the key to a healthy, profitable water system. A 2009 estimate from Environment Canada reported a 13.3 per cent average water loss from municipal systems across the country—that removes a lot of potential utility revenue.

Each water utility has both physical and logical assets—the physical being hardware such as meters, pipes, and sensors; and the logical being the representation of physical assets in a

utility's data system. For many water utilities, these assets diverge. There is a disconnect between the physical assets and their logical representation in a utility's data system. This has immediate impact on revenue. Missing

Missing or malfunctioning meters are invisible to the utility, silently leaking dollars from utility coffers.

or malfunctioning meters are invisible to the utility, silently leaking dollars from utility coffers.

Big data realigns both physical and logical assets for utilities. By implementing simple, data-driven software solutions, utilities can track the performance of existing infrastructure, maximize the collectable revenue, and reduce bad debt

through improved customer engagement. Big data solutions unite three major pain points for utilities under the same software umbrella to unlock shared benefits and economies of scale.

Smart metering

A typical water utility collects customers' meter data on a monthly basis. Big data systems protect vital utility revenue by identifying faulty meters in near real-time, before they become major headaches and revenue sinks. By combining existing databases with tax parcel data and other locally available information, the big data software is able to identify faulty and inactive meters in a utility's billing system and quickly alert managers about the issue.

Smart billing

In many utilities, the antiquated nature of their billing platforms precludes the adoption of Smart Grid for Water technologies. Lacking the technical and financial resources to fix this issue, many utilities believe they cannot modernize their systems. For cash-strapped water utilities, a cloud-based billing platform is the ideal solution to limit overhead and maximize revenue. Data-driven software solutions create a capital-light back office and data management system that provides revenue assurance for utilities and allows them to better track consumption and match customers' bills to their usage.

Great efficiency

Consumers are increasingly hungry for actionable information that helps them fine-tune their behaviours. With water utility big data software, customers are given access to an intuitive online platform that allows them to connect their daily activities with consumption metrics. Providing customers with highly granular, real-time data, along with push notifications based on usage and costs, empowers utility customers like never before and makes them better informed participants in the conservation conversation.

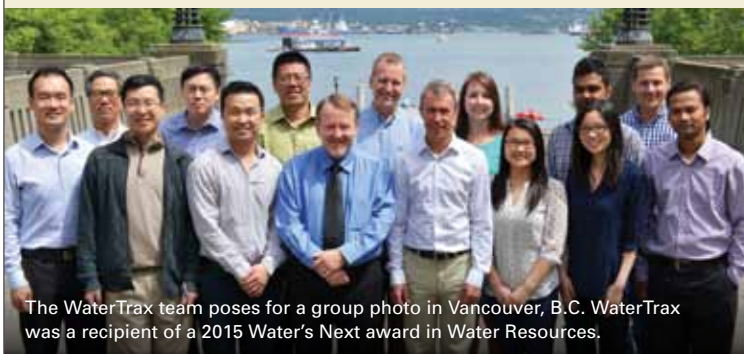
Our new water reality is challenging water utilities to do more with less. As water scarcity becomes more acute, big data systems will help utilities stay ahead of the curve and keep revenue high during times of low water use. **WC**



Trevor Hill is the chairman and CEO of FATHOM, a cloud-based software-as-a-service provider for the water industry. Hill started his career by co-founding a design-build firm

specializing in water reclamation facilities in British Columbia and the Canadian Arctic.

Cloud Surfing



The WaterTrax team poses for a group photo in Vancouver, B.C. WaterTrax was a recipient of a 2015 Water's Next award in Water Resources.

Cloud computing (a.k.a. web-based software services) are gaining traction around the globe by all types of organizations, including water utilities. The shift represents a leap forward in the way water utilities operates and how data is used.

Established in 2000, WaterTrax is a B.C.-based software provider that has designed a system to help agencies and utilities monitor and manage operational data for their water and wastewater systems, while staying in regulatory compliance. The company has installed its software with more than 90 clients in Canada—including agencies and utilities managing a variety of sized water and wastewater programs (with more in the U.S.). Their Canadian clients include the City of Kelowna, B.C., Kingston, Ont., Township of Langley, B.C., Alberta Capital Region Wastewater Commission, Metro Vancouver, and Halifax Regional Water Commission.

WaterTrax offers software suites of intuitive water and wastewater information management products to manage water quality, and asset and maintenance management data and activities. The company's software enables clients to access information in one consolidated platform, to simplify operating activities and manage compliance verification more easily.

Sheena Graham, a marketing specialist with WaterTrax said, "We typically work with water and wastewater utilities who, before working with us, were frustrated with the amount of wasted time chasing down data and manually checking it every time they needed to create a report. Our clients migrate all of their data into our cloud-based application, WaterTrax Data Management, from Excel spreadsheets, in-house databases, or paper records."

Graham added, "Before choosing a cloud-based application, they were receiving a lot of paper records and then filed away in filing cabinets, only to be retrieved during audits or when it came time for monthly, quarterly or annual reporting. This often creates a sense of anxiety and frustration when the regulator comes to visit."

When asked about the future of cloud-based information management in the water sector, Graham said, "Water utilities in North America are actively searching for ways to add innovation to their everyday activities to improve their processes. With every municipality has limited resources and is having to do more with less. Mobile technology, automation of tasks, and electronic reporting is the future for our industry." **WC** —Staff



"We're seeing savings of 25 per cent in energy costs for biological aeration as well as membrane scouring," said Richard Nie, president of Koester Canada, the company that designed and operates the system. "Our chemical usage is also about 50 per cent of what a typical MBR system would require."



Since commissioning in February 2016, the compact, containerized MBR system has performed beyond expectations and could set a new standard for savings in capital and operating costs.



An aerial view of Fetherston Mobile Home Park and the houses connected to the Clearwater system.

(L-R) Peter Rupcic and Richard Nie of Koester Canada; Karen Dunlop, Municipality of North Grenville; David Gordon, mayor of North Grenville; Kevin Loiselle of Clearford Water Systems, Maurice Dumoulin of Fetherston Mobile Home Park Residents Association; and Brian Carré of Municipality of North Grenville.



Paying for Performance

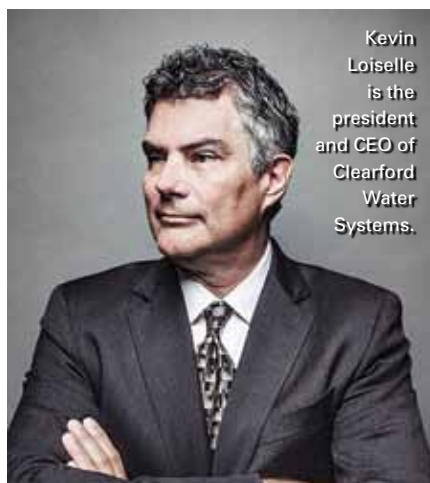
Mobile home park serves as demo site for innovative wastewater technology and unique pay-for-performance funding model.

BY EVE KRAKOW

SMALL COMMUNITIES IN ONTARIO can now benefit from an innovative wastewater collection and treatment system, as well as a unique funding model to implement it.

In 2013, residents at the Fetherston Mobile Home Park in Ontario faced eviction due to a septic system that had been leaking for years, and the prohibitive costs of replacing it. However, close cooperation between residents, the Township of North Grenville, the Ministry of Environment and Climate Change (MOECC) and Clearford Water Systems Inc. led to an innovative solution. The community became the first in Canada to install a Clearford One wastewater system under a pay-for-performance (P4P) funding model.

The system is made up of three components. Instead of a septic tank, each home is equipped with a smart digester. The digester separates and breaks down the sewage, providing primary and some secondary treatment. The liquid effluent is then conveyed through small-bore sewer pipes to the treatment plant. A membrane biological reactor, designed by Koester Canada, Inc., completes the



Kevin
Loiselle
is the
president
and CEO of
Clearford
Water
Systems.

digestion and removes suspended solids and nutrients. The effluent undergoes UV disinfection before being released into the environment.

"The Clearford system is ideal for small or remote communities, where piping sewage to an urban centre wouldn't make economic sense, and where putting in a conventional system would be too expensive," said Kevin Loiselle, president & CEO of Clearford Water Systems. "It's also ideal for subdivisions that will be serviced separately."

Among the advantages, Loiselle says the use of sealed, high-density polyethylene pipes prevents leaks and groundwater infiltration. The liquid flow requires half the slope of convention sewer pipes. Overall, the decentralized system boasts lower capital, operating and life-cycle costs than a conventional sewage system.

Clearford has been installing various components of its technology since 1999, but the Fetherston site, commissioned in February 2016, represents its first all-in-one installation that includes the new membrane bioreactor. Moreover, the demonstration site is the first to use Clearford's P4P funding model.

Unlike a typical P3 design, build, operate and maintain contract, the P4P model has no capital requirements. "Clearford will finance the entire capital and operating costs for the 25- or 30-year period, in exchange for the commitment of a monthly payment for each serviced home," said Loiselle. "In other words, there's no risk to the municipality of whether our system will work or how

much it will cost to operate. We take all of that risk on our own shoulders, as long as they commit to paying for the service when it works."

Ownership is transferred to the municipality at the end of the service agreement, at no cost. The expected useful life of all in-ground components is over 90 years.

Clearford funded Fetherston's \$1 million system itself. However, in January 2016, Clearford signed a \$100-million funding agreement with a Swiss facility, Signina Capital AG, to cover the capital costs of installing its wastewater collection and treatment system in Ontario municipalities.

"Municipalities in Ontario are considered very good credit risks," explained Loiselle. This is partly due to provincial legislation governing how much municipalities can borrow. Loiselle notes that because sewage collection is a rate-payer item, committing to pay for this service on a per-door basis will not affect a municipality's credit worthiness or borrowing limit.

Loiselle admits that establishing this fixed monthly payment can be tricky. "At the moment, people do not pay the full costs of water services," he said. "Most water bills just cover operation of the system, not the capital costs of putting the system in." For this reason, he suspects the model may be most successful in projects where a developer is adding on to a town, and where the town can bridge the gap in rates by charging fees to the developer.

Most recently, Clearford was one of two companies invited to submit an RFP for a wastewater collection and treatment system for a new development in the Township of Adjala-Tosorontio, Ont. If Clearford wins the contract, it would be its first P4P contract accessing the Signina funding. wc



Eve Krakow is a freelance writer based in Montreal.

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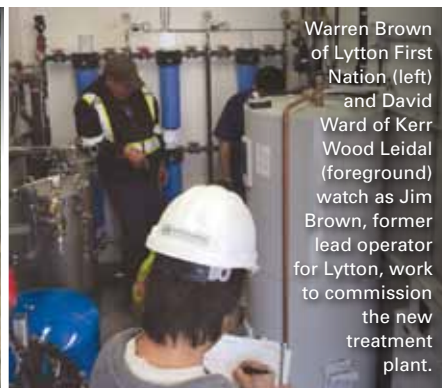
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L-R: Irfan Gehlen, Kerr Wood Leidal; Ted Molyneux, Indigenous & Northern Affairs Canada; Jim Brown, former lead operator of the Lytton First Nation; Taylor Bryant, INAC; Tim Tam, BI Pure Water; and John Bergese, former member of RES'EAU-WaterNET.



Jim Tam of BI Pure Water during preliminary pilot testing in the community using RES'EAU-WaterNET's Mobile Water Treatment Pilot Plant.



Warren Brown of Lytton First Nation (left) and David Ward of Kerr Wood Leidal (foreground) watch as Jim Brown, former lead operator for Lytton, work to commission the new treatment plant.



Replacing the community's reservoir. L-R: Unknown crew from Lillooet Contracting, Douglas Grossler, Lillooet Contracting, Jim Brown; unknown; David Ward, and Warren.



Receiving gifts from the community. L-R: David Ward, Jim Tam, Ted Molyneux, and Madjid Mohseni of RES'EAU-WaterNET (former Water's Next award winner).

Circle of Trust

Can a community-centric approach to innovation solve First Nations' water woes?

BY MEGAN WOOD, JIM BROWN, DANNY HIGASHITANI, TED MOLYNEUX, AND MADJID MOHSENI

IT DID NOT GARNER any national headlines, but the small community of Nickeyeah Indian Reserve (IR) 25 on the Lytton First Nation (located between Kamloops and Vancouver, B.C.) is no longer living under a boil-water advisory. That is big news to the people who inhabit its six homes, who have lived with recurring boil water

advisories since the 1990s.

A new treatment plant utilizing various types of filters, UV disinfection, and chlorination brings potable water to every tap, thanks to a unique collaborative research and outreach program. Nickeyeah IR25 represents the first fully realized Community Circle project

for RES'EAU-WaterNET—a research consortium hosted by the University of British Columbia that works with small, rural and First Nations communities to research and test promising new solutions under real-world conditions, integrating community feedback into the refinement process.

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Nickeyeah is the kind of drinking water success story Canada needs to replicate in many First Nations communities, as the federal government has recently promised to do. Our collaboration with RES'EAU on the Nickeyeah IR25 project has taught us many lessons that can guide national efforts to improve access to acceptable drinking water in all small water systems, which serve six million Canadians. Principal among them:

① First Nations cannot be painted with a single brush. There is no one-size-fits-all solution that will be a fit for the needs of hundreds of communities with diverse local source waters, culture, politics, community makeup, and history. These factors and others play a crucial role in success, representing a clear challenge to the prevailing belief in both industry and government that economies of scale will be achieved through the consolidation of small community systems into larger, centralized systems.

② Overcoming the challenges of even the smallest community is a time- and resource-intensive, complex process. There are few quick fixes. The installation of the new treatment plant is the result of a process that began with community consultations in 2013. A water-sampling program was undertaken in 2014, and potential technologies were tested in 2015 using RES-EAU's mobile water treatment pilot plant. Upgrades were made to the water intake, and the design and construction of the water treatment plant and water storage were completed in April 2015. From the start, local operators were consulted

to ensure the end goal was always top of mind. The project also required the close involvement of several partners, including Indigenous and Northern Affairs Canada, BI Pure Water, and Kerr Wood Leidal as industry and consulting partners, and Lillooet Contracting for local construction services.

③ Critical to the success of any solution is recognizing how to create an inclusive and proactive space where feedback and deeper levels of dialogue with communities, especially water operators, can be achieved. The success of our project hinged on community engagement, which included interviewing elders and water operators, holding talking circles and completing questionnaires with stakeholders, organizing a workshop for operators and outreach activities to engage local youth. In-depth consultations were made at every step of the technology testing and implementation process. A robust and clear plan is an absolute must to keep an entire community engaged and informed. Funds and resources must be allocated to each community project to support frequent updates, appropriate communications and outreach in partnering communities, and those mechanisms must be built into the projects at the earliest stage.

④ We have to “close the loop” on community-focused R&D projects. Despite what we thought were robust community consultation efforts and our own satisfaction with the project's conclusion, we learned that some community members had been affected

by water interruptions during the upgrade. This prevented some local gardens from being planted on time. Other residents reported water shortages for irrigation. Our communication efforts, it turns out, weren't as effective as we believed. The invaluable lesson here is that a clear plan is required to keep an entire community engaged and informed, before and during the project and post implementation.

Developing this level of knowledge and sensitivity to the unique aspects of each community's history, as well as an understanding of how they relate to challenges in water system upgrade or replacement projects, will be critical to improving access to clean drinking water in our First Nations communities. WC

Megan Wood is a research engineer at RES'EAU-WaterNET; Jim Brown is a former lead operator, for the Lytton First Nation; Danny Higashitani is a senior engineer of the Asset Management, Community Infrastructure Directorate for Indigenous and Northern Affairs Canada; Ted Molyneux is a senior engineer for the Water/Wastewater, Community Infrastructure Directorate at Indigenous and Northern Affairs Canada; and Madjid Mohsen is the scientific director of RES'EAU-WaterNET and professor of Chemical and Biological Engineering at the University of British Columbia.



More information on RES-EAU-WaterNET's community focused R&D program can be found at reseauwaternet.ca

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Staying Afloat

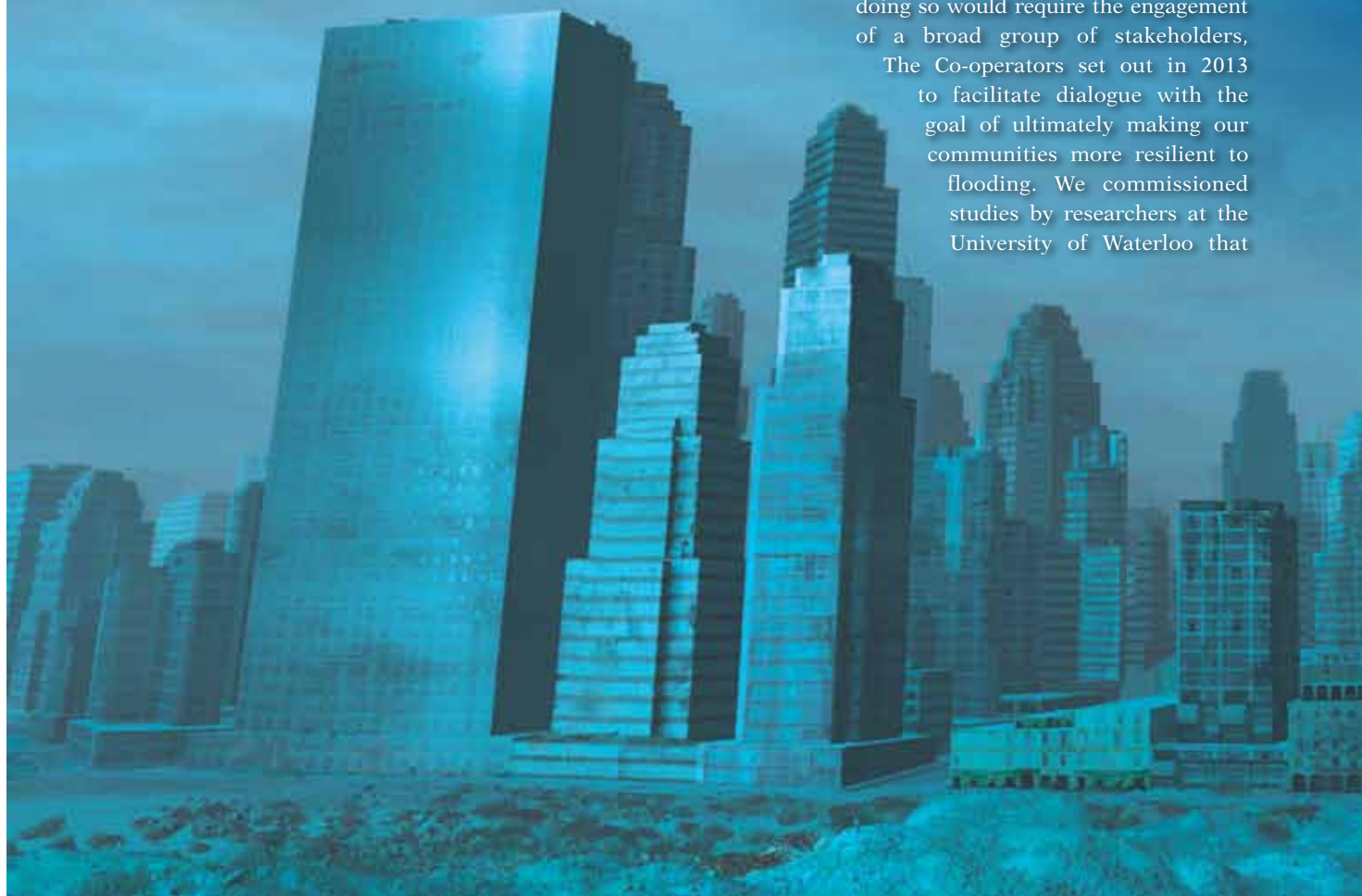
Partnering for action to build more flood-resilient communities.

BY ROB WESSELING

THE COSTS OF DAMAGE from extreme weather have doubled roughly every 10 years for several decades, and floods are by far the most common type of natural disaster in Canada. In the past decade, water has surpassed fire as the leading cause of home insurance claims in Canada. Yet, until the spring of 2015, Canada was the only country in the G7 in which homeowners could not buy insurance to protect them against overland flooding.

Determined to address this glaring unmet need, and recognizing that doing so would require the engagement of a broad group of stakeholders,

The Co-operators set out in 2013 to facilitate dialogue with the goal of ultimately making our communities more resilient to flooding. We commissioned studies by researchers at the University of Waterloo that





examined the viability of overland flood insurance and identified priorities for advancing flood resiliency.

Winning conditions

At a multi-stakeholder roundtable discussion, it was agreed that to improve our flood resiliency, Canadians needed the following conditions to be in place:

- 1 Canadians understand the risk that overland and urban flood presents to their homes, business, and communities.
- 2 Canadian decision-makers use their understanding of flood risk to make sound adaptation decisions aimed at protecting their homes, businesses, infrastructure and personal safety.
- 3 Canadians have access to a means to transfer the risks associated with flood damage that remains after adaptation.

I call these the “winning conditions” for flood resiliency. Last spring, we became the first Canadian insurance company to make overland flood insurance available to homeowners. When fully deployed, our coverage will be available to all of our clients from coast to coast to coast regardless of the level of flood risk that they are exposed to. Since our initial launch, a number of other insurers have begun to offer coverage against flood damage as well. This historic development has brought us some way to fulfilling the third condition, as insurance is a means of transferring risk from the homeowner to the insurer.

The second condition, (making good adaptation decisions), depends upon the first (having good information). This applies to all decision-makers, from the

prime minister to individual homeowners. A lack of knowledge or awareness has long limited homeowners’ ability to mitigate risk related to flooding and other natural perils. Insurers, governments, and others have a role to play in helping them become better informed.

A study we commissioned a report entitled, Preparedness of Fifteen Canadian Cities to Limit Flood Damage, found that many municipalities offer subsidies for homeowners to de-risk their property by installing a backwater valve, an effective mechanism that prevents water from backing up into a basement. However, these are under-utilized because homeowners either did not understand the function of a valve or were not aware of the subsidy.

Homeowners can now make better-informed decisions on where they choose to live because flood insurance is being introduced.

Given the amount of damage caused by flooding, the level of risk each property faces should be an important consideration for anyone in the market for a house. However, due to a lack of easily consumable flood risk information, more consideration is often given to the proximity of amenities and a home's aesthetic features than is given to its risk of flood damage. It is, after all, much easier to compare types of granite than it is to gauge relative levels of flood risk. Seeking out flood maps from local authorities and interpreting them correctly is a challenge. But that is beginning to change.

Homeowners assessing risk

With the introduction of what we call our Comprehensive Water product, we have conducted a new form of modelling that informs our pricing. We assess the flood risk of individual homes with a high degree of precision and share the information with the public through an online assessment tool (water.cooperators.ca) that provides an instant assessment of the level of flood risk for the home along with corresponding loss prevention tips.

Economic signals

One of the most important societal benefits of insurance is the economic signal it sends through the monetization of risk. Homeowners can now make better-informed decisions on where they choose to live because flood insurance is being introduced. When comparing two homes, families can now consider the difference in Comprehensive Water premium, and hence the relative difference in flood risk when choosing a home. The ability to access this new information will lead to more informed decision-making. Better decisions on the part of individual homeowners should have a knock on effect for builders, developers and municipalities as well. Knowledge is a key criterion in any effective type of risk mitigation. Governments, insurers and many others have a role to play

in making information about flood risk and what can be done to mitigate it more readily available. This is one of the main reasons we are a supporter of Partners For Action, an applied research network at the University of Waterloo that is helping promote a better understanding of how we can become more resilient to natural disasters. Better information can allow us to focus more on prevention than recovery, which ultimately will benefit everyone.

We are most certainly a long way from fulfilling our flood resiliency winning conditions. Progress is being made however, and with a concerted effort we can put the winning conditions in place and de-risk our homes and communities. **WC**



Rob Wesseling is the executive VP of property & casualty operations at the Co-operators General Insurance Company and COO of the Sovereign General Insurance Company



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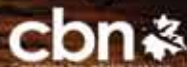
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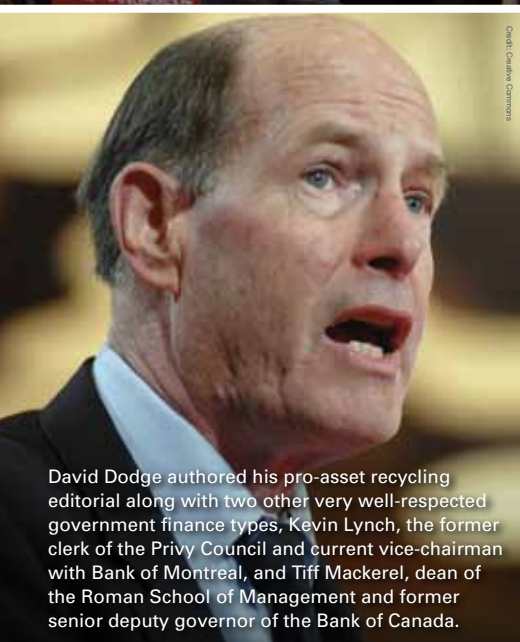
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Infrastructure spending is the Liberals' single largest policy response to the economic downturn. Provinces have long been asking Ottawa to help cover these costs. But, there are questions though as to how much more money provinces and municipalities can contribute to infrastructure, given that many cities and provinces are already managing high debt loads.



David Dodge authored his pro-asset recycling editorial along with two other very well-respected government finance types, Kevin Lynch, the former clerk of the Privy Council and current vice-chairman with Bank of Montreal, and Tiff Mackerel, dean of the Roman School of Management and former senior deputy governor of the Bank of Canada.



Mark Bainbridge, pictured here at the Ferguson Ave Pump Station in Hamilton, Ont., says the federal and provincial government should provide sustainable and predictable levels of water infrastructure funding.

Asset Recycling

A New Era of Infrastructure Financing.

BY JEFF SANFORD

JUSTIN TRUDEAU'S Liberal government handed down a budget this spring that indicates the government is set to spend a remarkable \$120 billion on new infrastructure over the next ten years. Experts welcome the money to begin filling the infrastructure funding gap—but some are raising questions about a new financing model that seems to be emerging as the trendy choice among Ottawa elites.

Former Bank of Canada government David Dodge indicated in a recent editorial that he thinks the government has used up the existing room on the government balance sheet to fund the last round of infrastructure spending. Dodge suggests the government undertake an “asset recycling” program to finance the next round of spending on infrastructure. The term asset recycling comes from Australia and the United Kingdom where it identifies a certain financing model that taps the money in large pension funds to help finance the spending. The idea is simple. The government sells off legacy assets. Large pension funds buy up those assets. The government uses the money from the asset sale to fund the next generation of greenfield infrastructure projects.

The benefits for the government are many. New infrastructure spending can be financed without issuing debt at the government level or raising taxes. Under an asset recycling program, revenues advanced do not go into general government coffers; they remain in the infrastructure stream, creating stable and visible funding streams for infrastructure. One expert suggested the government create a centralized

Infrastructure Bank to standardize contracts (and bundle smaller infrastructure projects into larger tranches that would make attractive investments for big pension funds).

There are opponents to the model. The Canadian Union of Public Employees (CUPE) considers asset recycling nothing more than a new label for privatization. The federal NDP argues asset recycling will see the money needed to catch up on maintenance raised through new user fees and toll charges. Others point out that radically low interest rates would allow governments to fund this infrastructure spending without having to give up future revenues from existing infrastructure. It is assumed that pension funds would demand a rate of return of between three-to-four per cent, whereas governments can borrow at one-and-a-half per cent. If so, it would be more expensive to finance these projects through the pension funds than by borrowing the money.

Some also worry about the potential for untoward political bargaining between the civil service and politicians. If Canadian public sector pension funds—such as the Ontario Teachers' Pension Plan (OTPP) or Caisse de dépôt et placement du Québec—invest in assets here, they say politicians would be tempted to begin to manage the labour relations with the civil service through opaque, politically-expedient deals cut between the funds and the politicians. To date, the big Canadian public sector pension funds have only invested in foreign countries.

Nevertheless, the idea is a popular one among the elite mandarins in Ottawa. David Dodge authored his pro-asset recycling editorial along with two other very well-respected government finance types, Kevin Lynch, the former clerk of the Privy Council and current vice-chairman with Bank of Montreal, and Tiff

months ago as being “thrilled” to see the phrase in the budget.

As new dollars begin to flow into the infrastructure sector it is clear asset recycling is being seriously discussed in Ottawa. “While a lot of people at the municipal level will recognize that this is a great start and that it gets the ball rolling on closing the funding gap, it’s just a small part of what’s needed,” said Bu Lam, manager of municipal programs at the Canadian Water Network. Lam noted that water systems need to be “future ready” as the effects

of global warming settle in. But doing the kind of long-term planning necessary to build resilience into the system is difficult to do when funds are handed out as large one-time grants.

Mark Bainbridge, director water and wastewater planning with the City of Hamilton, voiced similar concerns. “We’re glad to see them taking the infrastructure

issue seriously. And obviously no one is going to look at a grant program and say we don’t need the money. But we do need more sustainable and predictable levels of funding,” he said. “We want to create inter-generational equity so that those living now are not riding on the backs of those that happen to be born later and have to spend more at the end of the life cycle of this infrastructure to repair it. We should be collecting revenues through the whole process so that it’s not just generation at the end of the cycle that pays.” Supporters of asset recycling will no doubt argue this would be the case under such a model, even as the debate over privatization, costs, and the power of the pension funds plays out. **WC**

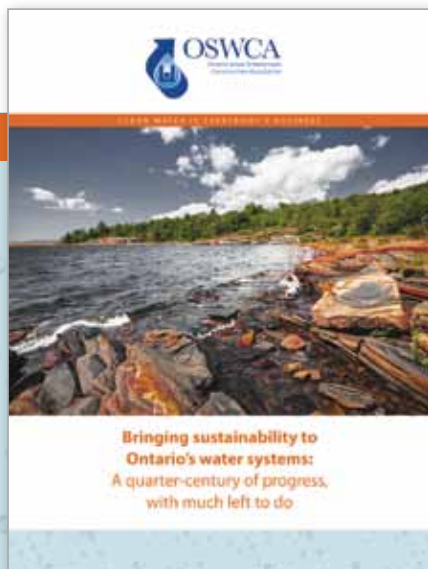
Long-term planning is necessary to build resilience into the system, but it is difficult to do when funds are handed out as large one-time grants.

Mackerel, dean of the Roman School of Management and former senior deputy governor of the Bank of Canada. An Access to Information Act request filed by the Canadian Press found a deputy finance minister using the phrase in February. Finance Minister Bill Morneau uses the phrase, as has a senior executive with the OTTP who was quoted a few



Jeff Sanford is a Toronto-based freelance writer with experience in pension issues, finance and infrastructure.

REPORT CALLS FOR FULL COST RECOVERY ON ALL LOCAL WATER SYSTEMS



The Ontario Sewer and Watermain Construction Association (OSWCA) recently released a report, authored by Michael Fenn and Harry Kitchen, which outlines a number of key recommendations including that the province of Ontario mandate that municipalities charge full cost recovery pricing for their water and wastewater systems, better coordinate water infrastructure projects and consolidate water sector revenues.

CLEAN WATER IS EVERYBODY'S BUSINESS



To download a copy of the report, visit bit.ly/OSWCA2016WaterStudy

oswca.org



Connecting Online

Will Canada be the front-runner in the race to transform our water sector through the Internet of Things? BY DAVID STEWART JONES

INTERNET OF THINGS (IOT) wireless connectivity are poised to transform the water industry within the next few years. Government-sponsored “Smart Cities” initiatives are accelerating IoT-based infrastructure management solutions south of the border—but there are indications that Canada might actually get there first.

A few years from now, a wireless-enabled acoustic sensor installed in a fire hydrant will detect the sound of a developing watermain leak and transmit a data packet to a cloud-based server. Once uploaded, specialized data-aggregation software will analyze the leak-detection data and send alerts to the local water utility. However, instead of immediately dispatching field crews to excavate and assess the pipe leak, the utility will do—nothing.

Why? The utility’s future IoT-based water-infrastructure management system will automatically collect and assess data from a vast array of smart sensors

monitoring the water distribution network, delivering the vital information the utility needs to make the right decisions. The system could analyze the utility’s maintenance schedule and operating budget with links to other regional public agencies, enabling the delay of costly pipeline repairs until they coincide with planned road construction for the area.

Canada’s IoT partnership

Eric Stacey, a product manager with Echologics who is involved with developing IoT-based water infrastructure management solutions, said, “Monitoring and coordinating all aspects of municipal services is the ultimate goal of IoT.” By harnessing Internet-connected sensors and devices using low-power wireless technologies, the company’s EchoShore leak detection platform is able to achieve system efficiencies with remote monitoring and management of large water distribution

systems.

Echologics is one of several water-industry companies collaborating with Bell Canada to create and launch integrated IoT-based solutions for deployment by water utilities. Data gathered by Echologics sensors and automated devices communicating through Bell’s planned low-power LTE-M wireless networks are processed by enterprise-grade data aggregation and reporting software, enabling utilities to boost operational efficiencies, cut costs, and deliver improved service to customers.

“Aside from the extraordinary technologies involved with IoT’s machine-to-machine communications, the real benefits are things that only humans can appreciate,” said Stewart Day, Echologics’ client manager for Canada. “Instead of the client struggling to manually obtain vital infrastructure data over long periods of time, an IoT system can automatically collect all the

data available and deliver it directly to the client. Further, the automated nature of an IoT-based infrastructure and asset management system frees utility staff and management to focus on the larger issues that challenge the future of the water industry.”

Will Canada get there first?

In the U.S., government-sponsored smart cities programs are fostering new IoT-based technology development. Collaborating with AT&T and IBM, Echologics installed their EchoShore-TX permanent leak-detection monitoring platform as part of an IoT water infrastructure deployment in Las Vegas. AT&T provided the wireless connectivity to transmit data from EchoShore-TX monitoring nodes, and IBM software provided a data-driven water management system with analytical, visualization, and reporting capabilities. Canada is next in line for such advancements.

“A high degree of IoT integration has been achieved here in Canada between technology developers and wireless connectivity providers,” said Stacey. She added, “Actually, Canada is near the head of the pack.” However, several U.S. cities including Cincinnati, Las Vegas, and California’s Bay Area are progressing rapidly toward integrated IoT-based water solutions as well.

Acknowledging Israel’s rapid advancements in this area, Stacey still believes Canada will be first to implement a comprehensive IoT integration. She cites Canada’s progressive water utilities as the decisive factor. “Canadian utilities are open to new IoT technology approaches and have served as the world’s proving grounds for water industry innovation in the past,” said Stacey. “And leading water utilities in Alberta, Nova Scotia, and Ontario have the potential to make Canada the IoT leader by 2020.” WC

David Stewart Jones is a freelance writer and researcher based in Toronto, Ont.



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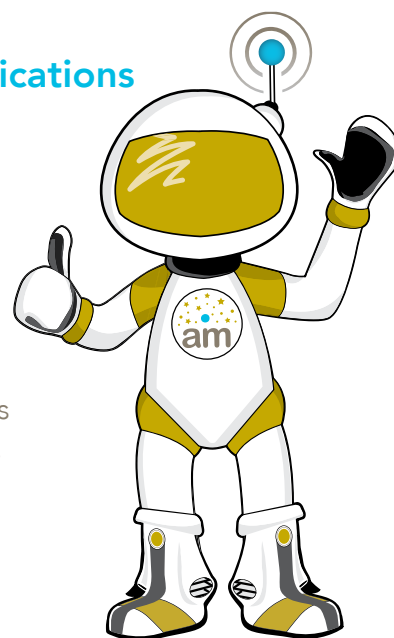
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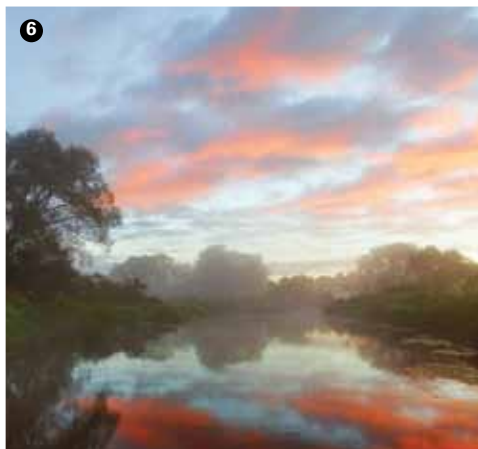
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Eau Canada

Celebrating 150 years of River Heritage. BY STEPHANIE MERRILL

CANADIAN HERITAGE RIVERS will be a showcased during Canada 150—the national birthday celebration that will provide Canadians with regional and national celebrations that contribute to our sense of national pride.

The St. John River Society led the effort to have the Saint John River in New Brunswick designated as Canada's 38th Heritage River in 2013, and is now bringing together river managers of the

Heritage River System with Heritage Canada and Parks Canada through the Canada 150 Fund, to support activities and events along each watercourse.

"We want to promote the importance of rivers to Canada and Canadians," said Molly Demma, executive director of the St. John River Society.

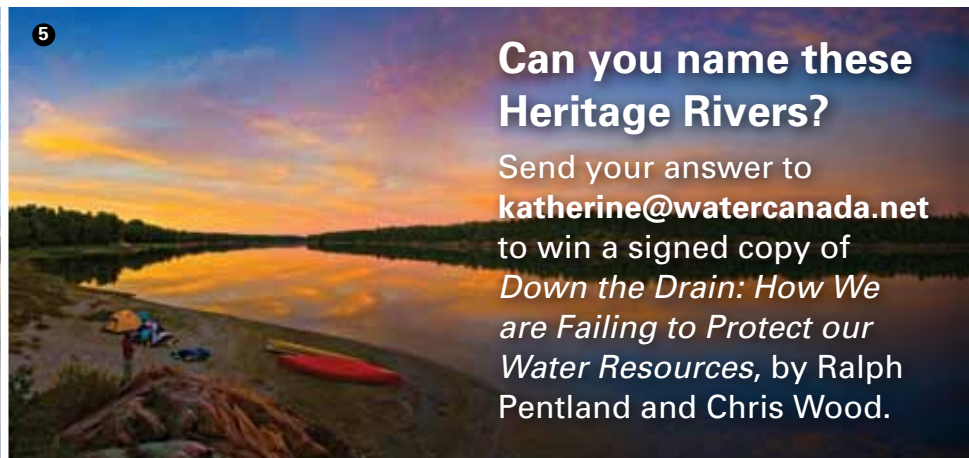
"Rivers were our highways—the 'road to Canada.' They are responsible for most settlement patterns today, and are

at the heart of Indigenous communities' culture. They are our national, natural heritage and this is an excellent time to celebrate them."

Throughout 2017, there will be public paddles, youth fishing derbies, tree planting, shoreline cleanups, and aboriginal story telling among other things. The events will focus on Canadian Heritage Rivers' cultural and environmental significance,



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Can you name these Heritage Rivers?

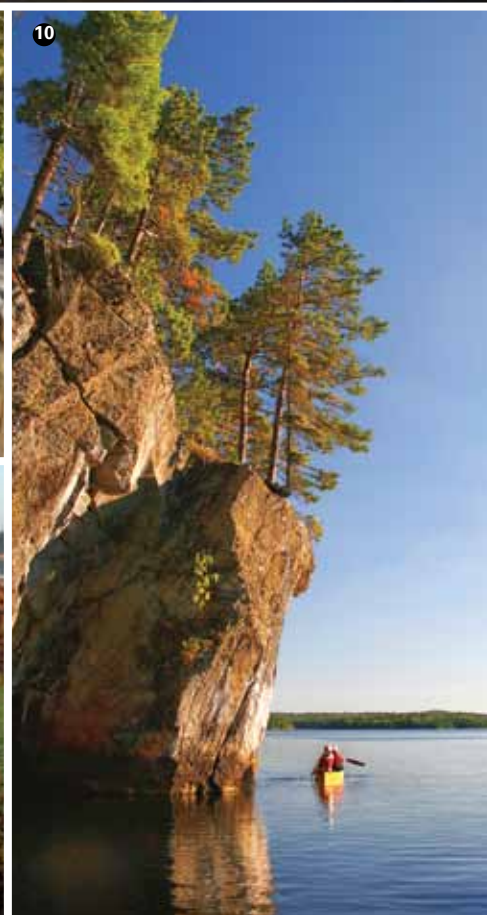
Send your answer to katherine@watercanada.net to win a signed copy of *Down the Drain: How We are Failing to Protect our Water Resources*, by Ralph Pentland and Chris Wood.



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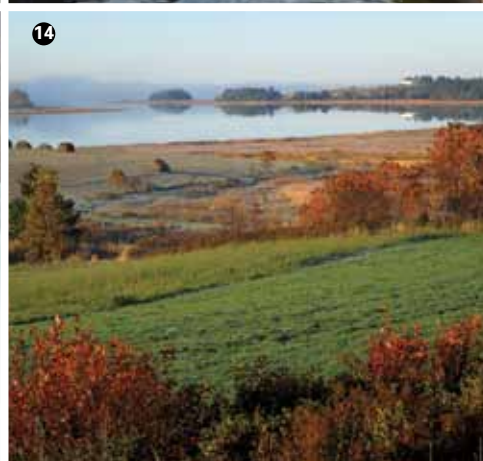
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and will bring together Canadians for shared experiences.

The national program of Parks Canada, the Canadian Heritage River System, exists to give national recognition to Canada's outstanding rivers and encourages their long-term management for the conservation of their natural, cultural, and recreational values.

"Canada 150 is a natural fit for highlighting the Canadian Heritage River System," said Demma. "We're excited that our colleagues across the country are joining us in this pan-Canadian celebration."

"With the Eau Canada project, we will highlight the essential role of rivers in our country's development. In 2017, let's become the protectors of our waterways—an important natural resource for Canada," said Canadian Heritage Minister Mélanie Joly. **wc**



Stephanie Merrill is a N.B.-based writer with ten years' experience in water policy, watershed management and community engagement.



We'll post the contest results on **watercanada.net** on October 1.

Visit [bit.ly/](http://bit.ly/RiverHeritage150)
RiverHeritage150



eXXpeditions Lake Ontario crew (top L-R): Diane Reid, Dr. Diana Papoulias, Dr. Elaine McKinnon, Stephanie Sardelis, Rowshyra Castaneda, (bottom L-R): Susan Debreceni, Katherine Balpataky, Christine DiCecco, Ann Bedard.

Credit: Marjorie Nijme Photography

SAILING FOR SCIENCE

An all-female sailing expedition to survey microplastics in the Great Lakes Basin.

BY KATHERINE BALPATAKY

A LIGHT BREEZE from the southwest catches the sails of our Catalina 42 as we manoeuvre her bow into the wind under the direction of our skipper, Diane.

"All right ladies, we are going to tack—this means we are going to turn the boat to the left," she hollers. "You're going to unwind that rope off the winch and keep a little bit of tension until the sail backfills. Hold it tight!" Seconds later, we are cruising into the sun.

Our interdisciplinary female crew is composed, for the most part, of sailing novices. On Lake Ontario, we are part of the world's largest simultaneous sampling of plastics in the Great Lakes Basin—one of seven teams sailing on each of the Great Lakes, including the St. Lawrence and St. Clair rivers. This event is part of a global, female-led initiative known as eXXpedition. The Great Lakes

event is also supported by over 1,000 citizen scientists from both Canada and the United States who signed up to take water samples as part of a global microplastics study and to conduct beach cleanups across the Great Lakes Basin.

An unknown legacy of pollution

Microplastics is the term used to describe small pieces of broken-down plastic that are less than five millimetres in diameter and enter waterways via litter, wastewater, deteriorated large plastics items, and the accidental loss of industrial materials during transport. Although microplastics have been spotted in lakes and oceans since the 1970s, evidence of their impacts on fish and birds and of their prevalence in marine environments is a more recent finding.

A 2015 study from the University of Waterloo found at least half a million pieces of plastic per square kilometre in parts of the Great Lakes; and an Ontario Ministry of the Environment and Climate Change (MOECC) study found a staggering 6.7 million particles of plastic per square kilometre in Humber Bay off Toronto.

One of the key challenges with microplastics is that fish, birds, and other creatures mistake them for food. Upon ingesting them, they absorb numerous toxins, including lead, cadmium, mercury, bisphenol-A (BPA), and diethylhexyl phthalate (DEHP). At this point, the toxins have entered the food chain. Many of them have been directly linked to cancers, birth defects, immune system problems, and childhood developmental issues in humans.



A vial of microplastics, large enough to be visible, from Lake Ontario.



Jennifer Pate and Shaun Henry co-founders of Love Your Greats.



The Lake Erie crew.



Lake Huron lead boat trawling.



Lake Huron cleanup crew.

Girl power

Elaine McKinnon, a neuropsychologist from Oakville, and Jennifer Pate, a filmmaker and Eco-park owner from Bayfield, Ont. spearheaded the

When I left for the Caribbean, all I could talk about was the sailing, but when I came home, all I could talk about was the plastics.

eXXpedition Great Lakes initiative. The two women had shared a life-changing journey on a global eXXpedition plastics voyage across the Atlantic Ocean in 2014.

“When I left for the Caribbean, all I could talk about was the sailing, but when I came home, all I could talk about was

the plastics,” said McKinnon. The voyage (a perilous journey straight into a five-day storm off the coast of Lanzarote in the Canary Islands) was the first of many global eXXpeditions that founder Emily

Penn has undertaken. While capturing global data on ocean plastics, Penn has also generated a global movement—as made clear by the efforts of McKinnon and Pate, as well as the work of

many of the women on my voyage.

For McKinnon, the decision to expand the eXXpedition movement into fresh water was also deeply personal. “Jenn had invited me to the premiere of her documentary on our Atlantic voyage in London, England,” she said. “I had

bought my tickets and was literally packing my bags to leave when I received word from my doctor that I had colon cancer.” McKinnon said that she had been experiencing symptoms and had therefore gone for tests. Given that she had already lost both her parents to cancer, she was mindful of the risks. But once the reality of her illness began to sink in, she grew even more determined to address the problem of plastics in her own backyard. (At the time of our Lake Ontario journey, McKinnon had just recovered from surgery to address the cancer.)

“The aim is that—no matter how participants can access the Great Lakes and its connecting waterways (whether it’s canoeing, kayaking, stand up paddleboarding, swimming, or even just walking)—everyone can be a part of this event and a part of the solution,” said Penn.

Biologist Stephanie Sardelis and Water Canada editor Katherine Balpataky pull in the manta trawl—equipment with a 60-cm wide mouth that dips 25cm underwater with a removable sock that captures tiny floating microplastics.

Below: Co-founder of the eXXpedition Great Lakes 2016, Dr. Elaine McKinnon speaks to a CBC crew onboard the sailboat on Lake Ontario.



Credit: Margaret Ogilvie Photography



To find out how you can get involved, visit exxpedition.com

To learn about the global microplastics study, visit adventurescience.org/microplastics.html

In search of solutions

In June of 2016, the federal government listed microbeads (found in personal care products) as a toxic substance, enabling a future ban on the plastic beads used in cleansers. As well, federal and provincial/state governments of Canada and the United States have launched research into the sources and effects of microplastics. But much about their prevalence, pathways, and the means to clean up our lakes is unknown. Initiatives like the Great Lakes eXXpedition demonstrate that citizens can play an important role in filling knowledge

gaps and fostering solutions.

Several of my fellow crewmates have already participated in global eXXpeditions in some way. It is clear that each of these women—who are leaders in their respective fields of aquatic toxicology, biology, food security, social activism, and art—is highly engaged in supporting one another's grassroots efforts. This supportive spirit is the cascading effect of Penn's vision for this initiative which is aimed at empowering women to take action on the plastics issue after experiencing first-hand how

prolific the problem really is.

Pate says the event was designed to foster interdisciplinary partnerships and encourage the next wave of actions. She said, "In the face of what is really quite a scary issue, it is heartening to enable people to respond to it in a very positive and action-focused way. It will be very interesting to see how people continue to engage in the future." WC

Katherine Balpataky is
Water Canada's editor.

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Engineered For Good

Nilufar Islam, P.Eng.: a young professional with global vision. BY JACQUELINE WATERS

NILUFAR ISLAM is a young engineer whose career has blossomed out of a strong passion for water and the environment. Growing up in Bangladesh, she was surrounded by sanitation issues that afflicted the country (an estimated 21 million people in Bangladesh lack access to a clean water source). Given the opportunities to improve water management in her home country, she grew inspired to work in the water field at an early age. "Without water there is

no life. So we must preserve it."

Islam finished her BSc in civil engineering from Bangladesh University of Engineering and Technology (BUET)—one of the top engineering universities in the country. She came to Canada in December 2008 to pursue higher education, to gain more in-depth knowledge in her area of interest. Upon completing her MASc in civil engineering, she enrolled in a PhD program at the University



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of British Columbia at its Okanagan campus. Her thesis focused on water quality management for small, rural, and First Nations communities using booster chlorination. In addition to her studies, she secured an engineering job at WSP/MMM Group Ltd—one of the largest building services firms in Canada. Throughout all her graduate work, Islam also worked as a research assistant where she developed nine decision-making tools for municipalities in the area of asset management, source water protection, and water quality management. This included developing a risk-based decision support tool, named WARRM (Water Main Replacement Risk-based Model) for prioritizing water main replacement in distribution networks.

Islam later obtained professional engineer designation in Alberta and British Columbia. Recently, she has taken on a new role as a project engineer at the City of Vancouver to work on their

capital projects. “My ultimate goal is to work to solve environmental issues. In my new job, I can truly work with environmental issues from a public side. I am really excited to work at the city as they follow the greenest city goals with strategies like zero carbon, zero waste, and healthy ecosystems.”

Islam is a high achiever. In 2011, she was recognized with Philip H. Jones Award for best presentation at the 26th Eastern Canadian Symposium of Water Quality Research, Canadian Association on Water Quality in Québec City. In May 2013, she received the NSERC’s Alexander Graham Bell Canada Graduate Scholarship, one of the top ranked national scholarships in Canada. She has also taken on many leadership roles through her voluntary work, such as the VP of the Canadian Water Network’s young professionals network.

Islam credits her achievements to her father, Engr. A. K. M. Nurul Islam Mondal. She said that he eagerly waits

for her publications and PhD (the first PhD attained in his family). “My father has always stressed that his goal in life was to raise his daughters to be highly-educated, well-established, and resilient. My mother, Nurjahan Islam, has never left any stone unturned to provide me anything I needed.” She also credits her supervisor, Dr. Rehan Sadiq, associate dean and professor at the University of British Columbia. Sadiq said, “I’ve never seen someone transform in such a short period of time, she is a natural leader. She can make her presence known and most importantly, is always filled with passion and energy. [...] All the credit goes to her.” WC



Jacqueline Waters is an editorial intern at Actual Media.

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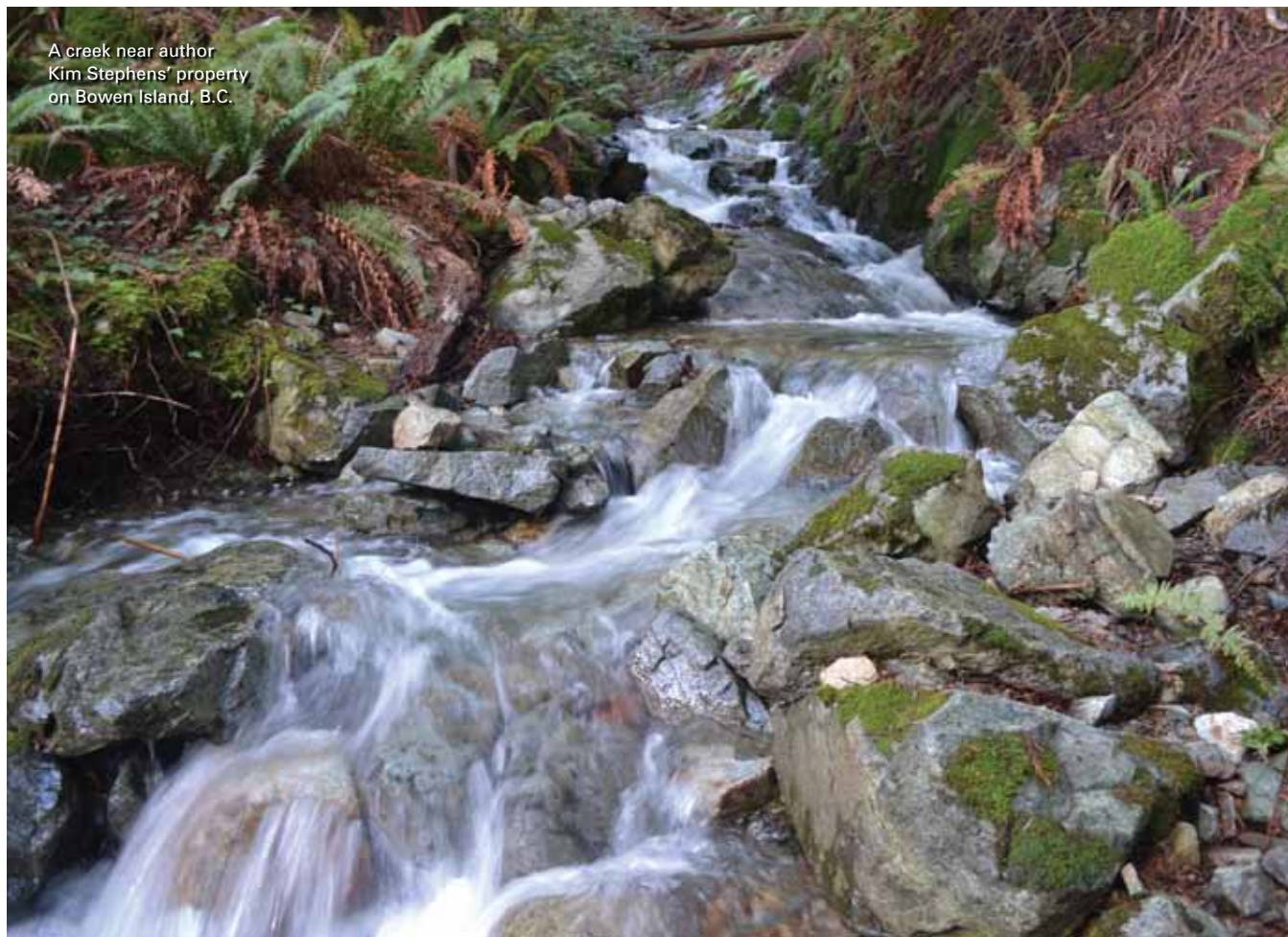


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We'll announce more details
and open nominations this fall.

A creek near author
Kim Stephens' property
on Bowen Island, B.C.



COURTESY, KIM STEPHENS

Watershed Moment

How British Columbia has incorporated watershed thinking into its asset management.

BY KIM STEPHENS

IN THE 1990s, Bill Derry, the founding chair of the Washington State stormwater managers committee, and I led a workshop program for B.C. municipalities, and provided cross-border sharing of stormwater research. Early access to the findings of two experts (Drs. Richard Horner and Chris May) allowed us to create what became known as the “fish pictures.” These graphics translated science and served as educational tools to create a common understanding, and informed decision-making by municipal, regional, and

provincial governments. The workshops fueled interest in the ecosystem-based approach to stormwater management. Several more events finally led to the Stormwater Planning Guidebook for B.C. and set the stage for British Columbia to move towards sustainable watershed asset management.

Hydrology rules

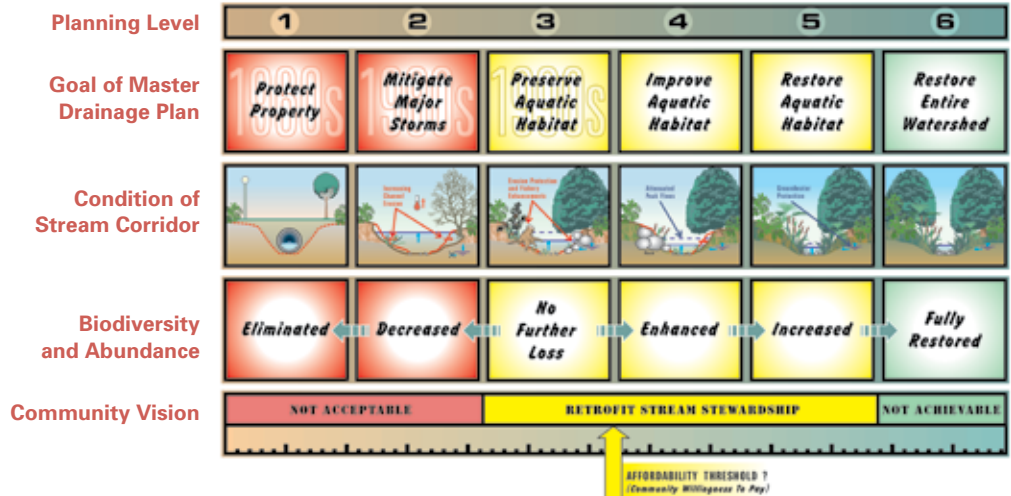
The goal in restoring the hydrologic integrity of a watershed is to forestall an unfunded taxpayer liability flowing from changes in hydrology. A cornerstone

of this approach is the legacy work of Horner and May. Their research made it clear that stormwater management is as much, or more, about land use decisions as engineering solutions. We also learned that we needed to address transportation choices. They taught us that changes in hydrology, not water quality, must be the primary focus of our efforts. If we get the hydrology right, water quality typically takes care of itself in a residential development.

“So many studies manipulate a single variable out of context with

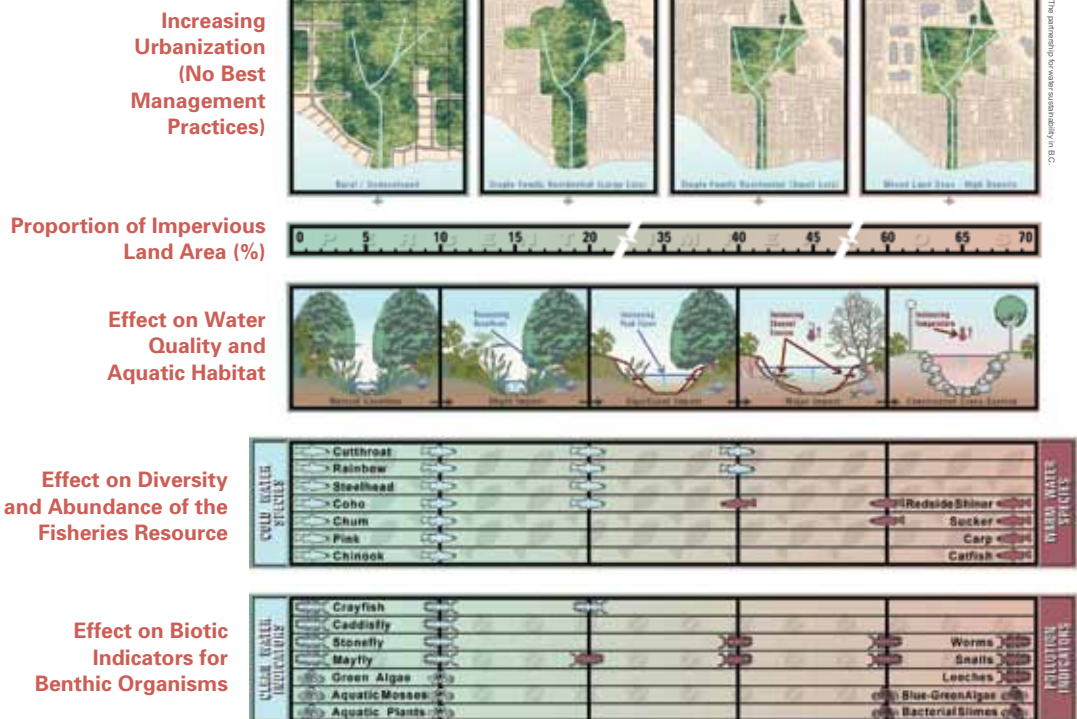
Alternative Visions for the Long-Term Environmental Health of Stream Corridors: Conceptual Framework for Selection of Master Drainage Plan (MDP) Level

This figure demonstrates how to apply figures 1 and 2 as a management tool for decision-making. It illustrates the consequences for stream corridor ecology as a function of the choice of MDP level.



Impact of Increasing Urbanization on Stream Corridor Ecology (Without Best Management Practices)

This figure demonstrates the impact of increasing impervious area on species diversity. Although it is based on research findings for lowland streams in the Puget Sound region of Washington State, the figure is intended for conceptual purposes only.



the whole and its many additional variables,” stated Richard Horner, now a professor emeritus at the University of Washington. “We [...] investigated whole systems in place, tying together measures of the landscape, stream habitat, and aquatic life.”

Mimic the natural water balance

“Unless and until land development practices mimic the natural water balance, communities cannot expect to restore the biological communities

within streams. Simply put, hydrology hits first and hardest—one could pour an equivalent volume of distilled water into a stream, and the consequences for stream health would be the same as if it was urban runoff.”

“When the goal of land servicing practices is pre-settlement hydrology however, this reduces the quantity of urban runoff discharged into a stream. It also improves the quality of the remainder of that which is discharged. In short, mimicking the natural water balance has a dual benefit,” emphasized Horner.

“The key to the “whole systems approach” is understanding how rainfall reaches a stream via three flow paths in a watershed—surface runoff, lateral interflow in shallow soils, and deep groundwater. Unlock that key and we can successfully implement appropriate measures to mimic the natural water balance,” said Chris May, now the division directors of Kitsap County public works in Washington State.

“We have applied this whole systems concept to develop our strategy for watershed retrofit and rehabilitation.



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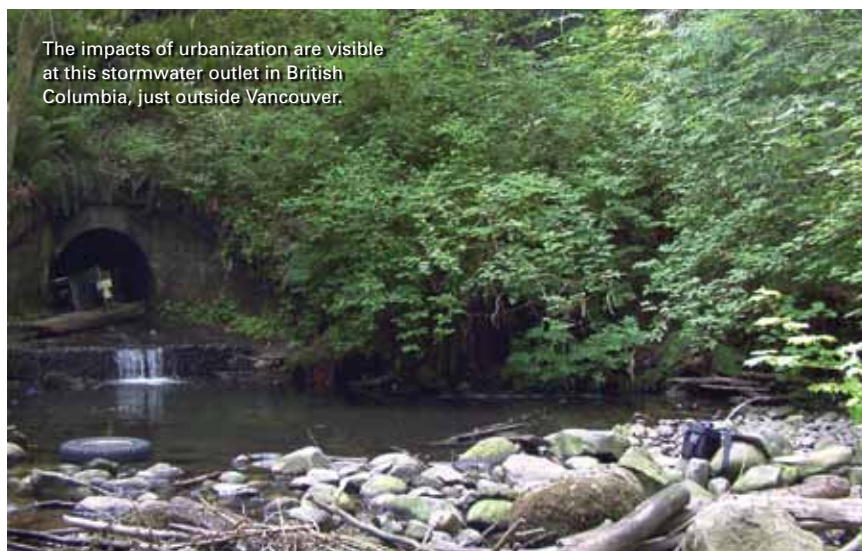
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Credit: Kim Stephens



The impacts of urbanization are visible at this stormwater outlet in British Columbia, just outside Vancouver.

County may be 'holding the line' in areas where development is occurring," concluded May.

Whole system services

The water balance of a watershed needs to be protected and managed in the same way that engineered assets and the services they provide are managed. Failure to protect the hydrologic integrity of water balance pathways has financial, level-of-service, and life-cycle impacts, as well as implications for taxpayers.

A legacy of past community planning and infrastructure servicing practices is the water balance of urban watersheds is out of balance. Asset management is the lens for bringing land development and infrastructure servicing practice into line with science-based understanding. **wc**

[...] We know we need to work at multiple scales and multiple levels to improve conditions in our small stream watersheds—that's our strategy."

Patience plus time

"Now it is a matter of wait and see in

order to be able to show the positive effects of the retrofit program. Everyone wants instant gratification, but realizing the benefits takes time. It took 100 years to get here. It will take 100 years to turn the situation around. The initial signs are good. The monitoring shows that Kitsap

Kim Stephens is the executive director of Partnership for Water Sustainability in BC

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A GRIP on Solutions

Isle Utilities' new business model for risk reduction and innovation.

BY DAVID MARTIN

FOR MANY REASONS, town councils, plant operators, and regulators are nervous about making changes in the way they run their water treatment operation. Change can be scary, especially when hundreds or thousands of neighbours drink the water from their taps that you are responsible for.

Stephen Hawking once said, "intelligence is the ability to adapt to change." Change for change's sake is not very intelligent; and when changes are made based on limited information, they can even be dangerous. So, is it reasonable to ask a water operator to overhaul his parameter monitoring system, just so that somebody else can check the biochemical oxygen demand (BOD) levels on their phone? Yes, it is. And we should.

Smart solutions wanted

In June, I attended the Canadian Water Summit in Toronto. It was there that I

met a young engineer who has developed a remote monitoring system that is faster, smarter, cheaper, more flexible, and safer than what the majority of operators in Canada have in their plants. She built it with advanced sensors and lightning-fast, artificial intelligence-enabled processors. Her dynamic coding team tested the technology in Melbourne and Lausanne.

You might argue that Australia and Switzerland have different water, weather, regulations and needs than we have in Canada. But maybe it's possible that the problem Canadian municipalities face with BOD discharge levels has already been solved in a city more than 8,000 kilometres away—we just don't know about it yet.

Isle Utilities Global Research and Innovation Partnership (GRIP) is a program that virtually unites water companies to explore business and operational strategies in key areas such as asset management, water quality, intelligent networks, innovation processes, people, and culture. Built on

Through a variety of programs and services, we reduce barriers to the successful development and commercialization of products and solutions.

ten years of success with the Technology Approval Group (TAG) model on four continents—GRIP brings a new level of certainty to adopting innovative technologies, products, and services.

In the TAG program, pre-screened technologies are presented to utilities. In this way, Isle also supports technology developers in building a dialogue with their end-user market.

Enabling investment through risk and barrier reduction

Isle's team of engineers and scientists undertakes detailed technical due diligence, market intelligence services, market entry studies, and an evaluation of the value proposition of technology providers' business plans when approaching a new technology. Through a variety of programs and services, we reduce barriers to the successful development and commercialization of products and solutions based on four principles:

- Ensure innovation and development meet pre-identified needs within the industry;
- Accelerate deployment of novel innovative solutions so that the benefits can be rapidly realized by the industry and the supply chain remains committed to innovation;
- Optimize approval and certification spending through well-planned regulatory analysis;
- Attract external investment into the industry by de-risking potential investments through the demonstrable regulatory engagement of end-users.

By undertaking technical due diligence on behalf of multiple purchasers, Isle provides an additional support structure for potential investments, and the end-user engagement ensures an attractive and well-defined market that Isle can help companies to exploit. Working closely with our members and understanding their individual and collective regulatory regimes positions Isle very well to guide product companies toward the best choices when

it comes to certifications, approvals and environmental verification.

Municipalities that don't have the budget to attend events in Singapore and Abu Dhabi can still benefit from innovations that have been proven around the world. Utilities that struggle with pricing models for wastewater treatment services can get answers from colleagues around the globe in a professional forum.

Just as we have seen dramatic and effective change in the energy and power utilities sectors, we will be seeing significant innovations in the water utilities sector. Affordable, intelligent, and well-executed change is happening all around the world in energy and water systems and through international efforts like GRIP we can all stay risk adverse for safety. WC

David Martin is an associate with Isle Utilities.

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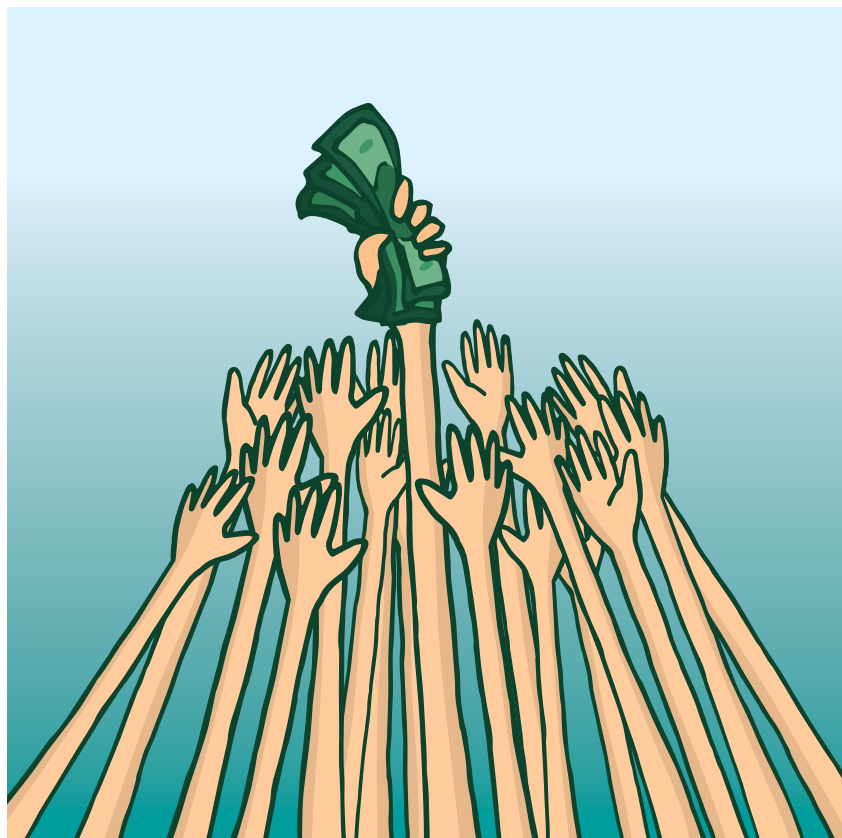
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A Hand Up

When infrastructure contributions come in, municipalities must come up with their share.

BY ROBERT HALLER

WE WERE ALL very pleased last fall—and I was outright excited—about the new federal government's focus on infrastructure renewal and its announcement of \$60 billion toward infrastructure in their first budget. Given the clear need for investment as supported by the Canadian Infrastructure Report Card, \$20 billion is earmarked for Green Infrastructure, primarily water and wastewater projects. And these funds are expected to leverage equal financial support from the provincial governments—something each of our provincial and regional associations are working on. But then we, as the municipal utilities, still have to come up with our portion, be it one-third, one-half, or more. This

shouldn't seem like an unreasonable expectation, but we all know that even finding the one-third contribution can be a huge challenge.

I will always start with the point I've been arguing for twenty years: that the distribution of taxes between our levels of government are out of whack and need a serious realignment. The Federation of Canadian Municipalities has identified this imbalance time and time again as we show that 60 per cent of the public infrastructure in Canada is municipally-owned, while municipalities receive less than 10 cents of every tax dollar collected. I have always argued that property services should be on the property tax bill, while all income

redistribution programs should be financed by income taxes. This would start to shift the balance. I don't know if our founding fathers fully understood back in 1867 that our cities and local communities would be the economic drivers in a global economy. But our system of collecting and allocating taxes must be re-thought to give appropriate taxation powers to the local level, while balancing reductions at the senior levels so as not to just add a greater tax burden on each citizen. This adjusts the tax collection to the appropriate levels, and gives the power to the local community to set its own priorities. There will still be many tools available for the federal and provincial governments to drive their own agendas and priorities when they feel they need to.

Well I got that off my chest... but I don't expect anything to change in taxation law any time soon. So in the meantime, we as municipal utilities rely on the water rates to finance current

operations, maintenance, and future replacement. Our shared goal is, and should be, to become self-sufficient operations that no longer depend on federal and provincial grants to be viable. This means developing full-cost budgeting that includes future replacement in the plans. This also translates into appropriate pricing models that recognize the value of water and inspire water conservation, but still makes water attainable by all and affordable to retain industry. That's an easy sentence to write and far harder to implement. I still argue with my colleagues about whether this must all be on the water bill, or if there is still a justification for property taxes to play a role.

Municipalities have been supported by provincial low-interest loan programs, and we await details on how any federal infrastructure bank might work. At the same time, we are seeing solid examples of

private-public-partnerships working for water/wastewater projects and we are even seeing them applied to smaller projects—a very promising sign. Hand-in-hand with the Liberal government's focus on infrastructure is their commitment to Canadian innovation. This will be a most-interesting part of the Phase 2 roll-out, to see how the federal government will promote and/or incentivize Canadian innovation. WC



Robert Haller is the executive director of the Canadian Water and Wastewater Association.



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Minister Sohi connects with a young professional after his closing keynote.

Credit: Susan Pickett/Water Canada

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APPOINTED



Hugo Blasutta

Montreal-based WSP Global has appointed **Hugo Blasutta** as a new president and CEO for WSP Canada. Blasutta was formerly the CEO for MMM Group, a Toronto-based company which WSP acquired last year. Blasutta helped MMM grow into one of Canada's largest privately owned engineering consulting companies, known for its work in planning and infrastructure design, transportation, and sustainability. A civil engineering graduate and post-graduate from the University of Toronto, he has more than 35 years' global experience in engineering. WSP, which now has 8,000 employees in 150 offices across Canada, also opened a new office in Hamilton, Ont. around the same time. As well, WSP Global entered an agreement with a U.S.-based company, Schlumberger, to acquire its industrial water consultancy business.



Jon Dogterom



Brenda Lucas



Mitchell Zamojc



Alicia Fraser

Ontario's Clean Water Agency is pleased to announce that **Jon Dogterom**, **Brenda Lucas**, and **Mitchell Zamojc** have been appointed to its board of directors. Dogterom leads Cleantech Venture Services at MaRS, assisting innovative Ontario-based companies in growing their businesses. Lucas is the executive director for the Southern Ontario Water Consortium (SOWC). Zamojc brings over 40 years of experience within the Ontario engineering industry to OCWA, including 25 years in senior management positions with the Regional Municipalities of Peel and Halton.

Members of OCWA's board of directors are appointed by the Lieutenant-Governor-in-Council. OCWA's Board is made up of qualified independent members and senior executives employed with the Ontario government. Together, the board has collective expertise in managing private sector and municipal corporations, including utilities, overseeing various levels of government, and advising on regulatory matters related to the environment and drinking water.

Earlier this year, OCWA welcomed **Alicia Fraser** to its executive management team as the VP of Engineering, Capital and Support Services. Prior to joining OCWA, Fraser held progressively senior roles with the City of Toronto and in the engineering and construction services industry, where she spent the past 10 years as a consulting engineer, designing and project managing water and wastewater plants throughout Ontario. In her new role, Fraser will guide the team providing technical expertise and capital solutions support to OCWA's operations so that they can deliver total solutions to its clients.

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AWARDED

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(L-R) Parliamentary Secretary Adam Vaughan, AMO president, Lynn Dollin and City of Cambridge councillor Donna Reid.

The City of Cambridge has won an Association of Municipalities of Ontario (AMO) Gas Tax Award. **Lynn Dollin**, AMO president, presented the award to **Donna Reid**, a municipal councillor at the City of Cambridge. The AMO Gas Tax Awards honour municipalities that have demonstrated excellence in the use of the federal Gas Tax Fund. Winning projects improve local quality of life by making a difference in our communities, while achieving the Fund's objectives.

Reid said, "Asset management planning allows us to continually offer city services with minimal interpretations. By leveraging modern technologies such as CCTV, we can also monitor assets below the ground to plan for future generations."

Cambridge invested \$461,965 from the federal Gas Tax Fund into CCTV inspection of storm sewers. The inspection allows staff to identify problems that need attention now and provide more information about the sewer's remaining service life. The City is using this information to plan for the future, including determining what infrastructure needs to be replaced and what type of preventive maintenance programs should be put in place.



More news items
can be found at
[watercanada.net/
topics/news](http://watercanada.net/topics/news)

ANNOUNCEMENT FROM WATER CANADA



Many friends in the water sector have come to know Water Canada's **Lee Scarlett**. Since 2008, Lee has been a proud champion of the magazine, attending hundreds of events and playing a crucial role in shaping the strong Water Canada brand.

For the last several years, Lee has been battling brain cancer and physical setbacks due to related strokes. Recently, Lee decided to step aside from his role as associate publisher to focus his energies on his health and family. He has asked that we share his new Twitter profile @AmbassadorWater for those who want to stay connected over social media. "I plan to stay engaged with the water industry in Canada, so please keep in touch," he said.

In the future, please contact Elena Langlois for advertising and marketing (416-444-5842 ext.151, elena@actualmedia.ca). Nick Reid and Todd Latham will also support the team. Yes, it will take at least three of us to do Lee's job. —Staff

EVENTS



L-R: Oliver Schraa, inCTRL Solutions Inc., Younggy Kim, McMaster University, Youngseck Hong, General Electric, Peter Gallant, WaterTAP; opposite, Rob Andrews, OCWA.

Getting to Net Zero Workshop London, ON

On March 22, 2016, the Southern Ontario Water Consortium (SOWC) and the Ontario Clean Water Agency (OCWA) jointly hosted a workshop in London, Ont. entitled "Getting to Net Zero." Bringing together water companies, researchers, regulators, as well as various levels of government, the event focused on identifying actions or changes that would facilitate the transformation of wastewater treatment to water resource recovery by improving the uptake of innovative approaches and technologies.

Workshops participants identified a number of measures that would assist in putting Ontario on a path to net zero, including the need to change perceptions of wastewater as a waste rather than a resource; for a comprehensive study in Canada on the whole concept of net zero and use a holistic approach to evaluate it, and the benefits that could be reaped with a change in regulations to ban or limit organics to landfill site. Notes from this event are available on the SOWC website at bit.ly/NetZeroSOWC.



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The Singapore International Water Week (SIWW) Singapore

The Singapore International Water Week (SIWW) is the global platform to share and co-create innovative water solutions. The biennial event gathers stakeholders from the global water industry to share best practices, showcase the latest technologies, and tap business opportunities. This year's event drew more than 21,000 participants from all over the world and \$14.6 billion in total value of business deals announced. This year, the Canadian government hosted a booth for companies to showcase their solutions to international delegates, as well as a reception that attracted high-level leaders from the sector and introduced them to the next wave of leading technologies



WaterTAP's Jon Grant (centre) flanked by Lee Kuan Yew Water Prize winners Andrew Benedek (left) and John Cherry (right).



SIWW delegates closed off the week with a banquet on the grounds of the world's largest greenhouse . (Flower Dome)

Credit: WaterTap

from Canada. Approximately 30 Canadian companies and organizations participated, including Ontario's WaterTAP, Echologics Engineering, Filtrum Construction, LuminUltra Technologies, Newterra, Pure Technologies, and the University of Waterloo.

Jon Grant, the manager of research for WaterTAP, who attended said, "Canada had an impressive presence at Singapore International Water Week. In its short history, two Canadians—**Andrew Benedek** and **John Cherry**—have received the event's prestigious Lee Kuan Yew Water Prize, and Singapore has adopted some of our country's most game-changing technologies."

Mark Nicol, Echologics regional director, Asia said, "The exposure in Singapore was great, as we had a lot of interest in our Smart Water City solutions for distribution and transmission main networks. Our clients in the region have had great success with our IoT based leak detection solutions and we leveraged this event to launch our ePulse Pipeline Condition Assessment technology to the Asian market." Nicol added, "Canadian companies are well-known for developing leading technologies, and it's important to demonstrate that at events such as SIWW." SIWW is part of the strategic program of the Singapore Government to grow the water industry and develop water technologies.

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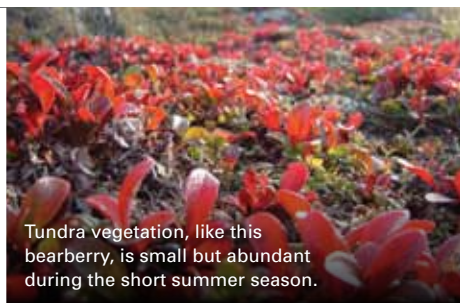
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The Diavik mine's infrastructure includes accommodations and maintenance complexes, power, water treatment, and process plants, and fuel storage. The current mine plan is expected to take the mine's production to 2023.

Cut Lacking Clarity



Tundra vegetation, like this bearberry, is small but abundant during the short summer season.



The Diavik mine is located on an island in the middle of Lac de Gras. A winter road built primarily on frozen lakes, stretches 375-km north from Yellowknife.

Has diamond mining undercut co-management of water in the Mackenzie Valley?

BY KEVIN O'REILLY

WATER MANAGEMENT in the Mackenzie Valley region of the Northwest Territories is done differently than elsewhere in Canada. Based on constitutionally entrenched land rights agreements, there is a public co-management system where Aboriginal and public governments nominate or appoint members to sit on boards to regulate water. The boards hold public hearings, set terms and conditions for the use of water and deposition of waste. The boards have worked very hard over more than 15 years to improve consistency and provide clearer guidance on their processes. There are few industrial water users, mostly related to mining, and some municipal operations.

Water management in the NWT underwent a very significant change as of April 1, 2014 when the Government of the Northwest Territories (GNWT) was delegated authority over inland waters from the federal government. Devolution over resources had been discussed and negotiated over more than 25 years. NWT residents wanted more control over decisions, but to what end? The current and NWT premier of the day, Bob McLeod promised that we would "devolve and then evolve" our resource management systems inherited from Ottawa.

Aboriginal governments and observers have raised serious concerns about

a recent GNWT decision on a water licence amendment by a diamond mining company. The board held a public hearing, took in evidence from a broad range of parties and came up with a reasoned decision. It set effluent levels from dredging in a manner that was protective in the short and long-term for aquatic life. The effluent levels were tougher in some ways than the original licence and the company request. The GNWT Minister of Environment and Natural Resources received the amended licence and had the authority to sign off on it, or send it back for reconsideration.

In this case, the minister made an almost unprecedented decision to send the licence amendment back for reconsideration. The company wrote to the minister twice after the public hearing claiming that the process was unfair. After receiving the second letter from the company, the minister wrote back stating that he could not accept any further representations due to procedural fairness. By sheer coincidence, the minister sent the licence amendment back to the board for reconsideration on the same day, due to procedural concerns. The direction for reconsideration caused an enormous amount of confusion, stress and work on the part of many participants. Recently, the company

withdrew its amendment request when it realized that the reconsideration process would stretch out until the completion of the construction season. The company did not offer any new evidence to dispute the licence amendment.

Why did the minister not write the company after the first letter and say no further representations could be considered? Why did the minister not tell the company, that the proper avenue for questioning procedural fairness is to seek judicial review? Some would say GNWT has shown its cards by siding with the mining company rather than the protection of the environment and thrown the integrity of the evidence-based co-management system into doubt. This is a very dangerous precedent in a place where many rights and interests are finely balanced, and where we still have an opportunity to get it right when it comes to water management. This is not why NWT residents fought hard for land rights, co-management and devolution. We have much higher expectations for our political leadership and will need to work very hard to restore public confidence. *wc*

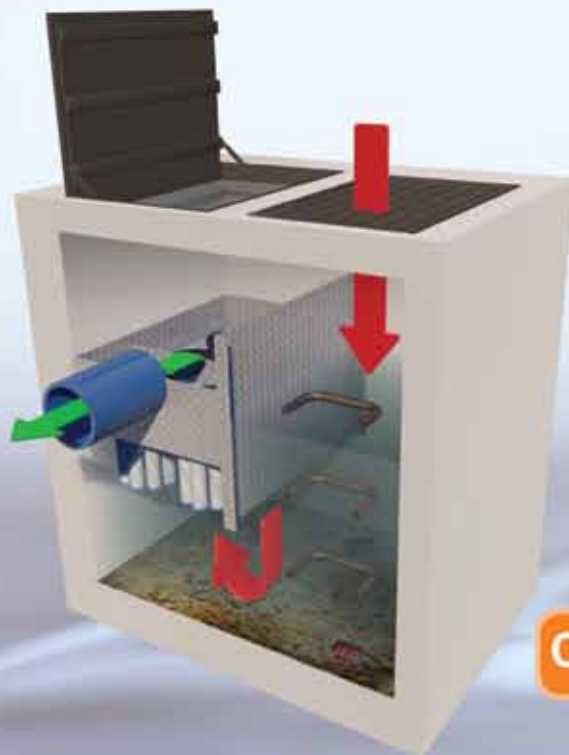
Kevin O'Reilly is a member of the Legislative Assembly for Frame Lake in the Northwest Territories.

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