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A National Water Policy

BY ANDREW MACKLIN

BY THE TIME you read this editorial, our country will be just a few weeks away from determining who will rise to power and take control of our federal government.

There are few certainties during the campaign period, but I don't think I would be out of line to suggest that a subject of national importance will fail to grab headlines during the course of the campaign; the need for a national water policy.

It isn't a new subject. Go to any of the provincial or national water conferences and you are bound to hear podium remarks that include a note about this. They might mention that we are the only country in the OECD that doesn't have a policy in place. Or they might mention that people have spent years calling for a policy, but the request has fallen on deaf ears.

The water sector has traditionally failed in getting much, if any, press during election time. It's not a 'sexy' issue that is guaranteed to win votes depending what side of the issue you find yourself on. It is not an issue that divides the parties, as everyone obviously feels that clean drinking water is something we should all have <scoffs>. Should being the key word of that phrase, since the screams of the many still lacking safe drinking water seem to fall on the same deaf ears in Ottawa as discussions for a national water policy does.

If safe drinking water for all Canadians can't rise to national prominence during a federal

election, then of course the need for a national water policy won't either.

But we shouldn't be resigned to just sit on the sidelines while other industry sectors push their agendas to the forefront of the national dialogue. No, we should instead be looking for ways to breakthrough the thoughtless rhetoric and force a national conversation on how to utilize water in this country.

Before we set our sights on a national water policy, perhaps we need to first build collaboration between the many association and academic partners that are trying to push the water agenda forward. Doing so would unite, I am estimating, tens of thousands of voices from across the country, powerful enough numbers to get noticed by political parties in their attempts to sway votes. A push for a national water policy, one that outlines strict policies and practices for ensuring safe drinking water for all citizens, could provide a powerful platform for influencing political policy in the four years to follow.

I hate to say it, but it's time to get political. It's time for the sector to stand up with one voice and be heard. If we can't do that, or we are not prepared to do that, then we shouldn't be surprised when the next government ignores the call for greater funding for the sector and the creation of a national water policy. WC

Andrew Macklin is the managing editor of Water Canada.

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WaterCanada



DIMPLE ROY
Dimple is the director of water management for the International Institute for Sustainable Development. Pg. 10



ANDY BURNHAM
Andy Burnham is the vice president of financial services for Stantec. Pg. 12



CHANDRA SHARMA
Chandra is the director of community engagement and outreach at the Toronto and Region Conservation Authority Pg. 18

ABOUT THE COVER

As capital costs continue to escalate, asset owners need to become increasingly creative in funding new and rehabilitated infrastructure. Learn more on page 12.



USask Study Explains Impact of Forest Management on Water Resources

NEW RESEARCH by the University of Saskatchewan (USask) explained the impact of forest management on water resources. The study found that the amount of water that landscapes are able to retain is the crucial factor in predicting annual streamflow increases when trees are cut down.

“There is huge variability around the world in the impact of harvesting trees on water flow, which has perplexed water scientists for decades,” said Jeff McDonnell, co-author the study and associate director of the Global Institute for Water Security. “These findings could help inform sustainable forest practices, helping planners to more accurately predict the impact of logging and tree planting on natural water resources.”

The study, Global Analysis of Streamflow Response to Forest Management, examined why felling

trees has not increased the water yield in some areas as expected. In other regions, deforestation or thinning trees led to a greater annual increase in water in streams than predicted.

The team of hydrologists assembled data from past published studies that had been carried out on 502 research basins or watersheds looking at the effects of forest planting and removal on streamflow.

“The amount of water storage under foot has a large role in determining how a stream will respond to above-ground harvesting. More storage below ground means more annual flow in the stream when the trees are removed,” said lead author, Jaivime Evaristo from Utrecht University in the Netherlands.

The research was funded by the Natural Sciences and Engineering Research Council of Canada. *wc*

Coming up in the next issue:
NOVEMBER/DECEMBER

Canada's Great Lakes
Protecting Canada's Largest Water Assets

- Ecosystem Report Card
- Battling Invasive Species
- Transformative Technologies

PLUS: Columns, news and insights, hiring announcements, coverage of the biggest industry events, and more.

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Share your story about the Canadian water industry with Water Canada!

Email Managing Editor Andrew Macklin at andrew@actualmedia.ca



New Report on Water Management and Big Data Analytics

POLLUTION PROBE and the Council of the Great Lakes Region have released a new report on Water Management and Big Data Analytics.

“We are very pleased to be partnering with RBC on this innovative project”, said Christopher Hilken, chief executive officer of Pollution Probe. “This report showcases opportunities for an improved approach to watershed management and adaptive decision-making to help ensure that water in the Great Lakes basin is protected.”

The report examines the role of ‘Big Data’ and advanced computing to improve predictive decision-making for the Great Lakes watersheds, in relation to climate change, land use change, and other socio-economic trends affecting the lakes.

“Millions of points of data are being collected every minute about our environment, our economy, and

how people interact with their city and surrounding environment, from transportation to water use,” said Mark Fisher, president and chief executive officer of the Council of the Great Lakes Region. “By connecting this data and analyzing it at incredibly fast speeds using smart computing technology, we can generate profound insights about what is happening in our watersheds, now and in the future, that will help governments, businesses, and civil society make better decisions regarding economic development, land use, and protecting the environment.”

This report compiles the ideas shared by experts at a workshop convened by Pollution Probe and the Council of the Great Lakes Region that explored watershed management and protection efforts on the north shore of Lake Ontario. [wc](#)

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NEWS: Toronto Seeks Funding to Accelerate Don River and Central Waterfront Project. bit.ly/DonRiver



NEWS: Government of Canada Invests \$3.1 Million in Halifax’s Water and Sewer Services. bit.ly/WaterSewer



NEWS: 1.5 Billion Litres of Grey Water Likely Dumped Along B.C. Coast. bit.ly/BCGreyWater

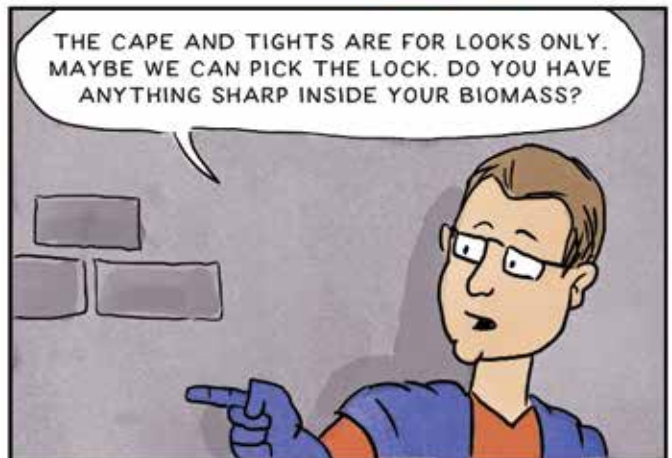


NEWS: Okanagan Water Board Renews Call for Stronger Invasive Mussel Regulations. bit.ly/MusselRegulations

THE ADVENTURES OF FATBERG



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Financing Resilience

Green infrastructure, like the floating wetland seen here, can provide significant environmental benefit with a minimal cost outlay.

How natural infrastructure can boost Canada's resilience to flooding.

BY DIMPLE ROY

WHETHER YOU CONSULT meteorological data or rely on others who are studying long-term trends, you will arrive at the same conclusion: due to the intensifying impacts of climate change, Canada is being subject to increasing incidents of natural disasters, including flooding.

And while the physical impacts of increased flooding on Canadian communities are clear, what is often forgotten is the economic fallout, especially the fact that insurance payouts for these disasters often depend on Canada's already burdened government coffers.

We need to mitigate the physical impacts of flooding if we want to reduce the financial burden and, of course, protect our communities and municipalities.

This is where natural infrastructure (NI) offers an exciting potential for harnessing the power of nature to mitigate nature's impacts.

What is natural infrastructure and why does it matter?

Natural infrastructure includes naturally occurring or naturalized areas or systems that are intentionally managed to provide

multiple benefits for the environment and human well-being. It differs from traditional "grey" infrastructure—such as pipes, dams, and factories—that is completely constructed by humans for a specific purpose. NI is distinct also from "green" infrastructure where any intervention, built or natural, counts if it provides an environmental outcome, such as in a built water treatment plant.

The 2016 Canadian Infrastructure Report Card highlighted that one-third of the country's municipal infrastructure is in "fair, poor, or very poor" condition, increasing the risk of service disruption. This widening infrastructure gap, the increased risk related to climate change, and a need to meet day to day services has led to a growth in the uptake of NI projects as a viable complement, or even an alternative, to grey infrastructure options.

For example, the Insurance Bureau of Canada, the Intact Centre on Climate Adaptation, and the International Institute for Sustainable Development recently reported that the damage caused by flooding across Canada could be significantly mitigated if more were

invested to retain, restore, enhance, and build NI, such as wetlands, water retention areas, and riverbeds.

How can municipalities harness the power of natural infrastructure to protect their communities?

While the potential benefits of NI for Canada's municipalities are clear, the execution requires two key processes for which currently two distinct funding paths exist: planning and implementation.

Planning involves the assessment of municipal needs, flood risks, and impacts; collaborative planning, conducting feasibility studies; benefit-cost analyses; business planning; and inventories of current natural assets.

Take, for example Canmore, Alberta. After its catastrophic floods in 2013, it opted to accelerate its resilience planning efforts and develop a climate change adaptation plan focused on mitigating risks from forest fires and floods. Its advice to other communities facing similar risks is to systematically

plan for risks such as flooding through collaboration and facilitated discussion.

The implementation stage then involves technical analyses, design, and engineering elements, and getting shovels in the ground to implement all that the planning stages have revealed.

Public sources of funding for natural infrastructure

The most prominent potential funding programs for NI is current government funds for infrastructure where a portion of funds have been allocated for green initiatives.

For example, the Investing in Canada Infrastructure program supports green infrastructure and has announced funding for water and wastewater treatment plants. The program also funds projects that support climate change mitigation; adaptation, resilience, and disaster mitigation; and environmental quality.

There is also the Disaster Mitigation and Adaptation Fund that supports natural infrastructure including projects of over \$2 million directed at the mitigation of and adaptation to the impacts of climate change.

These two programs primarily fund the implementation stage, as do provincial programs such as Manitoba's Conservation Trust.

There are other federal programs that contribute in various ways to the planning stage. Natural Resources Canada's BRACE program, for example, provides funds for communities as well as small and medium enterprises to adapt to climate impacts. Agriculture Canada's Canadian Agricultural Partnership supports NI on agricultural lands and Environment and Climate Change Canada's Climate Action Fund focuses on increased awareness and capacity for climate adaptation. There is also the First Nation Adapt program that focuses on assessments and responses for emergency management and floodplain mapping for communities at significant risk of flooding.

In addition to the federal programs mentioned above, the Federation of Canadian Municipalities supports both planning—such as for natural asset management, and implementation—focussed primarily on green infrastructure projects.



At Pelly's Lake in Manitoba, natural infrastructure has been restored around the lake to provide additional environmental benefits that help both the watershed and human health.

Looking further afield for funding opportunities

Socially responsible investing or socially conscious/ethical investing—which includes green bonds, sustainable bonds, and resilience bonds—can provide also emerging opportunities to support NI projects.

Green bonds are currently the most mature form of debt instruments used to finance projects with an environmental outcome. A bond allows a government or other entity to borrow money from investors and pay them back over time.

The Government of Ontario has successfully launched five green bond issues to date, totalling \$4 billion. The projects funded to date predominantly focus on clean transportation and energy efficiency. While green bonds are relatively new in Canada, their issuance is growing rapidly. Green bonds issued until now in Canada have focussed on green infrastructure and the model would need to be adapted to accommodate NI projects explicitly.

There are some international models that are promising. In the Netherlands, the government recently issued one of the largest green bonds ever (5.98 billion euros) including natural infrastructure for low carbon development and water management. This is while the New York Subway System and Amtrak issued their own catastrophe bonds (akin to health insurance) in response to Hurricane Sandy in 2013.

Looking towards the future

While there is no one perfect financing option, there is clearly growing momentum and innovation towards financing natural infrastructure projects. Ultimately Canada, along with the rest of the world, will need diverse sources of funding to ensure the long-term viability and sustainability of NI projects as part of the mainstream. And let's not forget the imperative to engage private and non-traditional players when it comes to funding these efforts. Cash-strapped governments cannot shoulder the financial responsibility alone.

Even so, we need to remember that planning and implementation of natural infrastructure for improved flood resilience are important and distinct steps. As we have seen, current programs are still focused on one or the other, with little effort to streamline and harmonize the transition to natural infrastructure towards improved resilience to natural disasters. Perhaps financing regional or watershed-based resilience including NI could be prioritized for flood-prone regions of Canada.

Nevertheless, current discourse suggests that while there is still much work to be done, the advancement of natural infrastructure as a viable means to address flood risks is on its way *WC*

Dimple Roy is the director of water management for the International Institute for Sustainable Development.



Water plants are not minor expenditures. Where possible, you should be trying to save the replacement cost of the facility on an annual basis.

Creativity in Affordability

Five things to keep in mind as you seek funding for capital projects. **BY ANDY BURNHAM**

LOCAL GOVERNMENTS, and the communities they serve, continue to face economic challenges. Water and sewer bills have gone up at 3x the rate of inflation since 2000, while the number of low-income households has continued to rise. The result: customers have less money and are more resistant to fee increases. At the same time, per capita water demand continues to fall, and yet utility infrastructure faces a critical need for reinvestment—in the billions of dollars. For some utilities and for some parts of their service areas—it's becoming an affordability crisis!

Here are five key considerations to help develop the most efficient and affordable funding strategies for upcoming capital project(s):

THINK ABOUT THE FAIREST WAY TO FUND/RECOVER THE COST OF THE IMPROVEMENT.

Specifically—who will be served and for how long? If it's a short-lived asset (like

some smaller pumps), you don't want to finance it over twenty to thirty years. You need to have adequate resources to pay for the project in cash. If it is a major investment, like a new wastewater treatment plant, you may want to consider debt and loan options to align the cost of debt retirement with the use of the project by future customers. Either way, the proper mechanism needs to align the useful life of the project with the generation(s) of customers that will pay for it. If it is a recurring annual need, consider cash versus financing; otherwise you will end up paying twice as much in annual principal and interest than if you set up an annual cash funding strategy.

BEGIN SETTING ASIDE MONEY NOW TO PAY FOR THE REPLACEMENT OF THE PROJECT IN THE FUTURE.

Let's say you construct a \$1 million facility in 2019, and its lifespan is estimated at ten years. Ideally, you should set aside money now to replace that asset in ten years. This is not the same as setting aside annual

depreciation. Depreciation often is not large enough to meet future costs. While funding of annual depreciation should be respected, we should recognize that the need is likely even more. Therefore, plan to start setting aside at least the annual depreciation of the improvement immediately and consider adjusting it for future inflation to sustainably pay for the asset's inevitable replacement.

DON'T FORGET ABOUT ANNUAL OPERATIONS AND MAINTENANCE COSTS.

You need to factor these expenses into future funding requirements, as well as project selection. A \$1 million asset that costs \$2 million per year to operate is more expensive in the long run than a \$2 million asset that costs only \$0.5 million per year to operate. For this example, if the two assets are operated for 20 years, they would have a simple lifecycle cost of



Regardless of what the project entails, it is vital to consider the cost of operations and maintenance when you budget for the capital expenditure.

\$41 million and \$12 million respectively. In other words, an upfront investment of \$1 million saved \$29 million over the life of the assets. You must understand what the annual and total lifespan of operation and maintenance costs are because these can easily outweigh initial capital costs and result in higher rates to customers.

MAKE SURE YOU LEAVE ADEQUATE FINANCIAL BUFFERS.

Don't deplete your reserves just to avoid the issuance of debt. Well-managed debt is a good tool for utilities. Similarly, if you're going to finance, make sure that it isn't such a high amount that you don't have any flexibility to withstand reasonable fluctuations in annual revenue and expenses, or have any capacity left for future borrowing. You need cash reserves and enough annual income streams to make sure you can still pay for the project if things don't occur as planned.

IT'S OK TO GET CREATIVE.

Look at alternative financing or funding sources such as new federal and provincial loan programs. Some municipal agencies are unfamiliar with and unsure of public private partnership (P3) projects.

P3 projects can be structured in many ways—they don't all have to involve the same elements. Consider performance bonds. Utilities can structure the bonds in a way that transfers risk. If the project doesn't perform as expected, the interest rate would be lower, and in return, if the project over-performs, you would pay a slightly higher interest rate and share some of the benefit with the lender. And yes, you will still own the asset.

After considering your funding mechanisms, it is time to think about integrating affordability into the financial planning, cost allocation, and rate setting process. A true understanding of affordability requires a more detailed interpretation and consideration of alternative measures—not just utility bills as a percentage of median household income.

Targeting areas with genuine affordability challenges can be achieved through census and billing data, the ratio of water and sewer costs to disposable household income, and/or the number of minimum wage workers. Integrating data from affordable housing and rental agencies can also provide a specific understanding of the water usage patterns. Are affordability problems occurring despite efficient use, or are they being exacerbated by water

losses behind the meter or through excessive consumption?

Have you considered attaching future rate increases to actual usage and incomes? It's important to understand how affordable your service is today, and in the future. When projected over time, how does it change for alternative financial plans? Using GIS, census, and billing data as part of the affordability analyses is a great way to visually show and communicate challenges. Managers need to know if their situation is stable, or if it is likely to get progressively worse, and if so, when.

Affordability doesn't have to be complicated. Be equitable, consider the future, think about your resources, and don't be afraid to be a little creative. Financial planning is a holistic process. The success of your utility is often judged on how well you avoid financial turmoil while still investing in your assets and delivering affordable, great service. **WC**

Andy Burnham is the vice president of financial services at Stantec.

Success for Startups



How to create an environment where water tech startups can succeed.

BY SIMRAN CHATTHA

CANADIAN WATER TECH STARTUPS have an opportunity to provide solutions for water and wastewater challenges around the world. To get to this stage, water tech startups need targeted programs and services to help overcome barriers that they might be facing when trying to get to the next step in their journey.

Water Canada recently had an opportunity to catch up with experts who are working with organizations from across Canada to help water tech startups grow and develop. The experts include:

- **Mike Dixon**, chief technology officer at WaterNEXT (Calgary, Alberta).
- **John Gillis**, president and chief executive officer at Innovation Cluster (Peterborough, Ontario).
- **Kieran Hanley**, executive director of the Newfoundland and Labrador

Environmental Industry Association (St. John's, Newfoundland and Labrador).

- **Jeanette Jackson**, chief executive officer of Foresight (Burnaby, British Columbia).
- **Josée Fortin**, executive director of Sherbrooke Innopole (Sherbrooke, Quebec).

These experts were asked questions about what programs and services their organization offers, as well as what type of feedback they have received from water tech startups about the services. Here are their responses.

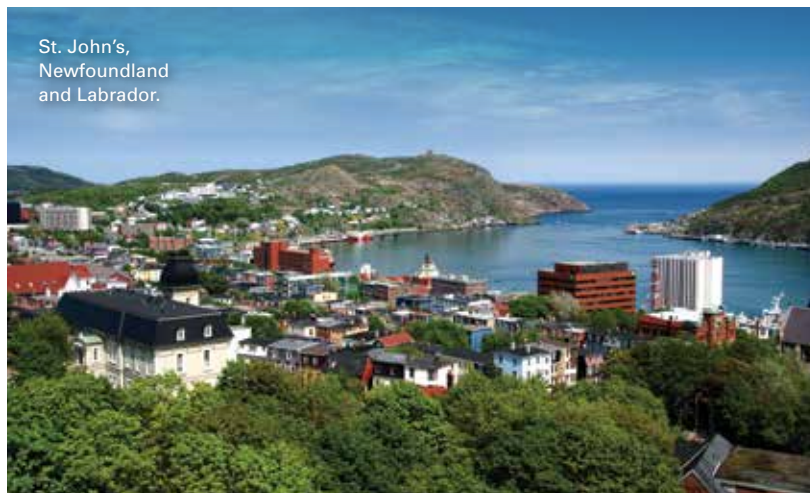
What programs and services do you offer to support water tech startups?

Mike Dixon: WaterNEXT offers a mentoring service that basically takes

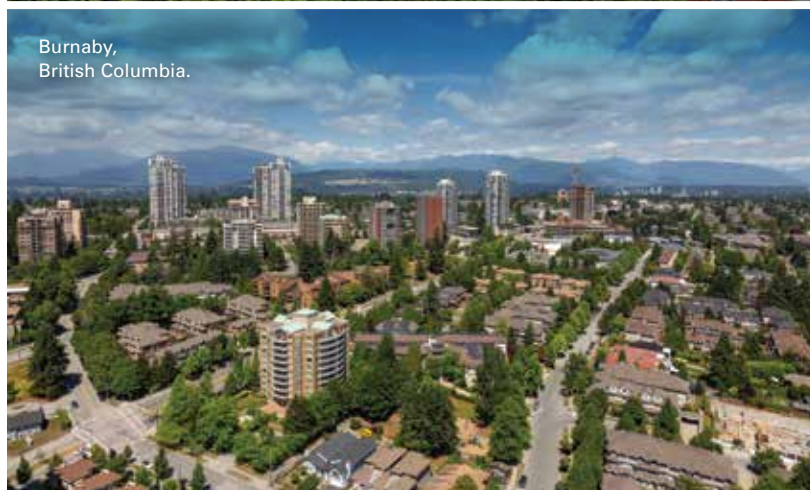
a water startup through how a venture capital investor or other investor might think about where a startup needs to be to put money behind them. Initially, we go through with each startup where they are at and we have a questionnaire built. They do a self-assessment and we chat with them to do our own assessment. Then we work on what things they need to improve to get them to the next level. So if they have funding, then how do we get them to the next level of funding. If they don't have funding, how do we get them into a position where they look attractive to go and get that funding. We also help them find the funding and introduce them to the right people. Most of that activity becomes introductions to customers and working through the technology to troubleshoot any issues that they have and also building on their



Aerial View of
Downtown Calgary.



St. John's,
Newfoundland
and Labrador.



Burnaby,
British Columbia.

business plan. Given that WaterNEXT is in its relatively early days, that's our core service. We're looking for funding ourselves so overtime we'll improve that service to include conferences and workshops where startups can meet other star-ups and talk to each other, who are all in the water space and start working more closely together to help each other on their programs as well.

John Gillis: The Innovation Cluster offers many programs and services for our startups. We just completed a \$60,000 investment in a H2O Maker Space, which houses portable water analytical equipment, which all our clients have free access to the equipment for lab testing. We have training and support on how to start up your business, which includes business planning [...] and financial forecasting.

Mentorship is very important to our startups, we try to ensure that the success

rate is drastically increased and that they can maintain employment in the Peterborough and Kawartha Lakes area. We are in the process now of opening a new office in the City of Kawartha Lakes - Lindsay, where the Centre for Advancement of Water and Wastewater Technologies (CAWT) is located, to help commercialize and support the startups coming from Fleming and the area. The Peterborough Region Angel Network (PRAN) is an integral part of the Innovation Cluster. They have provided not only seed capital to our startups, but also, some very valuable mentorship and advice.

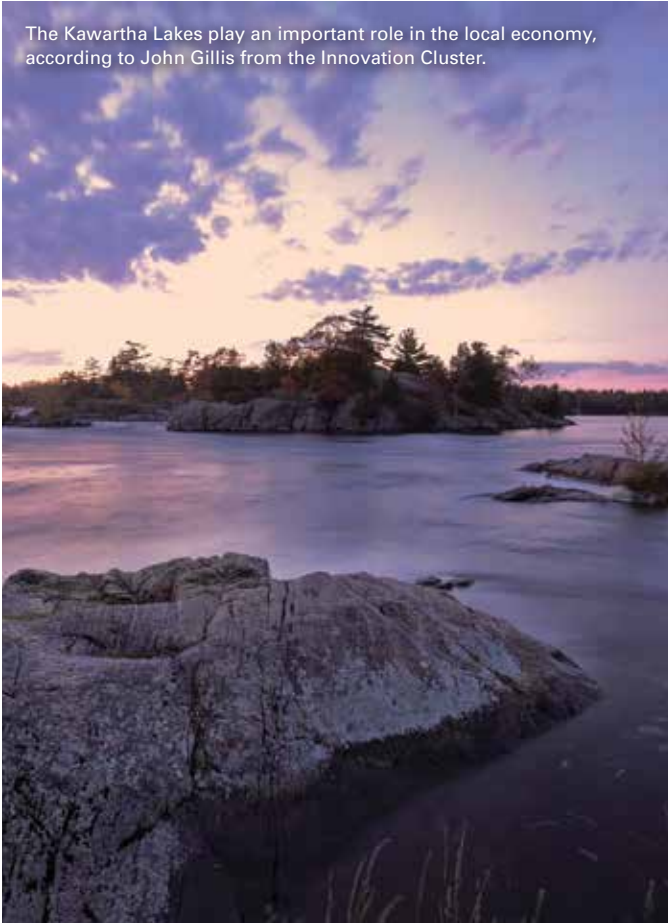
Kieran Hanley: The Newfoundland and Labrador Environmental Industry Association (NEIA) promotes the development of clean technology and the growth of the green economy in Newfoundland and Labrador, and this work includes supporting water tech

startups. In pursuit of these objectives, NEIA focuses its activities and initiatives in six areas to drive business growth, by providing:

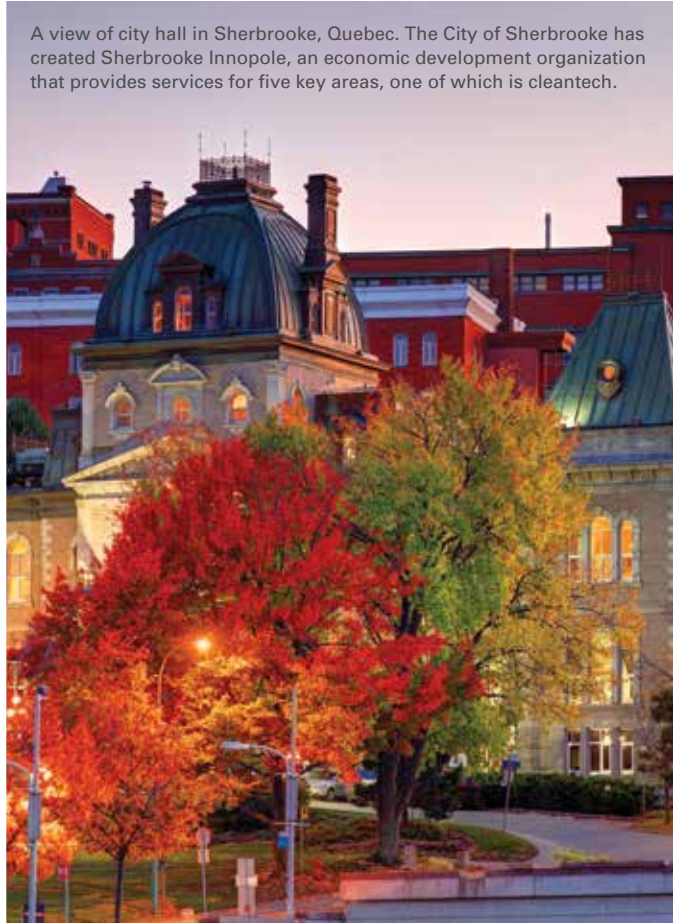
- 1 A support framework for entrepreneurs and startups.
- 2 Networks to help increase productivity and competitiveness.
- 3 Tools to encourage and foster innovation.
- 4 Export and international business development programming.
- 5 Training and professional development opportunities tailored to environmental sector employees.
- 6 Leadership on policy and advocacy issues.

We work very much at the firm-level to assist however we can in each of our members' growth, while providing targeted overarching services to clusters

The Kawartha Lakes play an important role in the local economy, according to John Gillis from the Innovation Cluster.



A view of city hall in Sherbrooke, Quebec. The City of Sherbrooke has created Sherbrooke Innopole, an economic development organization that provides services for five key areas, one of which is cleantech.



of firms that share an interest in either industrial or geographic markets. Strong partnerships with both provincial and federal governments have been very important in our efforts.

Jeanette Jackson: Foresight is uniquely positioned, being the longest serving accelerator in Western Canada that supports water tech companies. Here is a breakdown of our programs:

- 1 **Pre-Launch:** Early stage assessment on the team and value proposition of the startup (making sure the team understands the fundamentals).
- 2 **Launch:** Deep dive into business fundamentals and customer discovery plus executive mentorship with experienced cleantech executives (dynamic EiR model).
- 3 **Deliver:** New program that helps company chief technology officers determine optimal path forward through Technology Readiness Levels (move to commercialization faster).

- 4 **Grow:** Program designed to help fast moving companies scale faster (part programming, part project funding).
- 5 **Water Tech:** Annual program to sponsor 15 to 20 companies to WEFTEC accompanied by strategic introductions to industry players (three years running).

Josée Fortin: Sherbrooke Innopole offers unique and complete business assistance to startups. Our cluster managers are experts in their respective field (cleantech being one of five clusters), working closely with companies. We have also put in place a network of highly successful coaches to better align and support startups, increasing their success rate. We match startup companies with potential clients, worldwide partners, etc. Sherbrooke Innopole also offers several types of financial tools and assistance at all business phases, be it at the development phase and/or expansion stage.

What feedback have you received from water tech startups that has enabled you to improve the services you offer?

Mike Dixon: A lot of startups wanted more than just introductions. They wanted almost another team member working with them. They really like advisors, which is great, but they felt they wanted a more detailed service from WaterNEXT. Not just someone question and answer style like a mentoring relationship becomes but more like “hey, can you get embedded in this problem with us?” In most cases, we have been embedding ourselves in a market analysis kind of role, working with the startups to define what their target market is now, how can we look at additional markets for them, or whether the current market they are in is the right fit for them. This could include going away and talking to people in the industry and coming back to report on what might be better areas to go into. Or letting them

know that they got it right and then helping them by providing that data for them so that they can then take that to a grant funding agency or to a venture capitalist.

John Gillis: The H2O Maker Space is a perfect example of the Innovation Cluster listening to our startups. Since capital/cash is so important to start and run a business, the Innovation Cluster was able to purchase some very expensive equipment, which a startup would normally not be able to afford. With this equipment they will be able to do onsite, portable water analysis, with immediate results, allowing them to do modifications, while still onsite, saving hundreds of hours of time.

Kieran Hanley: Our members indicate that they get particular value from NEIA when we are able to help them navigate the support ecosystem. There are many programs to support business growth, and firms can spend considerable time trying to understand what fits best for

them at what point in their evolution. We try to take the guess work out of this and save them some effort by outlining a program trajectory for them, or even organizing a meeting between them and a number of support agencies at the same time to discuss where all of the pieces of the puzzle fit. NEIA's job is to understand the available programming and make the introductions at the opportune time. But what is the highest demand we get from companies? Networking. Magical things can happen when two or more businesses start talking, and as an industry association we play a role in helping make these things happen.

Jeanette Jackson: Like cleantech in general, many water tech companies need the right about of financing to commercialize and scale. Foresight also takes a more aggressive approach to ensuring the team and business model have the highest

chance for success—at all stages of the startup lifecycle.

Josée Fortin: Over the years, we observed that there was a lack in seed and pre-seed funding for startups crossing the chasm and looking for risk-loving investors. This enticed us to create two new investment funds, completing the entire financing chain. Sherbrooke Innopole is one of the few organizations in economic development offering equity financing. It is often cited as a reference amongst regional economic development agencies, offering varied types of services and tools. Companies are often convincing their partners to establish themselves in the Sherbrooke region. WC



Simran Chattha is the associate editor of Water Canada.

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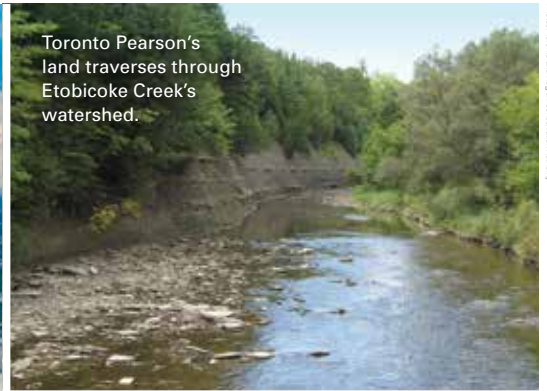


Hosts:






An aerial view of Pearson airport.



Toronto Pearson's land traverses through Etobicoke Creek's watershed.



The mouth of the Mimico Creek.

Conservation Authorities

A much needed model in today's climate. BY CHANDRA SHARMA

ON AUGUST 8, 2019, the Intergovernmental Panel on Climate Change (IPCC) published its special report on climate change and land. The report warns of “unprecedented” rates of land and freshwater degradation in recent decades due to rising temperatures. The various climate models used to develop the report are in general agreement that annual average air temperatures in Ontario may rise by two to five degrees Celsius by the end of the century. This will lead to changes in evaporation rates, severity of storms, and droughts resulting in significant alterations within the natural ecosystem of our watersheds. These changes may impact everything from species diversity to habitat health to human communities.

As a result of these changes and impacts, decades of floodplain management work, the adaptive watershed management approach, and the local expertise of conservation authorities (CA) in Ontario is being put to test. Conservation authorities are tasked

with the administration of watershed management programs such as:

- The collection, analysis, and modelling of local climate and water data.
- Flood and erosion management.
- Source water protection.
- Stormwater management (including natural green infrastructure and low impact development).

In many cases, this work has resulted in unique grassroots approaches to building resiliency of Ontario's rivers, lakes, and greenspaces.

The role of conservation authorities in Ontario

Approximately 95 per cent of Ontario's population, that's about 13 million people, lives in a watershed managed by one of 36 CAs.

CAs play an important role in determining how land in these watersheds is developed and used since they are a public commenting body under

the *Planning Act* and *Environmental Assessment Act*. They also issue permits under the *Conservation Authorities Act* to ensure that natural heritage will not be negatively impacted by development. In addition to this, CAs regulate flood plains to protect people and property from hazards including flooding. This critical role is strengthened by the fact that CAs own and manage approximately \$3.8 billion worth of flood control and prevention infrastructure, including 900 flood and erosion control structures (e.g., dams, dikes, channels, etc.).

This model of informing land use and infrastructure planning in Ontario is unique in that it is supported financially by public agencies. The model is also supported from a governance perspective since it is grounded in legislation including the *Planning Act* and its regulations, the *Conservation Authorities Act*, and parent class environmental assessments under the *Environmental Assessment Act*.

Another factor that contributes to

the success of the watershed planning model is the power of CAs to leverage government, agency, private sector, and community stakeholders. This collaboration is an absolute must to address the emerging environmental issues, such as urbanization and climate change, of our generation.

So how did we get here?

The success of Ontario's CAs can be traced back to the 1941 Guelph Conference where local conservation visionaries met to address natural resource conservation challenges of the day. At the time, soil loss, erosion, sedimentation, and flooding were associated with unsustainable agricultural and forestry practices and unrestricted floodplain development. This grassroots movement called for agencies that could have a coordinating and integrating role to promote conservation with the objective of formulating a unified program for the rehabilitation and wise use of all our renewable natural resources.

This conference and evolving government recommendations led to the passing of the *Conservation Authorities Act* in 1946. Hurricane Hazel led to further enhancement of the regulatory responsibilities of CAs. As CAs evolved over the decades, the adaptive (watershed) management approach served them well and enabled them to evolve in order to meet the needs of Ontario's environmental and land use challenges.

Watershed-based planning enables collaborative decision-making involving all levels of government and community. The benefits provided by CA watershed management programs have been successfully leveraged across the province to achieve many federal and provincial policy objectives around water management, climate change, the Great Lakes, protection of biodiversity, source water protection, sustainable agriculture, and urban growth.

How conservation authorities are dealing with land use and climate change

Increasing urbanization combined with extreme weather presents its own unique challenges and opportunities

for conservation authorities, such as the Toronto and Region Conservation Authority (TRCA), that are managing watersheds in the urban areas. A key challenge of the future is to protect and restore the natural resources and protect communities with aging infrastructure while trying to sustainably accommodate growth and prosperity.

While these challenges exist, there are signs that new, transformative solutions are being used at the local scale, including:

- Protecting and restoring water resources and biodiversity in a landscape that is subject to development and redevelopment pressures.
- Community design that integrates land use, built form, transportation, energy, and green infrastructure systems including flood protection measures.
- Achieving food security through sustainable local agriculture (land use, built form, and transportation).

Over the past two decades, innovative programs and partnership opportunities have emerged to integrate climate change, sustainability, and the green economy into activities that will increase biodiversity while providing good protection and recreation opportunities. These initiatives augment watershed programs and help prepare for the next generation of CA activities.

An example of this is a project that is currently underway at the mouth of the Don River with support from all levels of government and agencies. The project aims to remove the risk of flooding to over 240 hectares of urban land by engineering the river's course and creating naturalized features at the mouth of the Don River. This transformative project is a direct manifestation of the recognition by federal, provincial, and municipal partners that sustainable, resilient watersheds are catalysts in urban growth and redevelopment.

In addition to several flood mitigation projects similar to Don mouth naturalization, urban CAs have also launched several market transformation programs such as Partners in Project Green: A Pearson Eco-business Zone

(PPG), the Sustainable Technologies Evaluation Program (STEP), Sustainable Neighbourhood Retrofits (SNAP), and the Ontario Climate Consortium (OCC). Designed to address climate change and urbanization issues at different geographical scales and sectors, these programs deliver multiple objectives to achieve watershed sustainability.

Partners in Project Green: A Pearson Eco-Business Zone

Toronto Pearson, the largest landholder within the most urbanized watersheds of TRCA's jurisdiction, is surrounded by approximately 12,000 hectares of industrial, commercial, and institutional (ICI) lands.

TRCA's partnership with Toronto Pearson began with a mutual understanding and a drive to restore, protect, and enhance the Etobicoke Creek and Mimico Creek watersheds traversing through Toronto Pearson's lands. Soon, both entities realized that although they had improved Toronto Pearson's watershed, it would make little difference if those upstream and downstream didn't invest in similar improvements.

In 2007, Toronto Pearson made a commitment to work with local businesses in transforming the lands surrounding Toronto Pearson into an internationally recognized eco-business zone. To turn this vision into reality, Toronto Pearson worked with TRCA, the Region of Peel, City of Toronto, City of Mississauga, and City of Brampton to develop a program called Partners in Project Green: A Pearson Eco-Business Zone (PPG).

The program's jurisdiction covers an area that includes 12,500 companies that employ over 350,000 people. It works directly with companies to find efficiencies in water and energy use, as well as waste management.

Using a peer-to-peer learning model, collective projects, and on-site demonstrations/adoption of technologies, PPG is building a community of sustainability leaders. Calstone Inc. is one of these leaders that extended its commitment to sustainability by installing innovative low impact development (LID) stormwater management infrastructure on its property.

A view of the Don Watershed.



PPG helped the company create a new greenspace surrounding its office, which is located in the Highland Creek watershed, for employees by renovating an underutilized space setting. The new greenspace incorporates a stormwater management system that's designed to capture 100 per cent of the rainwater from Calstone's 3,900 square metre roof. This diverts approximately 0.8 million litres of rainwater annually from the municipal storm sewer and helps maintain a more natural water flow to Highland Creek.

Sustainable Technologies Evaluation Program (STEP)

The Sustainable Technologies Evaluation Program (STEP) is a multi-agency initiative developed to support broader implementation of sustainable technologies and practices within a Canadian context. Managed in partnership with TRCA, Credit Valley Conservation, and Lake Simcoe Region Conservation Authority, STEP WATER focuses on green infrastructure and LID, erosion and sediment control, healthy soils, preservation of natural features, and road salt management.

An Archetype House (bit.ly/ArchetypeSustainableHouse) located at the Kortright Centre in Vaughan was designed to educate and motivate the public and building industry professionals to move beyond these obstacles and to adopt greener building practices. The site includes LID

features such as rainwater harvesting, downspout disconnection, permeable pavement, bioretention, and a green roof.

Since its inception, this initiative has actively engaged the industry in some of leading edge technology transformation projects including:

Evaluation of Permeable Pavements:

STEP first evaluated permeable pavements in 2005 at Seneca College's King campus by examining soil and water quality, year-round stormwater management performance, and the effects of infiltration on groundwater quality. In 2008, a second Living Lab was constructed at the Kortright Centre for Conservation in Vaughan, Ontario. This long-term project evaluated and compared different permeable pavements relative to a conventional asphalt surface. Research topics included performance on tight soils, winter effectiveness, changes in infiltration capacity over time, long term performance, and the effectiveness of pavement cleaning techniques.

Bioretention Studies:

STEP has conducted several bioretention studies involving both new and retrofit installations to evaluate both proprietary and generic types. Key research topics to date have included pollutant removal and runoff reduction capacity, winter performance, road salt impacts, durability, maintenance needs, long term performance, cost-effectiveness, and phosphorus removal techniques.

LID Treatment Trains: With the widespread implementation of LID stormwater management practices, more sites are being designed to include LID treatment trains (TT). The TT approach involves the application of lot level, conveyance, and end-of pipe practices, often in series. TTs help maximize a site's capacity to achieve LID water management objectives, including maintaining the hydrologic cycle, protecting water quality, and preventing erosion and flooding. STEP is currently carrying out a monitoring evaluation of a multi-LID site—Mosaik Homes Glenway Subdivision in Newmarket - to assess the individual and combined effectiveness of the LIDs and their financial and technical feasibility from a construction and maintenance perspective. The project is one of the first in Ontario to demonstrate and evaluate widespread application of LID on the scale of a medium density residential subdivision.

The importance of CAs in today's climate

Much like the original natural resource management challenges CAs were formed to help solve, many aspects of future climate change and sustainability challenges need to be addressed locally but at scales that often transcend municipal boundaries. Ontario's CAs are well positioned to serve Ontario well in this regard. The importance of a governance structure that facilitates an integrated approach in dealing with climate change is emphasized in the IPCC's various assessment reports. This well-established model of bridging federal and provincial interest with municipalities objectives and local action presents an excellent approach to help address future challenges in Ontario and across Canada. **wc**

Thanks to Conservation Ontario and John MacKenzie, chief executive officer of the Toronto and Region Conservation Authority, for their contributions to this article.

Chandra Sharma is the director of community engagement and outreach at the Toronto and Region Conservation Authority (TRCA).

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The current wastewater lagoon system being used by Lloydminster, one of the major components to be replaced as part of the new project.

Inset: Mayor Gerald Aalbers of the City of Lloydminster.



alexander/istockphoto.com

One City, Two Provinces

Lloydminster project demands cooperation. **BY SAUL CHERNOS**

WHEN YOUR MUNICIPALITY STRADDLES a provincial border, as the City of Lloydminster does with Alberta and Saskatchewan, building a new wastewater treatment plant is no simple undertaking.

The community's unusual bi-provincial status requires cooperation on many fronts. Lloydminster Hospital, located on the Saskatchewan side, serves everyone through an interprovincial agreement. A series of special provisions exempts the Saskatchewan side from provincial sales taxes to create a level playing field with Alberta, which has no such tax. And, while Lloydminster is incorporated by both provinces as a single city with a single municipal administration, each side falls within its own provincial riding.

Residents rely on replica survey pins from the 1800s and a simple line down a sidewalk to mark the dividing line because no natural north-south markers exist. The North Saskatchewan River flows nearby but in an easterly direction, itself crossing

the border. So, when officials designed the city's plumbing networks decades ago, they placed intakes from the river in Alberta and treatment and outflows in Saskatchewan, carefully ensuring each facility met the required specifications of its provincial host.

Fast forward to 2016, when the federal government notified the city that its 32-year-old lagoon-based wastewater treatment plant needed amending in order improve the quality of effluent and meet evolving climate change adaptation standards. City politicians set their sights on a new mechanical system and braced themselves for yet another round of complicated multi-jurisdictional negotiations.

Under the lagoon system, which will remain in place until its replacement is completed on an adjoining city-owned

site, effluent travels through a series of three lagoon before its discharge into the North Saskatchewan. Cold-water nitrification and full aeration features, added over time to enhance bacterial activity, weren't enough to stave off the need for an eventual overhaul, and Mayor Gerald Aalbers says a doubling of the

Shovels will basically hit the ground by the spring of 2021 unless something miraculous happens...

population over the last three decades to roughly 31,500 and further plans for growth hasten the need for change.

Aalbers wasn't yet on council when politicians considered public-private partnership funding and initiated a series of grant applications to the three upper-tier governments. But he says P2 and P3 models didn't sit well with local

residents. “We would have given up our infrastructure as collateral to another company to operate and would never see owning it ourselves,” he explains. “People felt it was important to have direct control.”

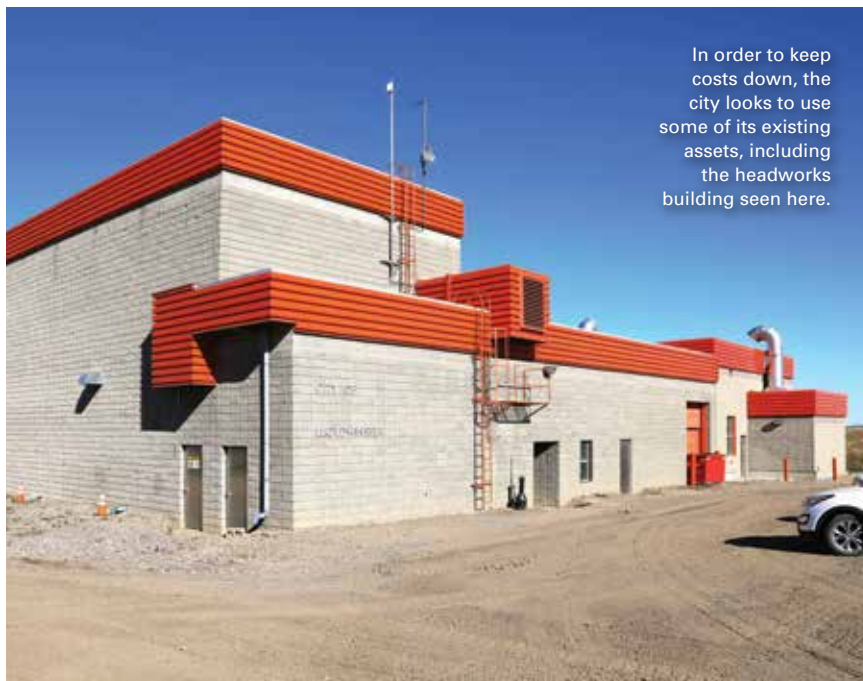
Following a municipal election in 2016, a newly elected Aalbers and his team settled on a municipally owned project. With a \$81.5 million preliminary budget, the federal government stands to contribute \$24.2 million through matching infrastructure grant programs that have Alberta and Saskatchewan providing \$12.7 million and \$12.1 million respectively. That will leave the city covering the remaining \$32.5 million.

“We’ll have to borrow money against this eventually, though we don’t know how much yet,” Aalbers says. “That will depend on the final tab for the project. But we have the authority in place to do that so we can move forward.”

Reaching this point wasn’t easy given the multiple jurisdictions involved. With the Conservatives replacing the NDP in Alberta earlier this year, the city has effectively had to work with two governments in that province. “We ended up having two ministers of municipal affairs in Alberta and three in Saskatchewan over a three-year time frame,” Aalbers says, describing considerable back and forth to bring all parties on board. “I’ve lost track of how many trips I’ve made to Regina and Edmonton.”

While pursuing provincial commitments, the city also had to respond to the Canadian Department of Environment and Climate Change directive to have the new plant operational by 2020. The conundrum, Aalbers explains, is governments insist money can’t be spent without project and financial approval. “Our community was caught in the middle. We have a directive that says we have to build the plant and get our wastewater treatment into better condition, but at the same time we’re waiting on another government department to give us the grant funding and approval to move forward. We’re damned if we do and damned if we don’t.”

The realization that complex projects take time to plan has, thankfully, prevailed. With approvals, financial commitments and initial plans in place, the city has issued requests for proposals



In order to keep costs down, the city looks to use some of its existing assets, including the headworks building seen here.

and expects to line up contractors and vendors and have key equipment and pre-fabricated materials on-site or available by late 2020. “Shovels will basically hit the ground by the spring of 2021 unless something miraculous happens and we can move it forward,” Aalbers says, mentioning autumn 2023 as the current target for commissioning.

Terry Burton, Lloydminster’s director of engineering and planning, says he expects the new system will almost certainly fall into the mechanical category. While a membrane plant is a strong possibility, a final decision will be made once actual proposals are in hand. “The City has identified key requirements for the facility to meet. This includes more stringent treatment requirements to future-proof the facility as much as possible,” Burton says.

“We’re proceeding with an integrated project delivery method where we’ll collaboratively design a treatment system that meets environmental regulations and the critical objectives the city has. That collaborative design process is basically starting from scratch, so they’ll look at all the options and at the current site and conditions and come up with something that meets all those objectives.”

Regardless of which technology is selected, proponents face at least minor technical challenges. “Integrating with

the existing system will be the biggest challenge that we face,” Burton says, adding these same situations also present opportunities.

For now, preparatory work continues. The city is proceeding to desludge its lagoons one last time, for \$3 million, to ensure the old system functions optimally until it’s replaced.

The city is also in discussions with neighbouring municipalities to explore the potential for regional water and wastewater servicing agreements, Burton says.

Ultimately, Burton sees the new system as representing one less worry in terms of Lloydminster’s growing infrastructural needs. “This is a big win for us,” he says.

Mayor Aalbers says, meanwhile, it’s “a distinct possibility” he will seek reelection in the 2020 municipal election, and he looks forward to seeing the project through to completion.

“It’s always nice to see something start to finish,” Aalbers says. “We don’t spend \$80 million dollars on a regular basis on any one item, so this will be a project that carries us forward.” WC



Saul Chernos is a Toronto-based freelance journalist and frequent contributor to Water Canada.

Two permeable pavements were installed as a part of the Collingwood Pilot Project to reduce stormwater runoff.

Photo: Collingwood

Collaboration to Action

How the Town of Collingwood is leveraging local expertise to address stormwater challenges. **BY SIMRAN CHATTHA**

MUNICIPALITIES IN ONTARIO are taking an interest in addressing stormwater challenges within their communities. One of these municipalities is the Town of Collingwood, which has been exploring how innovative technologies can be used to address local concerns and also help the community adapt to the effects of climate change. Here's an example of how a solution developed by a Collingwood teen is helping the Town of Collingwood achieve its objectives.

The need for reliable sump pumps

Faulty and outdated sump pumps create serious concerns for homeowners in communities where extreme rainfall events occur.

If a sump pump fails, it can lead to water leaks through cracks and gaps in a home's basement, which can in turn lead to flooding and trigger an insurance claim with a hefty price tag. The average

insurance claim for a flooded basement was \$43,000 in 2018, according to the Insurance Bureau of Canada's data that was cited in a report by the Intact Centre on Climate Adaptation.

This is something that some homeowners in the Town of Collingwood, a municipality located in southern Ontario, have been no stranger to. Daniel Correia, a local teen in Collingwood, knew that something needed to be done about this when he saw his dad and neighbours dealing with these issues time and time again. So he set off to find a solution.

The solution: remote monitoring

With a passion for electronics, Correia set out to create a solution that would provide peace of mind for homeowners in Collingwood and beyond.

Correia developed Safe Sump, a system that uses Internet of Things

(IoT) to keep homeowners updated through an app about how their sump pump is performing. The app provides information about variables like the backup battery, which can continue to provide power to the sump pump in the event of a power failure.

The Safe Sump solution quickly captured the attention of staff at the Town of Collingwood. "One of the main objectives of the Safe Sump technology is to initiate early warnings for homeowners about power outages, backup battery time you have on hand, and the flow rates you are seeing," said Nic Keast, a senior project manager at Greenland Consulting.

"You also want to have the ability to call out to an alarm company or someone who can respond in the absence of the homeowner," Keast said. "[At the outset of the Collingwood Pilot project,] Huronia Alarms, a local alarms company, already had a presence in mobilizing for



Kevin Mercer, the chief executive officer of RainGrid, provided an overview of the app that connects to RainGrid's cisterns during a site tour.



Greenland Consulting hosted a tour during the Canadian Water Summit on May 31, 2019 to showcase some of the sites in Collingwood where permeable pavements and rain cisterns have been installed.



Aerial view of a small shipyard dock in Collingwood, Ont.

emergencies and [undertaking] call outs to homes so when the installations were put into homes that were already clients of Huronia Alarms, they came to benefit from having Huronia Alarms get access to the Safe Sump data and assist in their call outs.”

Given that the Safe Sump solution could monitor flow rates, staff at the Town of Collingwood started exploring whether Safe Sump could help address some of the challenges it was facing. In particular, the town knew that wet weather flow was entering the sanitary sewer from a particular subdivision. Before upgrading the wastewater treatment plant, one of the questions that staff had was: how many basement sump pumps are directly connected to the sanitary sewer?

The Town of Collingwood enlisted Greenland Consulting to help determine whether Safe Sump could be used to determine whether sump pumps were contributing to the wet weather flow entering the sanitary sewers during extreme rain events. In an effort to

reduce the stress on municipal sewer infrastructure and save costs, the town also wanted to find out what combination of technologies and approaches could be used to reduce stormwater runoff by 50 per cent during 24-hour rainfall events.

The project partners proceeded with scoping out a pilot project that would involve installing 50 sump pumps in homes that were at a high risk of basement flooding. The project also proposed installing two rain gardens, two permeable parking lots, and 10 RainGrid cisterns. With this combination of solutions scoped out to help address stormwater runoff in the community, the Town of Collingwood secured a grant through the Green Municipal Fund to undertake a pilot project. Once the Town of Collingwood secured the funding, it brought the Environment Network on board to undertake public consultations.

Pilot project enables data-driven decision-making

Thanks to the data gathered through the Collingwood Pilot Project, the Town of

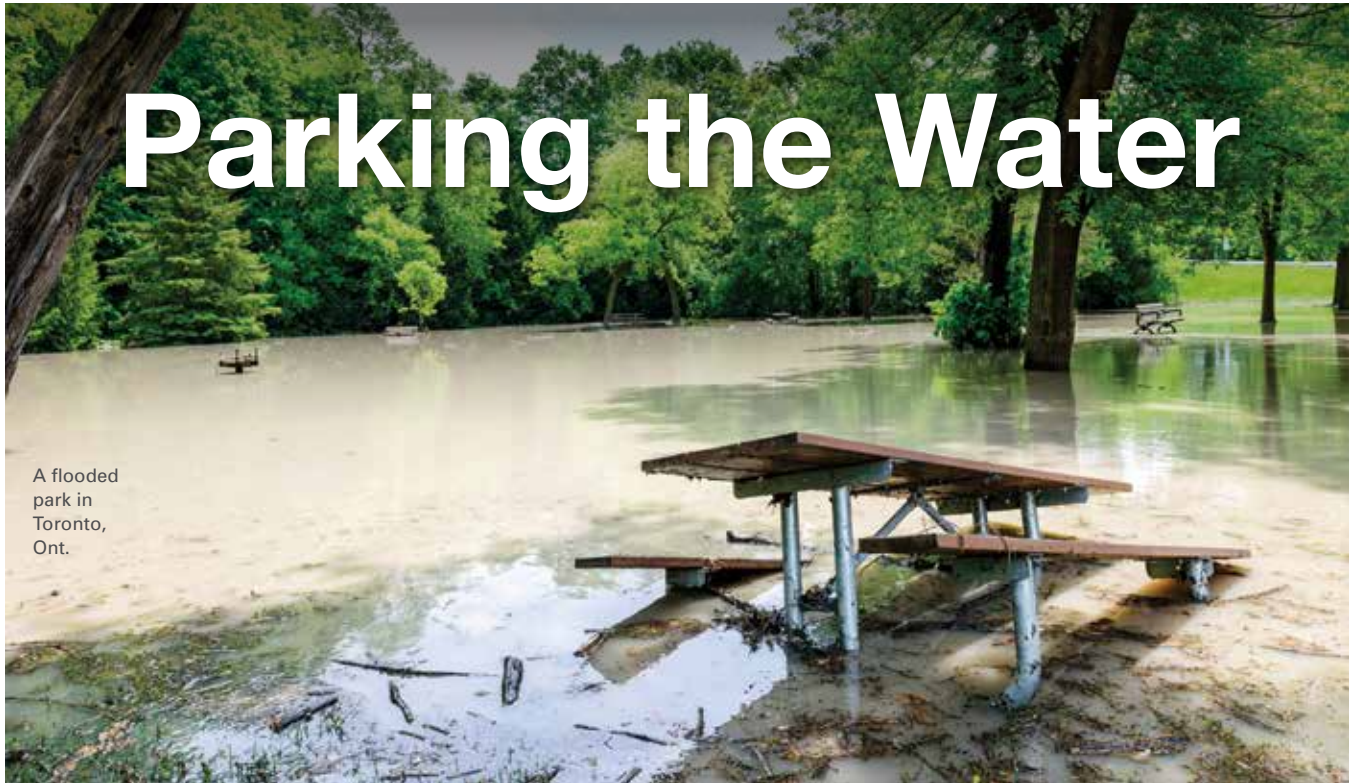
Collingwood and Greenland Consulting were “able to see what the dry wet weather flows were in the sanitary sewer,” Keast said. “Then based on the sump pumps installed within the subdivision, we were able to begin assess whether sump pumps are contributing to that wet weather flow. Ultimately, we were able to compare the data collected with the sump pumps with the data collected by the sewer main.”

Using the data, the Town of Collingwood and Greenland Consulting made inferences that sump pumps weren't contributing to the wet weather flow. Using this information, the Town of Collingwood determined it didn't need to allocate resources towards a sump disconnection campaign to educate homeowners on making sure their sump pumps aren't connected to sanitary services. **wc**

Simran Chattha is the associate editor of Water Canada.

Parking the Water

A flooded park in Toronto, Ont.



Mitigating damage from severe storms can start with building above-grade parking. **BY ANDY MANAHAN AND MURTAZA HAIDER**

WHEN CONSTRUCTION PROJECTS involve multi-level underground parking in areas with strained sewer capacity, it can present challenges in cities with aging infrastructure. Antiquated combined sewer systems can result in untreated wastewater and pollutants entering our local lakes, rivers, and streams from combined sewer overflows, rather than going to treatment plants.

While older cities such as Toronto and Vancouver have built storage tanks to alleviate the overflow during heavy rainstorms, other measures must be taken to reduce the strain as intense storm events are becoming more frequent. One cost-effective option to curtail sewer system overflow is to build above-grade parking garages. In this way, the existing sewer capacity could better handle stormwater inflow instead of treating groundwater.

Updating parking standards is thus an excellent area to tackle first. That is why the Residential and Civil Construction Alliance of Ontario (RCCA) commissioned a report by the

Ryerson Urban Analytics Institute on How Parking Regulations Need to Evolve for High-Rise Buildings.

Although the impetus for the study involved considering how the city could continue to grow in the face of infrastructure constraints, Ryerson researchers emphasized that evolving travel behaviour (such as the use of ride-hailing apps) and rising home buying costs, will have a great impact on future parking demand, especially in downtown urban markets. If municipalities do not plan carefully, below-grade parking garages could become a series of stranded assets across Canada that are likely to be a burden on future generations.

Ryerson found that Canada's largest city has not meaningfully updated its parking standards since 1986 and has not addressed the consequences of maintaining strict minimum parking

standards when demand for parking space is expected to decline in the future. Led by Professor Murtaza Haider, the study also recommends building above-grade parking in high-rise residential buildings instead of underground (or below-grade) parking. Above-grade parking is not only less expensive and quicker to construct but, more importantly, the space can be repurposed

The consequences of building too much underground parking are profound, including overloading our stormwater and sewer systems.

later if it becomes redundant, meaning there is a longer-term value proposition.

Above-grade parking also circumvents issues with groundwater that burdens sewer systems. The construction of below-grade parking in areas with a high-water table has an adverse impact on stormwater capacity, as seen during the



R.C. Harris Water
Treatment Plant in
Toronto, Ont.

flash floods that hit Toronto on August 7, 2018. Among the headlines that day was the story of two men dramatically rescued by police after being trapped in a flooded underground parking elevator in the city's west end. "The water was approaching our necks," one of the men told the *Toronto Star*.

Unfortunately, Toronto's Tall Building Design Guidelines state a preference for below-grade parking, and that is turning out to be a critical factor in addressing stormwater capacity concerns. If the municipal system has insufficient capacity to handle a peak load, then no connection to the sewer will be granted.

Toronto Water, an agency of the city, recently described how sewage capacity constraints in the form of private water discharge permits and/or long-term agreements for groundwater impacted seven high-rise building projects. If underground parking had not been required for the two commercial and five residential projects, the equivalent of nearly 20,000 additional suites could have been built. This represents a trade-off between the city's current requirements for the provision of underground parking spaces and its intensification objectives.

The report finds that future parking

requirements must consider a range of factors such as stormwater management, new trends in mobility and housing affordability. Punching more holes into the ground has a cumulative effect on hydrology—this can affect the hydrostatic pressure on buildings and can decrease the ground's geological capacity to hold additional water from precipitation. This results in overwhelmed stormwater and sewer systems, creating significant safety, health, and sanitation problems from flooding and sewage overflows. Prohibiting above-ground parking and promoting water-tight below-grade parking will continue to exacerbate the overall stormwater problem. Each additional underground structure will increase pressure on the groundwater table.

We would also be remiss if we didn't mention that constructing water-tight below-grade parking is an extremely costly and complex process.

A good solution would be to upgrade the city's aging infrastructure, but we can't wait a decade or more for this to happen. Practical alternatives, as presented in the report, are to:

① Overhaul minimum parking standards to reflect the trend of lower parking demand.

② Encourage innovative above-grade parking garages that can be repurposed in the future.

We must be forward thinking in the way we plan new parking in urban centres across Canada. The consequences of building too much underground parking are profound, including overloading our stormwater and sewer systems. (The floods in August 2018 led to \$80 million in insurance claims.)

Let's embrace flexibility and plan properly for the future of parking in Canadian cities. Let's change policy for minimum parking standards so that the generations that follow us can effectively use or repurpose what we planned decades before. *wc*



Andy Manahan is the executive director of the Residential and Civil Construction Alliance of Ontario (RCCAO). Paul De Berardis is the director of building science and innovation for the Residential Construction Council of Ontario (RESCON).

Murtaza Haider is a professor at the Ted Rogers School of Management at Ryerson University in Toronto.

Photo: Mike Quinn



UNDERWATER TRACKING

Partnering to provide valuable data for Canadian watersheds. BY ANDREW MACKLIN

TWO ORGANIZATIONS were looking for the same solution. All it took was one Google search for them to find each other. The rest is history.

It started in 2014. Dr. Brian Branfireun, a Canada research chair at Western University, was in need of a better way to collect data. With unpredictable weather and limited resources hampering his ability to collect valuable data from the water, he hoped for a solution that would put less strain on his limited resources.

“The research that catalyzed this was collaborative work I was doing in the Northwest Territories, being led by my colleague at the University of Waterloo, Dr. Heidi Swanson,” said Branfireun. “I was doing work on water chemistry and she was doing work on food webs and lake ecology, and connecting those dots together. We were working on a number

of small lakes in the Northwest Territories and doing some of this water chemistry characterization. We recognized the challenge, and in some cases inefficiency, of making just single measurements in a lake and sort of crossing your fingers that that was reasonably representative.”

While on one of his northern research excursions that year, he remembered a conversation from a few years earlier. He had met Natalia Lecki, a Western graduate who had recently started working in sales at Hoskin Scientific. Dr. Branfireun asked Lecki what the cool new technology was, and she mentioned the i3XO EcoMapper AUV (Autonomous Underwater Vehicle) from YSI.

He reached back out to Lecki and, after learning more about the technology, worked with his colleague from Waterloo to pursue a grant to purchase the

EcoMapper. They were successful in getting the funding, and began planning to purchase the AUV.

Elsewhere in Ontario

David Sweetnam, executive director of Georgian Bay Forever (GBF), was facing a similar issue to Branfireun. Sweetnam, a biochemist by trade, would hop in the boat to travel to different areas of Georgian Bay, collecting samples in 12 different areas in order to obtain data about the water. The process provided very limited information, was time consuming, and was expensive.

Sweetnam did some research of his own and discovered the AUV, and the potential it provided to secure real data that could show important aquatic trends throughout Georgian Bay. In early 2017 he began thinking about the idea



The EcoMapper will provide valuable data of the state of the Georgian Bay watershed.



Branfireun, left, and Sweetnam, right, discuss the technology behind the EcoMapper during a live demonstration in Georgian Bay.



further and sharing it with members of GBF team. He had seen health care foundations successfully rally fundraising efforts around a single purchase, like an MRI, and thought the AUV could provide a similar opportunity. Based on the purchase

One of the biggest holes that exists on the Canadian side is the detailed coastal bathymetry.

price (around \$350,000 with additional technologies included), Sweetnam estimated it would take the non-profit organization around five or six years to raise the capital. And that's exactly what they were working towards in August of 2018.

Running Out of Time

By the summer of 2018, Branfireun and his colleagues were having a dilemma. They had obtained financing for the AUV, but based on a fluctuating dollar and a lack of additional capital, they found themselves short of the amount needed to purchase the AUV that had all of the desired sensor technology included, invaluable to the research they wanted to conduct.

So Branfireun went to his computer, hoping that a Google search might uncover a potential collaborator, one who could provide the missing capital to order the enhanced version of the AUV. And thanks to some great online storytelling, Georgian Bay Forever popped up in his search.

Seeing that GBF was already in the midst of a capital campaign to purchase an AUV, Branfireun immediately reached out to Sweetnam to talk about the potential to work together on the purchase. Sweetnam saw it as a chance to work with leading academic institutions and have access to the technology several years earlier. And by August 2018, they had raised a decent amount of money; enough money to help purchase the enhanced unit. Quickly the two worked with their respective partners, and were able to strike a deal to work together. By the end of March 2019, just a few months after their first conversation, Branfireun took delivery of the EcoMapper.

Sharing the Opportunity

Both Georgian Bay Forever and the academic consortium will have their opportunity to use the EcoMapper to collect the invaluable data that they

seek to understand water trends in the respective regions.

“One of the biggest holes that exists on the Canadian side is the detailed coastal bathymetry,” explained Sweetnam. “A digital elevation model is a computerized simulation of the

GBF will also use the additional technology included on the enhanced EcoMapper, such as the high resolution side scan sonar imaging, to be able to collect data on things like water flow patterns and volumes of blue-green algae. And because the vehicle can be programmed to follow the same route in a given body of water any time it is placed in the water, the data points that come back can be from the exact same

where they will conduct more complete characterizations of small, remote lakes, as well as efficient spatial surveys that will produce rich data on water quality.

The EcoMapper has also opened the door to new research opportunities. The technology will be taken to the Grassy Narrows region of northern Ontario where it will be used to provide valuable data on water body characterization. It will also be used in the Yukon, where the technology can help map groundwater interactions with large, alpine lakes.

Thanks to a single Google search, we will soon have a better appreciation for the health, condition, and shape of several bodies of water throughout Canada. WC

We recognizes the challenge, and in some cases inefficiency, of making just single measurements in a lake.

physical space that we’re in. And when you have a computer simulation of that, you can play around with water levels to see, say, what would happen if the water levels went up to the peaks or if they dropped to the all-time lows (from 2013) again.”

location year after year, given accurate data on changing trends in a given body of water.

Branfireun, Swanson and their additional academic partners, including Wilfrid Laurier University, will take the technology to northern Canada,



Andrew Macklin is the managing editor of Water Canada.

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Low tide on the sandy beach at the popular quaint seaside community of White Rock surrounding Semiahmoo Bay near Vancouver in British Columbia



Removing Arsenic and Manganese in White Rock

When the City of White Rock needed a solution to remove arsenic from the community's drinking water supply, they turned to AdEdge.

The City purchased the utility from EPCOR Utilities Inc. in 2015 and collaborated with RES'EAU-WaterNET to decide the best solution for removing arsenic and manganese from the community's groundwater supply. Arsenic and manganese are found naturally in groundwater in all regions of British Columbia. Concentrations that approach or exceed the drinking water quality guidelines can occur locally anywhere in the province.

Water that contains arsenic is only a health-related concern if it is used for drinking or cooking. There are short term or acute symptoms for exposure to high levels of arsenic, but the primary concern

is related to decades long exposure of even low levels of concentration in drinking water. This exposure can increase the risk of developing certain cancers.

Recent research is showing that manganese is more than an aesthetic annoyance and is actually a health and development related concern. Studies have proven that exposure to manganese can cause lower IQ and poor motor functions in young children, and also cause a disorder similar to Parkinson's disease in the elderly.

The process for removing manganese is a well-known and proven process that AdEdge efficiently and cost-effectively applies to dozens of projects across North America every year. The AdEdge Bayoxide E33 media for arsenic removal is particularly unique in that it is the highest

performing and longest lasting adsorption media available in the market. Using this media results not only in the most economical system for reaching the very low arsenic treatment targets set by White Rock on the project, but also the system with the lowest operating cost because media replacements are reduced as much as possible.

After the manganese is removed, the water goes through a second set of pressure vessels that contain a specialized media called AdEdge Bayoxide E33. This media is a granular ferric oxide (which means it is made mostly from iron) and the arsenic binds itself to the media through a process called adsorption.

Thanks to the introduction of the AdEdge's patented technology, residents of White Rock can feel safe in drinking water straight from the tap. ■



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Inspecting Pipes

Cost effective solutions for managing buried pipeline assets. BY DAVE RUSSELL

ASSET MANAGERS in the municipal marketplace are often dealing with aging assets, increasing failure rates, and limited budgets for maintenance and repairs. Funds for asset replacements are typically less than 1 per cent of what would be needed for wholesale replacement of the entire piping system. Where to spend the budgets most effectively? This article discusses the options that pipeline owners have to gain knowledge of pipe conditions prior to making replace/rehab/repair decisions.

The new AWWA guidance manual M-77, published in the spring of 2019, is a good reference source for asset managers who wish to know what technologies are currently available for undertaking a pipeline condition assessment. The premise of the manual is that you can assess the condition of one or two mains in an area of a city and impute the results of that inspection to other nearby mains. So long as the soil conditions (corrosivity, resistivity, drainage, etc.), pipe type and age are similar, then this is a powerful way to rank an area for possible life extension through spot repairs, rehabilitation

(lining), or replacement while limiting the costs of the condition assessment work. It is also a useful way to assess the new tools that are available for detailed condition assessment through a limited scope of work.

Chapter one of the M77 manual defines the benefits of undertaking a condition assessment as (quote):

- “Estimate the likelihood that a water main may continue to provide satisfactory service, both now and in the future.
 - Help determine the remaining service life of the water main.
- Make better decisions regarding main renewals.
 - Allow some water mains to remain in in service longer.
 - Prevent some pipeline failures from occurring by intervening sooner.
 - Make decisions more confidently (with less chance of error).
- Find active leaks.
- Tailor renewal projects and methods to better match the conditions of the mains.”

Condition assessment and monitoring are essential components of a risk-based strategy for maintaining a minimum level of service for municipal customers.

This article briefly describes the condition assessment tools available today and their strengths and limitations.

Let’s start with the simplest and least expensive tools.

Spot Testing

The least expensive way to check a pipeline’s health is to excavate and remove a sample of the pipe. Samples should be taken in different soil types so that a relationship can be established between the pipe condition and its soil environment.

The sample pipe should be sand-blasted to remove surface scale, coatings, and liners and measurements of depths of corrosion pits can be made by “pit-depth gauges,” laser scanning, or ultrasonic thickness gauges.

The results of the spot test should be accurately recorded on the GIS for the municipality and overlaid with soil and pipe age/failures and pipe type layers to establish any distinct patterns.

While most degradation of water mains

tends to be soil-side, certain potable, waste and raw water chemistries can create corrosion on the inside of the pipe as well.

Leak noise detectors (correlators)

There are several different types of leak-noise detectors. The most common type is purchased and used by municipal staff for under \$6,000. The operator of the equipment basically presses a microphone on any exposed pipe component (e.g. a valve in a vault) and listens for “leak noises.” By triangulation from two to three spots, the location of an active leak can be found.

Limitations:

- The leak must be making an audible noise.
- Requires a minimum degree of training.
- Must be run again and again to detect “new” leaks.

- Requires a dedicated crew, using the equipment daily.
- No predictive value.

Strengths:

- Reasonable sensitivity to leak noise so long as many readings are taken.
- Inexpensive and simple to operate.

In-line leak noise detectors

To improve the detection and location of a leak, the microphone (or hydrophone) should be as close to the noise as possible. There are two devices that are used to bring a hydrophone close to a leak noise. One is on a cable that is introduced through a hydrant, and is pulled into the pipe by a small parachute (e.g. Sahara) and the other is a self-contained device that travels through the pipe with the flow (e.g. Smart Ball, Nautilus, Recon+, etc.).

Limitations:

- The leak must be making an audible noise.

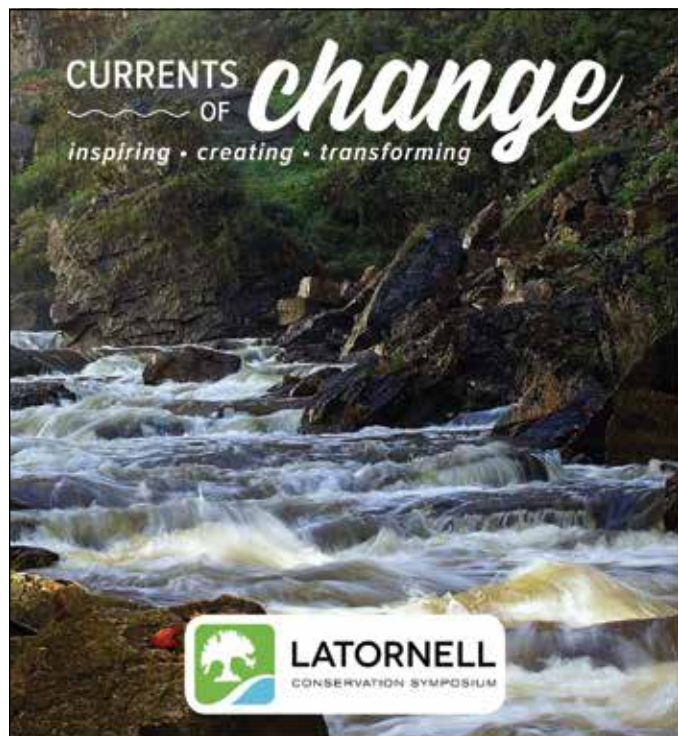
- The devices are intrusive and must be sanitized before entering potable water lines.
- Requires a trained, experienced crew to launch, receive, and analyse data.
- Must be run daily to detect “new” leaks.
- Requires an inspection contractor to run the devices.
- No predictive value.

Strengths:

- Better sensitivity to leak noise due to proximity.
- Covers more pipe length in a shorter time.
- Can do long lengths of pipe in a day.

Bulk wall thickness testers

There are several technologies available for bulk wall thickness measurements. All of them rely on reflections from thinned areas when a shock wave is introduced into the pipe.



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Restoration Ecologist

Limitations:

- May be able to inspect long lengths, but best results are closely spaced.
- Reflections require a high degree of skill to interpret.
- Relatively high cost (requires an inspection contractor to operate).
- Cannot detect local areas of thinning (e.g. local corrosion pits).

Strengths

- High production rate.
- Can be used on many materials, including AC.

In-line condition assessment tools

In-line condition assessment tools are the most expensive technologies for determining pipe condition. However, they may be the most cost-effective because they detect and report all weakened areas, including localized corrosion pits, which gives the asset manager full and detailed knowledge of

the pipe condition and allows him/her to make informed decisions, proactively.

Technologies carried on board these tools can be:

- Ground-penetrating radar (GPR) for concrete pipe inspection.
- CCTV and laser profilometers for all pipe types.
- RFT and MFL tools for inspection of metallic mains.
- Ultrasonic tools for clean bare pipes (all materials except cast-iron).

Limitations:

- Cost.
- Requires trained and experienced contractor operators to deploy.
- May interrupt service or require pipe to be out of service.
- Extra civil costs to insert and extract the tools.

Strengths:

- Highly detailed inspection results.

- Allows asset manager to proactively act to avoid service disruptions from leaks and breaks.

- Can inspect long lengths in “free swim” mode or shorter lengths on a tether.

- Can be used to calculate fitness for service and extend asset life.

This overview, while brief, has provided some options for asset managers to consider when deciding what to do with a main that is:

- Old but not leaking.
- Leaking often but not over its full length.
- Critical for the supply of potable water to a municipality (i.e. can’t fail).

For further details consult the AWWA M-77 manual at awwa.org. wc



Dave Russell is the president of PICA Corp.

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The investments made by Coca-Cola are building healthy watersheds, leading to improvements in the quality and quantity of local fish populations.

Photo: Brian Tom, WWF-Canada



Among Coca-Cola's efforts are investments in the restoration of watersheds around the globe.



The company's partnership with WWF-Canada has led to investments across the country, such as the rehabilitation of a watershed in cooperation with Katzie First Nation.

Committed to Conservation

Coca-Cola works to reduce its water footprint. BY ANDREW MACKLIN

BEVERAGE MAKERS extract millions of litres of water from Canadian watersheds each year, then distributing the products throughout the country and around the water.

Over the past few years, those same manufacturers are taking steps to attempt to reduce the overall impact of their water extraction. And while it would be impossible to return every drop of water back to the original community that it was originally extracted from, the companies are working diligently on conservation programs, watershed rehabilitation, and water reuse systems that lessen the impact, on a global scale, of their business practices.

At Coca-Cola North America, the man leading these initiatives is Jon Radtke, the company's water sustainability program director. Water Canada sat down with Jon during the Canadian Water Summit to discuss how the company is working to reduce its environmental impacts.

When you and your team talk about sustainability, what do you mean by that?

Everyone has their own definition of sustainability. [...] I view it as using our resources, now, so that we have enough for our current needs but also for the needs for the future.

Is the push for sustainability just about water or does that include other elements of the beverage making business?

We have a goal to sustainably source our key ingredients by 2020. There are 15 key ingredients across the globe that have been identified, everything from sweeteners to different types of fruit, coffee, and things like that. We have a set of sustainable agricultural guiding principles that we get our suppliers to adhere to. It addresses everything from the social aspects of workers' rights [...]

all the way to environmental issues around water and carbon. And then even on-farm practices; making sure that they are using the best management practices on the farm.

Around sustainably sourcing our water, we have several goals around that both inside of our operations and outside the four walls of our plant. We have a lot of goals around water efficiency improvements for instance. To give you a few examples of some of the programs or projects we might do inside of our plants to improve efficiency other than just fixing leaks: we might put in air renters to rinse the bottles before the product goes in; we used to rinse with water, now most of our plants use ionized air to rinse those bottles. For the lubrication on the conveyor lines in the factories, we used to use wet water-based lubrication and now we use dry-based lubrication. [...] We also try to reclaim and reuse as much water in our operations as we can, and so we'll take reject water from a reverse

osmosis treatment systems, and then we'll take that water and use it for other things in the plant.

We have a goal to improve our water efficiency by 25 per cent by 2020 globally, and we are well on our way towards that goal. In fact, in Canada, we've

plants. And at every one of those we do an assessment, outside the four walls, about where our water is coming from.

In about 50 per cent of the cases, we actually purchase it from a municipality, and in the other half we source our own water, say from onsite wells. Then we do

these assessments to identify any risks or vulnerabilities in those watersheds, and then we develop a plan at the plant level then implement it to reduce and mitigate the risk.

Beyond that, we have our 'Water

Replenish' goal. That's a goal to return to nature, and communities, all of the water that we use in our beverages and their production. One component of that, returning to nature, is just through cleaning and treating our wastewater so that it's set to the environment at levels

that are suitable for the aquatic habitat and that meet all local standards.

But then what do you do with that volume that actually goes out in the product? [...] We've established a goal to return to nature that same volume. The goal was to do that by 2020 and globally we actually reached that goal five years early. A lot of that work was done in some of the most water stressed parts of the world—in India and parts of South America—but also we just achieved that goal in Canada in 2018.

So what does that actually mean? What does replenishing that water actually translate to at the end of the day?

In most parts of the world, including Canada, we do that by working with local partners (NGO and sometimes government partners) and we identify an issue, or a watershed that is degraded in some way, and then we rely on our local partners to identify what solution

We rely on our local partners to identify what solution is needed; how can we restore that watershed so that it functions like it's supposed to by returning it to its natural hydrology.

actually reached that goal of improving our efficiency by 25 per cent based on 2010 levels.

We also do a lot of source water protection work at every one of our facilities. Globally, we have 863 manufacturing facilities or bottling



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Lake Winnipeg in Manitoba.

We have a goal to improve our water efficiency by 25 per cent by 2020 globally, and we are well on our way towards that goal.

is needed; how can we restore that watershed so that it functions like it's supposed to by returning it to its natural hydrology.

A lot of those types of restoration projects are about getting more water to soak into the ground to recharge instead of just running out and off and taking contaminants with it. So we do work in the agricultural community.

One of our biggest partners is Ducks Unlimited and we have helped support restoration protection of around 1,000 acres of wetlands. That's mainly in the prairie pothole region in Manitoba and also around Lake Winnipeg. What that does is it helps store water on the land in areas where the agricultural community have drained these natural wetlands. That's one example of a project that we're doing in Canada.

We also have a partnership with WWF Canada and we're helping to support their water restoration fund. They do projects all across the country. Different

watershed groups will submit proposals, and then they will select the proposals that help meet their needs around establishing habitats and that also meet our needs around replenishing water.

Lastly, what is Coca-Cola doing to reduce the impact of its packaging on the environment?

In 2017 we announced a goal, we call it 'World Without Waste', and that goal is to recover and recycle 100 per cent (equivalent) of the packages that we put out in to the market. On top of that, we have a goal to have our packages 50 per cent recycled material by 2030. That's both for our aluminum and plastic packaging.

We thank Jon for taking the time to sit down with Water Canada. wc

Andrew Macklin is the managing editor of Water Canada.



McCormick Place
in Chicago, home
of WEFTEC 2019
September 21-25



WEFTEC 2019 Preview

WEFTEC 2019, the 92nd annual technical exhibition and conference hosted by the Water Environment Federation, will be held at McCormick Place in Chicago, Illinois September 21-25.

Each year, hundreds of Canadian companies and associations gather at the international showcase, joined by thousands of colleagues from across the United States and around the world. In 2018, more than 20,700 attendees joined just over 1,000 exhibitors in New Orleans for the 91st edition of the event, the largest water quality showcase in the world.

In addition to the exhibition floor, WEFTEC features a strong lineup of technical programming and events those looking to improve their education in the sector. In 2019, four major themes will be highlighted through the programming:

- 1 One Water
- 2 Resilience
- 3 Water Energy Food Nexus
- 4 Workforce

Also at WEFTEC 2019, Water Canada will host a Canadian CEO Roundtable on the show floor. The discussion will focus on shaping the digital future of water. Digitalization is changing how water and wastewater utilities can collect and analyze data. This session will provide examples of how Canadian companies are helping utilities improve water quality, find operational efficiencies, and maintain infrastructure more effectively.

The overall objective of the session is to provide examples of how Canadian water tech companies can help utilities adopt digital solutions, such as artificial intelligence and Internet of Things. The session will also provide insights, using real-life examples where possible, into how utilities can overcome actual and perceived challenges associated with adopting digital solutions.

We are very excited to be joined by four well-recognized C-suite officials from across the Canadian landscape. Taking part in this year's panel is:

- Jodi Glover, CEO of Real Tech
- Mohamad Vedut, COO of Emagin
- Ed Quilty, CEO of Aquatic Informatics
- Naysan Saren, CEO of CANNForecast
- The panel will be moderated by Andrew Macklin, Managing Editor of Water Canada

This year's panel discussion will take place on Tuesday, September 24th from 1:00pm-2:00pm on the trade show floor. If you are unable to attend, you will have the chance to learn about the key discussion points and action items that emerge in our special coverage in the November/December edition of Water Canada.

And if you can't make it to WEFTEC 2019, be sure to follow Water Canada on Twitter September 22nd to 25th for live coverage from the exhibition floor. Stay tuned for extensive coverage of this year's event online at watercanada.net and in the November/December edition of Water Canada magazine. *wc*

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APPOINTED



KEVIN
HARRIS

Kevin Harris has been elected as Ducks Unlimited Canada's 44th president. He assumed the role of president, DUC's top volunteer position, at the organization's national board of directors meeting on June 16, 2019.

Harris is well-equipped to take on this important post. In addition to his work with DUC, Harris belonged to the Miramichi Salmon Association, the Atlantic Salmon Federation, and served on the board of the Hammond River Angling Association. He is also a former chair of the New Brunswick Wildlife Trust and a former chair of Wildlife Habitat Canada's national board.



JON
DOGTEROM

Jon Dogterom has been named senior vice president of venture services at MaRS Discovery District.

"Jon was instrumental in helping Canada's cleantech sector grow both domestically and internationally through his work at MaRS, and because of that influence and exceptional leadership, he was a natural choice to lead our entire venture services team," said **Yung Wu**, chief executive officer of MaRS.

The former managing director of MaRS Cleantech, Dogterom is tasked with leading the MaRS strategy of helping Canadian start-ups and scale-ups grow their businesses and reach new markets. He is also responsible for leading the organization's stakeholder relations throughout the global innovation community.

The Municipal Natural Assets Initiative (MNAI) announced at its annual general meeting that it has expanded its board to include more members and expertise that will help municipalities provide core services

to their residents while working with nature.

The new board members are **Isabel Gordon**, director of financial services for the District of West Vancouver; **Mike Puddister**, former chief administrative officer and director of watershed transformation at Credit Valley Conservation Authority; and **Natalia Moudrak**, director of climate resilience at the Intact Centre on Climate Adaptation.

Emanuel Machado remains board chair, and **Jay Ritchlin**, director-general for western Canada at the David Suzuki Foundation, remains vice president and secretary.



ANDREW
VITATERNA

Andrew Vitaterna joined Clearford as its new vice president of business development when the company acquired ASI Water.

Prior to the acquisition, Vitaterna had been with ASI Group since 2000. Most recently, he worked at ASI Water in the role of manager of business development.

A professional engineer since 1987, Vitaterna spent the first 13 years of his career designing decentralized water and wastewater treatment systems in the consulting engineering business.

Doug McNeil has been named Ontario's special advisor on flooding by the Government of Ontario.

The special advisor will assess current roles and responsibilities of governments, agencies, and organizations involved in flood management, including any opportunities for improvement. He will also review the feedback received, identify focused recommendations, and ensure all recommendations are consistent with the province's ability to implement them.

In addition to this, the special advisor will build on input from Flooding Engagement Sessions held by the Ontario government earlier this year in Muskoka, Pembroke, and Ottawa to hear from municipalities and industry leaders on how to better prepare for and respond to floods.

The International Joint Commission (IJC) has appointed eight new members from Canada and the United States to its Great Lakes Water Quality Board under the Great Lakes Water Quality Agreement (GLWQA).

The Great Lakes Water Quality Board assists the IJC in assessing progress by Canada and the United States to accomplish the goals and objectives in the GLWQA, identifies emerging issues, and completes research projects to recommend strategies to address complex challenges facing the lakes.

The board includes representatives from federal, state, provincial and municipal governments, Tribal governments, First Nations and Métis, watershed management agencies, nongovernment organizations, and the public. New members include:

- **François Houde** who is the Québec provincial representative. Houde is also the general director, state in the Environment Assessment Division of the Québec Ministry of Environment and the Fight against Climate Change.
- **Elizabeth Kirkwood** who is one of the United States public or at large representatives. Kirkwood is also the executive director of For the Love of Water (FLOW) and an environmental attorney.
- **Monica Lewis-Patrick** who is one of the United States public or at large representatives. Lewis-Patrick is also the co-founder of We the People of Detroit.
- **Chris McLaughlin** who is the Canadian municipal representative on IJC's Great Lakes Water Quality Board. McLaughlin is also the executive director of the Bay Area Restoration Council for Hamilton, Ontario.

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IWA Young Water Professionals Conference Toronto, Ont.

This was one of the questions that **Medhavi Gupta**, a water design specialist at Jacobs Canada, explored as part of a research project that assessed the energy consumption of different primary wastewater treatment technologies.

Gupta presented the findings of her research, which she undertook with Western University and Trojan Technologies, at the International Water Association's Young Professionals Conference.

Gupta tested four scenarios using wastewater collected from the Pottersburg Wastewater Treatment Plant in London, Ontario. These included:

- Raw wastewater treatment (no primary)
- Rotating belt filter
- Chemically enhanced rotating belt filter
- Primary clarifier

She found that the scenario with the chemically enhanced rotating belt filter was the most energy positive because it had the lowest aeration demand and the highest amount of methane energy recovered.

Gupta also used sequential batch reactors (SBRs) during the testing to help with nitrification and

denitrification. She found that total nitrogen removal (TN) averaged:

- 54 per cent for the raw wastewater scenario.
- 45 per cent for the rotating belt filter scenario.
- 30 per cent for the chemically enhanced rotating belt filter scenario.
- 29 per cent for the primary clarifier scenario.

Some of the main conclusions of Gupta's research include:

- The "rotating belt filter offers an alternative to primary clarifiers."
- "Excessive carbon removal by a chemically-enhanced rotating belt filter can compromise overall nitrogen removal."
- A chemically enhanced rotating belt filter is an ideal option for carbon diversion in scenarios, such as anammox, that have a low chemical oxygen demand to nitrogen ratio.

For more information, visit iwa-youngwaterprofessionals.org



In the lab, attendees were able to learn about best practices for jar testing.



An attendee does some hands-on work during the pressure control valves module.



In the parking lot, attendees learned about the basics of utility locates.

WCWC Maintenancefest Walkerton, Ont.

The Walkerton Clean Water Centre's (WCWC) annual Maintenancefest attracted over 100 industry professionals from across Ontario for two days of industry education on the important issues impacting drinking water system operators.

The event has been held annually since the centre opened a decade ago, with just a couple of modules and approximately 30 or so people in attendance. Presenting its largest course selection to date, 12 different modules, the WCWC event offers hands-on training opportunities with expert instruction from the centre's group of expert trainers from throughout the water industry. Attendees receive CEUs for the modules that they attend as part of the event.

According to WCWC CEO **Carl Kuhnke**, the course modules are carefully selected each year based on attendee

feedback, providing industry knowledge on the subjects most in demand by those working in the industry. For the 2019 event, the available modules were:

- UV Maintenance
- Backflow & Cross Connection
- Hydrostatic Pressure Testing
- Concrete Pressure Pipe Tapping
- Unidirectional Flushing
- Basics of Utility Locates
- Pressure Control Valves
- Basics of SCADA Programming
- Well and Well Pump Monitoring
- Jar Testing
- Leak Detection
- Logbook & Logsheet Entries

The Concrete Pressure Pipe Tapping course was one of the new ones added to the roster for 2019 based on feedback from attendees, and an opportunity

to collaborate with the private sector. Expected to only attract a handful of people, Kuhnke noted that the module was full within just a few weeks of advertising its availability. He believes there is a good reason for the popularity, even among the smaller communities.

"When their own employer starts increasing the laying of pressurized pipes because of growing populations, they want to be the first ones to stand up and say no problem, I know how to repair that, and I know who to call and how to do it."

Maintenancefest is also offered during the year as a regional event, with north and east events also undertaken. For more information on Maintenancefest, both the regional and provincial event, visit wcwc.ca

One Fish at a Time

COURTESY: WATCANADA



BY IAN HAMILTON

B.C.'S KATZIE FIRST NATION'S proposed restoration project is much more than a great example of environmental stewardship of its culture and history. The location—the Upper Pitt River's Blue Creek—has been home to Katzie First Nation since time immemorial and is a major reproductive hotspot for Pacific salmon species that rely on the Fraser River watershed, like the Upper Pitt Chinook salmon.

This key species has been in decline for decades. With spawner numbers as high as 3500 in the 1950s and 1960s, recent reports suggest that they have dwindled to as low as 75 in 2018. Chinook Salmon are not only an important cultural and economic species to all inhabitants of the Lower Fraser River, but are a major food source for Southern Resident Killer Whales. The whales are an important keystone marine mammal currently listed as Endangered by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC). By restoring the watershed, we protect the Chinook, which helps other species as well.

This decline of salmon can largely be attributed to ocean exploitation and human development in the Lower Fraser River. As a keystone species in Pacific

Northwest aquatic ecosystems, the loss of important salmon stocks could lead to food-web imbalances, known as a trophic cascade, which have terrible consequences for all species that rely on salmon for survival.

Large-scale forestry in B.C. has destabilized many mountain sides that have caused landslides and disturbed the riparian area of rivers and streams that are critical for salmon. But this is just one reason for concern. There is also significant risk from mini jet boats that transport fishermen to fishing sites that disturb and frequently destroy spawning areas. Along with impending climate change, these are major stressors for the Chinook that depend on these habitats for survival.

The Blue Creek project represents a rare opportunity to restore a previously productive spawning habitat. In Spring 2018, a landslide occurred on the north bank of Blue Creek, about 800m from the confluence with the Pitt River. Large amounts of sediment entered Blue Creek, creating several large fish barriers to the upper spawning grounds near its headwaters and threatening the integrity of the lower reach which is critical Chinook spawning habitat.

Our restoration plan aims to remove in-stream barriers in this area for fish migration and build a series of rock and log fortifications to protect the lower spawning beds. The project also aims to restore ecosystem connectivity and water flow into Larson Creek and Alvin Patterson Channel, two areas that are important for Chinook, Upper Pitt Sockeye, Coho, and populations of endangered Steelhead Trout.

Our community hopes to improve this habitat and turn this Blue Creek restoration into an ongoing project with annual improvements to help the Lower Fraser River salmon survive and sustain British Columbians in the future. As Katzie Councillor Rick Bailey says of the project, "Salmon are more than fish, they are our family. Like our children, we need to provide them with a safe place to return." And by doing so, we hope to protect future generations of species and British Columbians. **wc**



Ian Hamilton is a fisheries biologist with the Lower Fraser Fisheries Alliance.



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