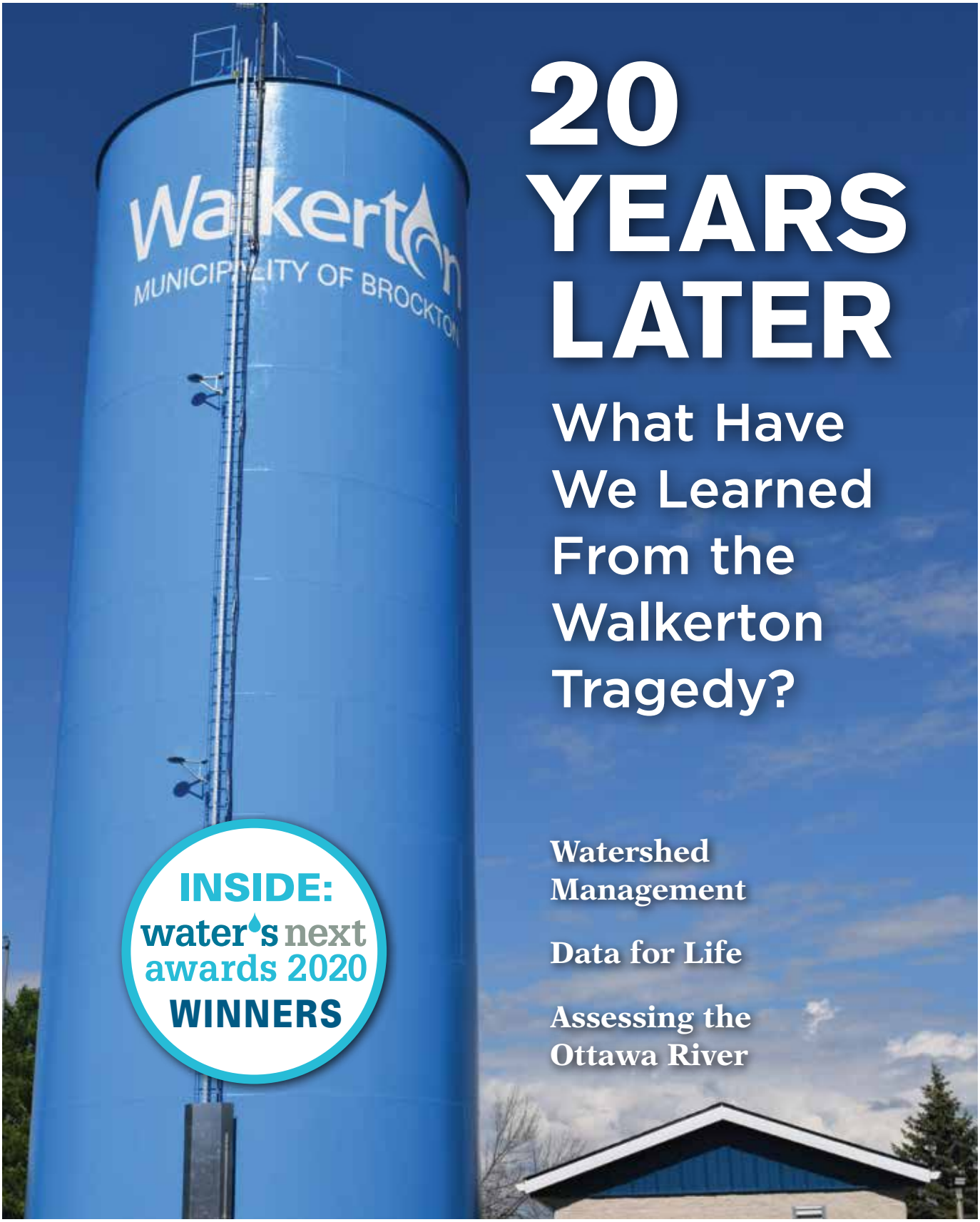
PROJECTS, POLICY, AND INNOVATION

JULY/AUGUST 2020

WATER CANADA



20 YEARS LATER

What Have We Learned From the Walkerton Tragedy?

INSIDE:
water's next awards 2020 WINNERS

Watershed Management

Data for Life

Assessing the Ottawa River

JULY/AUGUST 2020
VOLUME 20 NUMBER 4

WATER CANADA

PROJECTS, POLICY, AND INNOVATION

water's next awards 2020

SPECIAL FEATURE

Water Canada recognizes the people, projects, technologies, and companies that were among the winners of this year's 14 Water's Next awards.

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WATER CANADA

PROJECTS, POLICY, AND INNOVATION

JULY/AUGUST 2020
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Water Canada is published six times a year by Actual Media Inc.

actualmedia.ca

ACTUAL MEDIA INC.
150 Eglinton Ave. E, #806, Toronto, ON, Canada M4P 1E8
Phone: 416-444-5842

Subscription/customer services:
416-444-5842 ext. 211

Water Canada subscriptions are available for $39.95/year or $64.95/two years and include the annual Buyer's Guide issue.

Printed in Canada.

MIX Paper from responsible sources FSC® C014584

Undeliverable mail return to:
150 Eglinton Ave. E, #806, Toronto, ON, Canada M4P 1E8
Canadian Publications Mail Product Sales Agreement 40854046
ISSN 1715-670X

How will Canada invest?

BY ANDREW MACKLIN

FOR THE PAST FEW MONTHS, we have listened to speculation from throughout the Canadian infrastructure sector, as the 'experts' deliver their insights on how the federal government should spend billions in proposed infrastructure stimulus dollars.

The individual sectors have strong cases to make: better roads help goods get to market faster and cheaper, transit systems move people around with a reduced carbon footprint, and health care investments can provide additional capacity in times of health crises.

Yet as strong as those cases are, you can make an event stronger case for investments in different forms of water infrastructure: COVID-19 can be detected in wastewater streams, clean water sources provide the necessary sanitation to prevent the spread of disease, and green infrastructure can help filter chemicals out of the water, and reduce the impacts of other types of disruptive events such as floods.

The COVID-19 pandemic also exposed a clear vulnerability in the health and safety of our country as the lack of safe water supplies in remote and Indigenous communities caused entire villages to close their doors to outside visitors of any kind. And it didn't just happen in communities found in the most remote corners of our country, it happened in places like the Six Nations on the Grand in the heart of southwestern Ontario, where roads were barricaded as they grappled with the impacts of the first few cases of COVID-19.

There is also evidence emerging that, with proper data detection systems in our wastewater plants, we maybe have been able to respond to the pandemic much quicker than we did. According to an article in the June 20, 2020 edition of The Globe and Mail, scientists in Italy found traces of the novel coronavirus in wastewater collected from Milan and Turin in December 2019. Imagine how this country, and others for that matter, could have responded to the pandemic had we known when the virus was already appearing in our water systems? How would the current climate be different with that information in our grasp. The pandemic response may have looked much different.

Water is a vehicle for us to truly understand the health of our communities, at all times, not just in a time of crisis. And with new contaminants entering our water stream, posing a risk to human health, having the ability to detect these chemical concentrations as soon as possible could save lives. (Check out the story on page 14 for a further look at the issue.)

If it wasn't brutally obvious before the pandemic that investments were needed in water infrastructure, it has to be now, doesn't it? Even with a logjam of competing stimulus priorities, it has to be obvious that water is the solution to this problem, as it is for almost every other type of disruptive event that plagues our cities nationwide. WC

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PG. 14

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ABOUT THE COVER

Twenty years after the Walkerton tragedy, has Ontario made significant progress to protect its water resources? We provide two views on the subject on pages 8 and 10.

FRONT

REPORT: Investments in Natural Infrastructure Have Significant Economic Returns

CANADA'S BUILT, or 'grey,' infrastructure requires an estimated investment of $5.3 billion per year in order to keep pace with the effects of climate change. This comes as COVID-19 puts unprecedented strain on our economy. A new Greenbelt Foundation report suggests a way to address infrastructure needs and build climate resilience, while helping the economy recover.

"Restoring the function of our natural assets will support economic recovery from the COVID-19 pandemic," said Kathy Macpherson, vice president of research and policy at the Greenbelt Foundation. "Natural infrastructure projects create good jobs. According to a U.S. figure, the job creation resulting from these projects could be as high as 33 per $1 million U.S. invested. In contrast, the oil and gas sector supports approximately 5.2 jobs for the same investment."

Investing in the Future: The Economic Case for Natural Infrastructure in Ontario illustrates how by investing in natural areas, municipalities can save money, reduce reliance on expensive built infrastructure, mitigate the effects of extreme weather, and create much-needed jobs. The Greenbelt Foundation worked on this report with three conservation authorities to determine the return-on-investment of ecological restoration efforts in their jurisdictions: the Brock Lands, Saltfleet Conservation Area, and Lake Scugog.

"This is timely and important work," said Lynette Mader, Ontario provincial manager of operations for Ducks Unlimited Canada. "The case for natural infrastructure investment is clear: building back better means building back greener. Restoring natural cover such as wetlands upstream, naturalizing built-up systems downstream, and ensuring new development includes meaningful natural spaces is the path forward." WC

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

Email Managing Editor Andrew Macklin at **andrew@actualmedia.ca**

New Partnership Aims to Drive Corporate Action to Protect Global Water Supply

THE GLOBAL INSTITUTE FOR WATER SECURITY (GIWS) at the University of Saskatchewan is partnering with Ceres to develop a new global assessment. The assessment will take a comprehensive look at the major threats that unsustainable corporate practices pose to the global water supply.

"Despite an increased focus on water-related risks, companies and investors have not fully understood or addressed the far-reaching impacts of their own industry practices on our global water supply, or on their own portfolios," said Kirsten James, director of water at Ceres.

GIWS will conduct science-based research and analysis on industry practices in water-intensive sectors that have led to increased water scarcity and pollution, and threatened ecosystems and accessibility in communities around the globe.

"Our partnership with Ceres represents a major opportunity to provide the latest water science for corporate and investor decision making," said Jay Famiglietti, executive director of the GIWS. "We simply cannot move the needle on global water security without buy-in from industry. Engaging with Ceres to produce the global assessment report may have profound implications for how industry views its role in water stewardship moving forward."

To ensure the research and analysis is relevant to capital market audiences, the effort will also be informed by the ongoing work of the Valuing Water Finance Task Force, a group of pension funds and commercial banks. Ceres has partnered with the Government of Netherlands Valuing Water Initiative on this overall effort to catalyze capital market leaders to address water risk as a financial risk. WC

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Online at WATERCANADA.NET

NEWS: Halifax Water Recommends No Increase in Water Rates Over Next Two Years. ***bit.ly/HalifaxWaterRate***

NEWS: New Partnership Aims to Address Flooding in Okanagan Valley. ***bit.ly/OkanaganFlooding***

NEWS: P.E.I. Launches Cleaning Our Shoreline Initiative on World Oceans Day. ***bit.ly/ShorelineInitiative***

STUDY: Major Investments in Great Lakes Restoration Are Paying Off. ***bit.ly/GreatLakesInvestments***

The Walkerton tragedy led to new legislation in Ontario. But does the new legislation provide the necessary protection for Ontario's drinking water?

Credit: Jac Jacobsen Photographics

Ontario's Clean Water Act

Is the Act responsive to contemporary water source protection challenges?

BY PATRICIA HANIA

IN MAY 2000, the E. coli water crisis in Walkerton, Ontario and the cryptosporidiosis outbreak in the spring of 2001 in North Battleford, Saskatchewan became turning points for water governance in Canada. Provincial governments across the country moved quickly to introduce new water laws, and did so without much debate. In the wake of the Walkerton Inquiry and in response to Justice O'Connor's two-volume report, the Ontario government introduced the Safe Drinking Water Act and the Clean Water Act, 2006 (CWA). The introduction of the CWA focused on a participatory model to water source protection planning and recognized First Nations, municipal, industrial, agricultural, environmental, health, and general public representatives as holding a seat on water source protection committees (O. Reg. 288/07). This localized, stakeholder and consensus-building approach to developing a water plan was considered forward thinking. Ontario was deemed to be a leader in water governance, and the CWA was regarded as a gold standard in legislative reform. In most provinces, this participatory and localized model of water governance is now the dominant model.

In his report, Justice O'Connor stressed that local water management planning had to include input from the general public. In his view, it was important to provide members direct participation to the planning process because it was Ontario's communities that would be most directly affected by all water committee decisions. Justice O'Connor's recommendation was based on the fact that seven residents of Walkerton had paid the ultimate price for the water governance failure on that Victoria Day weekend. An additional 2,300 community members of a town of 5,000 residents had become seriously ill after unknowingly drinking tap water contaminated with the deadly bacteria E. coli (Escherichia coli O157:H7). Justice O'Connor intended that these seven deaths be a constant reminder of the need for input from local communities when it comes to water governance. This tragedy is the reason we need to question whether the CWA is responsive to contemporary water source protection challenges that go beyond the original 21 drinking water threats included in the legislation.

Is the CWA addressing contemporary challenges?

During the first stage of Ontario's water planning from 2007 to 2015, it became evident that the process was not being responsive to local citizens who were concerned about the safety of their drinking water sources. As part of my doctoral research, I attended water planning committee meetings in the Lake Erie Source Protection Region. At that time, this water committee, called the Lake Erie Region Water Source Protection Committee, was unable to

effectively address the primary concern being raised by local citizens about the potential contamination of drinking water sources from aggregate extraction activities. This included the Wellington Water Watchers—a group of citizens—in Guelph, who brought forward their concerns with city officials to the committee relating to the extraction activities at a Dolime Quarry. The committee also heard from the Concerned Citizens of Brant, who were worried that their drinking water source would be at risk of contamination because of planned aggregate extraction activities in the area of Paris, Ontario. Both of these groups requested that the committee seek approval under the CWA to add aggregate extraction to the legislatively prescribed list of drinking water threats. Under the CWA, a water source protection committee can request permission from the Minister to add an additional threat to those listed under regulation O. Reg. 287/07. After numerous presentations to the committee, including an advocacy campaign by a general public representative on the committee, these citizens were denied their request to add aggregate extraction to the region's list of threats. This example illustrates a participatory governance practice that went against Justice O'Connor's local planning recommendation, and where citizens were left frustrated at not being able to protect their local water source.

As Ontario moves into the second water planning cycle, it is time to ask if this regulatory approach has truly been protective of water sources for all Ontario residents. The simple answer is: NO! Even though the legislative purpose of CWA is "to protect existing and future sources of drinking water," there is no certainty that these sources will be protected for all Ontarians.

More recently, another example has been raised as to why water sources may not be well protected. In December 2019, Richard Lindgren and Theresa McClenaghan of the Canadian Environmental Law Association (CELA) submitted an application under Ontario's Environmental Bill of Rights that called for the review and reform of the CWA. They correctly pointed out that the current CWA is limited to municipal drinking water systems, and only to water services served by municipal wells and surface water intakes. Lindgren and McClenaghan argue that existing and future ground water and surface water sources that supply non-municipal drinking water systems should be protected as well. They advocated for an urgent review of these facilities that serve vulnerable populations such as First Nations, the elderly, and children including residents supplied by private well-clusters. Their application highlighted that these vulnerable residents may be at risk of contamination because the facilities or their homes are served by a non-municipal drinking water service not protected under CWA. Their application also pointed out that under the CWA only three bands within 133 First Nation communities receive protection. In part, this limited protection is because the legislation generally extends to those three First Nations, and only to local communities that fall within a source protection region covered by a conservation authority. The CELA application highlighted how water insecurity and drinking water threats continue to exist for many Ontario residents and calls into question whether another Walkerton could happen under the current CWA.

> This tragedy is the reason we need to question whether the CWA is responsive to contemporary water source protection challenges

As currently drafted, the CWA is not responsive to contemporary and future water challenges—as demonstrated by the citizen extraction campaigns and by CELA's concerns. In order to be forward thinking, the Ministry of the Environment, Conservation and Parks must ask some tough questions in this second phase of water planning. In addition to the concerns stated above, two other critical process and substantive concerns should be on the agenda:

Process:

- A water committee's decision-making process must consider an Indigenous worldview of water, and focus on reconciliation by taking into account the participation of Indigenous water knowledge holders. In some First Nations, it is women who carry the responsibility to speak for water, and as such should be offered a seat on a water committee, if they wish.
- A gendered analysis that for example, considers the effects of low-dose exposure of contaminants on women.
- An Integrated Regulatory Approach to take into account conditions set out licences, approval certificates, and Farm Nutrient Management Strategies.

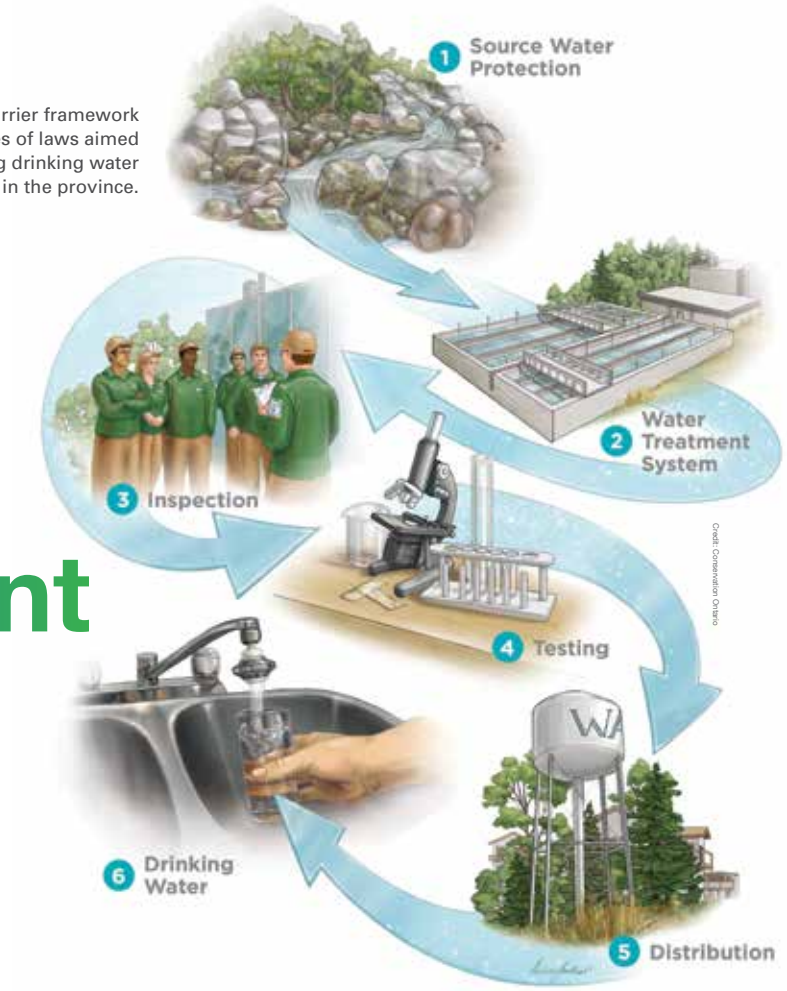
Substantive:

Evaluation and characterization of drinking water risk should include:

- Emerging chemicals of concern from pharmaceuticals excreted by humans and farm animals, pesticides leached into groundwater, microplastics, and nanoparticles in personal care products leached into water sources.
- Legacy sites (old landfills, abandoned wells), small above grade fuel tanks, the runoff from farms into water sources creating algae problems (refer to Ontario's Environmental Commissioner, 2018 Environmental Protection Report).

In order to be a water governance leader, Ontario must consider the public's input in the decision-making process. The voices of concerned citizens cannot be overlooked, as outlined above. And First Nations communities must be invited to participate in a respectful and culturally appropriate regulatory approach. By taking into account these concerns, water source protection committees and the government will be well placed to protect drinking water sources and ensure water security for all residents. WC

Patricia Hania is an assistant professor in the law and business program at Ryerson University's Ted Rogers School of Management, and is a member of Ryerson Urban Water.



Ontario's multi-barrier framework includes a series of laws aimed at protecting drinking water resources in the province.

Essential Watershed Management

Remembering the Walkerton Drinking Water Tragedy.

BY KIM GAVINE AND CHITRA GOWDA

TWENTY YEARS AGO, in May 2000, a municipal well in the Town of Walkerton, Ontario became contaminated with deadly bacteria. Seven people including a child died due to the contamination, and thousands were left with severe long-term illnesses. A waterfall memorial there is dedicated to the victims of this drinking water tragedy, and reminds us about the necessity of proper water management.

Multi-barrier approach to drinking water protection

Since the Walkerton tragedy, vast improvements have been made in drinking water safety in Ontario, due to recommendations stemming from a public inquiry led by Justice O'Conner in 2001. Those recommendations are the building blocks of Ontario's multi-barrier framework that includes the Safe Drinking Water Act (2002), the Clean Water Act (2006), and other laws. Conservation Ontario, the network of Ontario's 36 watershed-based conservation authorities, provided recommendations to the public inquiry including the need for watershed management to protect our drinking water sources.

Since water quality test reporting began in 2004, more than 99.9 per cent of the tests for over 522,000 municipal drinking water systems continue to meet Ontario's water quality standards. Municipally-treated drinking water is delivered safely to over 80 per cent of Ontarians who can trust the tap, water treatment is part of the multi-barrier approach, and it follows the first step of protecting the source water quality and supply. The Great Lakes, inland lakes, rivers, and groundwater aquifers are our sources of drinking water, and we need to protect them from contamination and depletion.

Achievements in protecting drinking water sources

In Ontario, the Clean Water Act mandates the protection of sources of municipal residential drinking water systems, through local source protection plans. Certain other types of drinking water systems can be included as well. The Clean Water Act establishes the framework for local, multi-stakeholder decision making on a watershed basis, in step with Justice O'Conner's recommendations. There are 19 source protection committees representing municipal, economic, public, and Indigenous interests. They carry out their responsibilities supported by the watershed expertise of source protection authorities, who are comprised of Ontario's conservation authorities, the Severn Sound Environmental Association, and the Municipality of Northern Bruce Peninsula.

The committees led the development of 38 local source protection plans. These plans include science-based assessment reports that provide a strong foundation for policies. The assessment reports include delineations of drinking water protection zones around municipal wellheads, surface water intakes, highly vulnerable aquifers, and significant groundwater recharge areas. These zones are based on local science and follow methodologies established by the provincial government. The source protection plans also contain policies that manage certain activities within drinking water protection zones for:

- Over 900 groundwater wells.
- Over 70 Great Lakes intakes.
- Over 60 inland lake intakes.
- 13 Lake St. Clair and St. Lawrence River intakes.

Most source protection plan policy implementation began by 2015, with two-thirds of the implementation by municipalities, close to one-third by provincial ministries, and the rest by conservation authorities and others. Policy tools used include land use planning, risk management plans, permits, and educational programs. Source protection authorities indicate that support from landowners, who implement management measures within protection zones, has been a strong element of success of the program. Other successes include:

- Over 1,000 risk management plans have been established.
- Over 5,000 septic systems have been inspected.
- Over 900 road signs have been installed to identify drinking water protection zones.

The Clean Water Act also supports a continuous cycle of improvement through annual progress reporting and source protection plan updates. Source protection authorities collect information from policy implementers every year to develop progress reports on policy implementation. The plan policies are based on science and approaches that are updated as needed to reflect changing activities on the landscape, growth and development pressures, and other factors.

Finding solutions with watershed management

As we look back at the twenty years since the Walkerton water tragedy and recognize all that has been accomplished, we must also reflect on the lessons learned, plan for challenges ahead, and continue our efforts to protect our sources of drinking water.

A healthy watershed is key to a healthy community and a thriving economy. Conservation authorities and others have long supported elements of source water protection through their local watershed management programs that help to prevent and manage many source-water issues. The multi-stakeholder, collaborative and watershed-based approach in Ontario will continue to help face both ongoing and new challenges in source water protection.

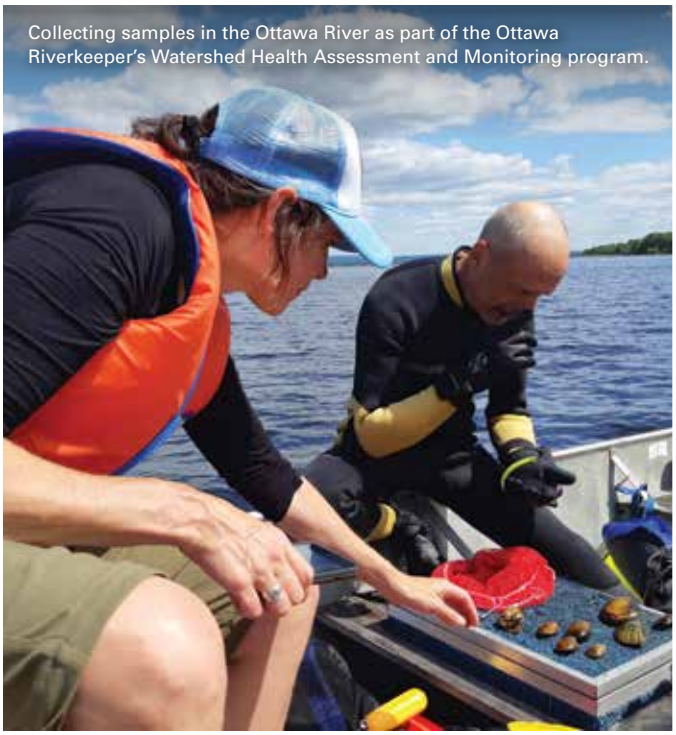
We are living in a markedly changing climate and face exacerbated conditions including warmer temperatures, floods, and droughts. In parts of Ontario, flood events severely impact residents with private water supplies such as wells due to the high risk of contamination. As well, many First Nations communities are challenged with long-term drinking water advisories of boil water, do not consume, or do not use. Emerging contaminants like PFAS (per and polyfluorinated alkyl substances, commonly used in firefighting foam) are a public health concern health. At the same time, we face new unknowns like microplastics for which human health impacts are not fully studied yet.

Watershed-based source protection planning balances economic, social, and environmental needs for healthy and prosperous living. For example, water budget studies show where adequate water supplies exist to support new or growing populations. Watershed monitoring allows for the early detection of climate change impacts, including water quality and supply problems. Watershed-based policies help protect both existing and future water supplies, spanning political boundaries. These are crucial components of watershed management, without which we may become vulnerable to water contamination and lack of adequate water supply.

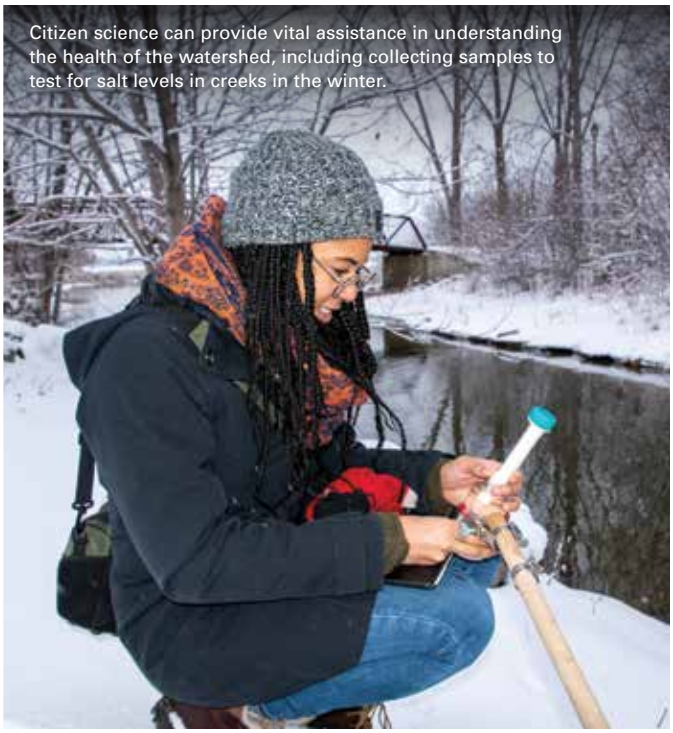
Twenty years after the Walkerton water tragedy, it is more apparent than ever that watershed management is necessary across Ontario to protect our precious sources of drinking water. WC


Chitra Gowda is the source water protection lead at Conservation Ontario.

Kim Gavine is the general manager at Conservation Ontario.



Collecting samples in the Ottawa River as part of the Ottawa Riverkeeper's Watershed Health Assessment and Monitoring program.



Citizen science can provide vital assistance in understanding the health of the watershed, including collecting samples to test for salt levels in creeks in the winter.

All photos: Ottawa Riverkeeper

Assessing the Ottawa River

Informing the public on the quality of the watershed.

BY ELIZABETH LOGUE

IT'S AN EXPRESSION that resonates on so many levels in the water quality and watershed health assessment world! Inviting people to join, to enjoy, and take in the beauty of clean, refreshing water—just the right temperature, not too hot, not too cold. It is also a phrase of encouragement for someone to start something. With the Watershed Health Assessment and Monitoring project that is exactly what Ottawa Riverkeeper organization has done—dove in and invited others to join with a goal to understand how 'fine' the water is.

The Ottawa River watershed is the traditional, unceded, and unsurrendered territory of the Algonquin Anishinaabe people, and now home to many. The name Ottawa is derived from the Anishinàbemowin (Algonquin language) word adàwe, meaning "to trade." Much of the work Ottawa Riverkeeper is doing on and for the protection of the watershed and its health is linked to the sharing of information and knowledge accented on engaging, collecting, and reporting. Sharing the love of the water, and sharing the information that helps assess its health.

Today the river, which stretches 1,271-kilometres from source to mouth, descends approximately 400-metres from an elevation of 430-metres at the headwaters to 20-metres at its mouth, and spans many jurisdictions, including Algonquin First Nations, two provinces, and over 200 municipalities. The Ottawa River is Canada's capital river, a heritage river, and the second largest river in Eastern Canada. This is an important watershed that needs a voice. A voice that aims to bring people and players together, to dive in, to solution-find, share data, and build a story that takes into account the many layers of history and ecology.

Established in 2001, Ottawa Riverkeeper became the third Waterkeeper program in Canada to be licensed by the international Waterkeeper Alliance. Ottawa Riverkeeper works throughout the Ottawa River watershed to protect the Ottawa River and to influence decisions that affect the health and future of the river. A fundamental objective and underlying vision for all that the organization does is based on a desire to know, monitor, and assess the health of the watershed.

In 2006, Ottawa Riverkeeper published a comprehensive assessment of the Ottawa River. The purpose of the report was to inform a broad audience of the current physical and biological conditions of the Ottawa River watershed and the impacts of human activities on the watershed. The report was followed by an Ottawa River Summit in 2010 and another in 2015. It was at this 2015 summit that participants articulated an overwhelming interest in assessing the health of the Ottawa River and its watershed. Given that a full watershed assessment is a very large undertaking, Ottawa Riverkeeper agreed to begin the process. A watershed health committee was established and began a process and series of conversations to develop indicators that could be used to help assess watershed health.

Through this initial study, a series of 14 indicators were selected to help answer the question of how healthy are our rivers. As we continue this investigation

we are gathering, analyzing, and sharing new data for each of the indicators we have identified through collaboration with two Algonquin communities: Kebaowek First Nation and Kitigan Zibi Anishinabeg. Together we are co-designing projects and working with communities throughout the watershed to understand local issues and engaging citizen scientists to participate in community-based monitoring projects. Through this effort to collect and analyze data, we hope to empower people as they learn more about the health of the watershed to take actions to protect the incredible Ottawa River.

How do you know how healthy a river is? This is a question Ottawa Rivekeeper is often asked. However, the answer, especially for a system as complex as the Ottawa River watershed, can be a challenging puzzle to untangle.

What is known and is embraced in a very real way is: that there is great value in searching out an answer so that can help us better understand what influences the health of the rivers, creeks, and lakes that make up the watershed and help guide what needs to be done to protect it into the future. Healthy waterways have intrinsic ecological value and provide a wide range of economic and social benefits to communities—see values for our waterways for information. Waterways are subject to a range of threats which can result in the degradation and loss of ecological, economic, and social value.

This is why Ottawa Riverkeeper's Watershed Health Assessment and Monitoring multi-year project builds off an initial study to continue this investigation. We are creating partnerships, co-designing projects, working with communities throughout the watershed to understand local issues, and engaging citizen scientists to participate in community-based monitoring projects. Through this effort to collect and analyze data, we hope to empower people as they learn more about the health of the watershed to take actions to protect the incredible Ottawa River.

This work will serve as a national model for transparent data dissemination, public engagement, and science-based decision-making. It will drive tangible, data-driven improvements to our watershed and inspire 21st-century river stewardship in Canada.

Ottawa Riverkeepers collect samples from the Ottawa River.

By working collaboratively, Ottawa Riverkeeper engages the public and empowers citizens to become advocates for the protection of the river and all communities. We believe that people protect what they love. Citizen science allows people to engage in real-life issues and actively participate in science driven research. Creating educational opportunities for the upcoming generation of freshwater stewards is a fundamental aspect of our work at Ottawa Riverkeeper.

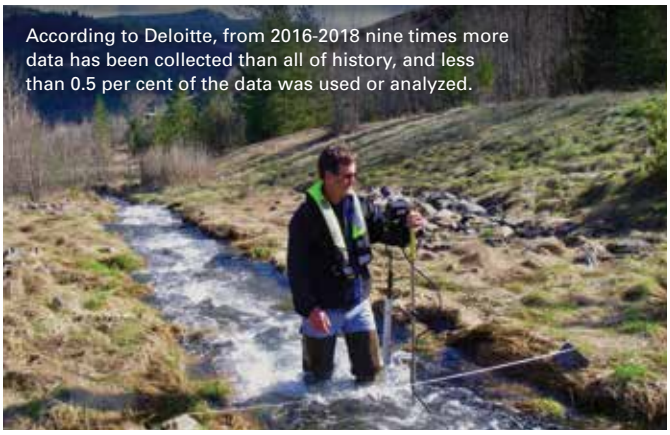
There are three key components of this project. It works to engage through expanding community-based monitoring throughout the watershed and growing the already solid Riverwatcher network and other partners. It also serves to monitor by building on recently-established indicators to coordinate watershed health assessments and using these findings as outward facing educational and engagement tools to reach a broader audience.

Finally, it will report by building interactive media displays and online tools to showcase river data and information that is co-created with communities along the river; and serving as an education and awareness building tool.

To further foster experiential place-based learning, Ottawa Riverkeeper is exploring a river school in the Ottawa River watershed. We will connect people to waterways and empower them to become engaged citizens who can be a voice for the Ottawa River watershed. Using a holistic approach, the river school will incorporate innovative teaching methods by highly qualified educators, scientists, Indigenous knowledge keepers, and community experts.

All this work is impossible without collaboration and building an engaged and connected watershed community. The work of developing a governance model to support the ongoing collaboration, data sharing, and information gathering needed to sustain the watershed health assessment is where Ottawa Riverkeeper is putting muscle now. Reaching out to decision-makers, leaders, politicians, and industry to invite them in to ensure the water is fine. WC

Elizabeth Logue is the Ottawa Riverkeeper.



According to Deloitte, from 2016-2018 nine times more data has been collected than all of history, and less than 0.5 per cent of the data was used or analyzed.

Collection of field sample data and integration of laboratory results through online platforms significantly streamlines the generation of results for analysis.

All photos: Aquatic Informatics

Kelowna Wastewater Treatment Facility uses WaterTax to manage their water data and streamline compliance.

Data for Life

Clean water starts with access to data.

BY EDWARD QUILTY

AS GOVERNMENTS ACROSS CANADA and around the world rally to address the coronavirus pandemic and the economic catastrophe it has unleashed, there is a slower-burning crisis that still needs attention. Water contamination and shortages have the potential to be far more devastating than our current situation if we don't manage this resource better.

Charles Fishman, author of The Big Thirst, observed that water's biggest problem is its invisibility. He said, "You don't tackle problems that are out of sight. We need a new relationship with water, and that has to start with understanding it." One of the many hidden issues for Canadians lies in the high levels of lead found in our tap water; a recent study showed a shocking 39 per cent of samples collected from cities across the country exceeded the national safety standard.

Our modern water crises stem from a lack of visibility which stems from a lack of data, and subsequent analysis to produce actionable insights. Modernizing our water data by using new technology such as the cloud, and seamlessly integrating the latest evolution of software analytics to comply with ongoing changes in regulations, will become a necessity to ensure safe drinking water. The good news is these technologies are getting easier to deploy and manage, regardless of the size and budget of the municipality.

Making water data accessible to protect life

In municipalities across Canada, aging pipes, changing climate, urban sprawl, population growth, toxic chemicals (PFAS), nutrients (HABs), pharmaceuticals, and reduced capital budgets are all serious threats that affect water quality. By successfully connecting water data, municipalities can get a handle on these issues, proactively predict water quality issues, and ultimately protect life with access to timely information.

For example, the City of Ottawa manages two surface water treatment plants and five groundwater well systems to deliver safe drinking water to over 850,000 Canadians. Following an E. coli outbreak in Walkerton in 2001, the City was spurred into action to connect their data and make it accessible to everyone who needed it.

Today, its data input and collection process includes over 100,000 test results per year from a number of different sources, both internal and external. Gwyn Norman, water quality data analyst at the City of Ottawa said, "We keep an eye on lead, disinfectant byproduct, and pH levels, among others, which helps us ensure good water quality for our customers. We also look at our data on a daily basis and analyze trends over time to optimize our treatment process and achieve financial savings."

If you can't manage it, you can't act on it

There's more data being collected from more sources of the water distribution cycle than ever before, and it's no small task managing these continual feeds. To give you an idea, a municipality we work with recently put in 40 water quality monitoring sensors that generate over one million data points every year. Manual entry of this data can take an enormous amount of time and mistakes can be made, making analysis unreliable. Streamlining this process with automation is vital not only for the integrity of the data but also for what insights you gain from it, and proactive actions you take.

Modern data management and analytics allows municipalities to

streamline regulatory compliance and increase access to all stakeholders to make faster, better decisions when it comes to protecting water. Simple tools like automatic alerts to the right people on any connected device when a set threshold is met, allows immediate action to prevent contaminants from going undetected.

Accessible water data changes attitudes

A recent report from the Canadian Water Network highlighted the mounting financial pressures facing Canadian water utilities. Balancing the Books: Financial Sustainability for Canadian Water Systems acknowledges the widening gap between citizen expectations and water system revenue to fully recover costs.

This is not just a Canadian problem, there are similar scenarios in cities and countries all over the world. Because water is largely unpriced, global water infrastructure is drastically underfunded. By sharing information with the public about water quality and conservation efforts in their communities, governments can help change attitudes about the value of water. When everyone can see and make sense of their community's water data, they can all play a role in protecting the integrity of their water supply. Take that one step further to a global sharing of water data and we can adjust our behaviour even more.

Water data creates efficiencies and benefits industry

With around 60 hydroelectric generating stations, Hydro-Québec is one of the world's largest hydroelectricity providers. It is able to achieve this thanks to the expansive hydraulic resources that reside within the province—some 4,500 rivers and a half million lakes.

Part of what makes Hydro-Québec successful is the flexibility that hydropower offers through regional cooperation. By monitoring power levels of neighbouring areas and contrasting against their own reservoir water levels, they are able to make strategic business decisions on how to optimally manage their water and energy reserves. As you might expect, this requires a lot of environmental data.

While water quality stewardship may not be their primary focus, energy providers such as Hydro-Québec are still important players within their regional watersheds. And with water data embedded at the core of operations, it increases the likelihood of that information being fit for sharing among internal and external stakeholders.

Breaking down data silos

Governments, utilities, and agencies across Canada are in various stages of maturity in collecting and analyzing water data from a variety of applications including stormwater, source water, drinking water, wastewater, pretreatment, FOG (fats, oils, and grease), backflow, and asset performance. The problem is much of this data is siloed in the individual organization and in some cases department.

Understanding the relationships between those consolidated water data sources is powerful. It can unveil insights we would never have found otherwise and offer correlations that we can use to test new hypotheses about the cause and effect of different water activity.

For example, changes in water temperature, pH, dissolved oxygen, nitrogen, and chlorophyll individually may not raise alarms but when read together, they indicate signs of agricultural runoff pollution that can cause harmful algal blooms. Having access to data that shows the presence of a high level of a contaminant in one part of a watershed helps inform everyone else in the watershed of its presence, allowing them all to use the data to try and track down the source.

The first milestone on the journey to a sustainable water system is to break down some of the many data silos that currently exist and connect all stakeholders. This could include laboratories, all departments of municipal water and waste, residents, businesses, and environmental agencies—essentially all entities that are served or affected by a water system. Many water organizations are entrenched in legacy systems which can hinder progress. While others have been automating data collection in several areas for some time (e.g. via SCADA), few are examining the data sources alongside other data sources (like LIMS, GIS, billing data, compliance data, etc.) to connect the dots and uncover real insights.

Roadmap for accessible water data

To secure a budget for valuable data initiatives, governments, utilities, and industries that manage and use water should try to solve a small data problem like connecting lab data to compliance data.

By showcasing the results from these small data wins, organizations can unlock more funding to build the people, process, and technology required for more advanced data initiatives.

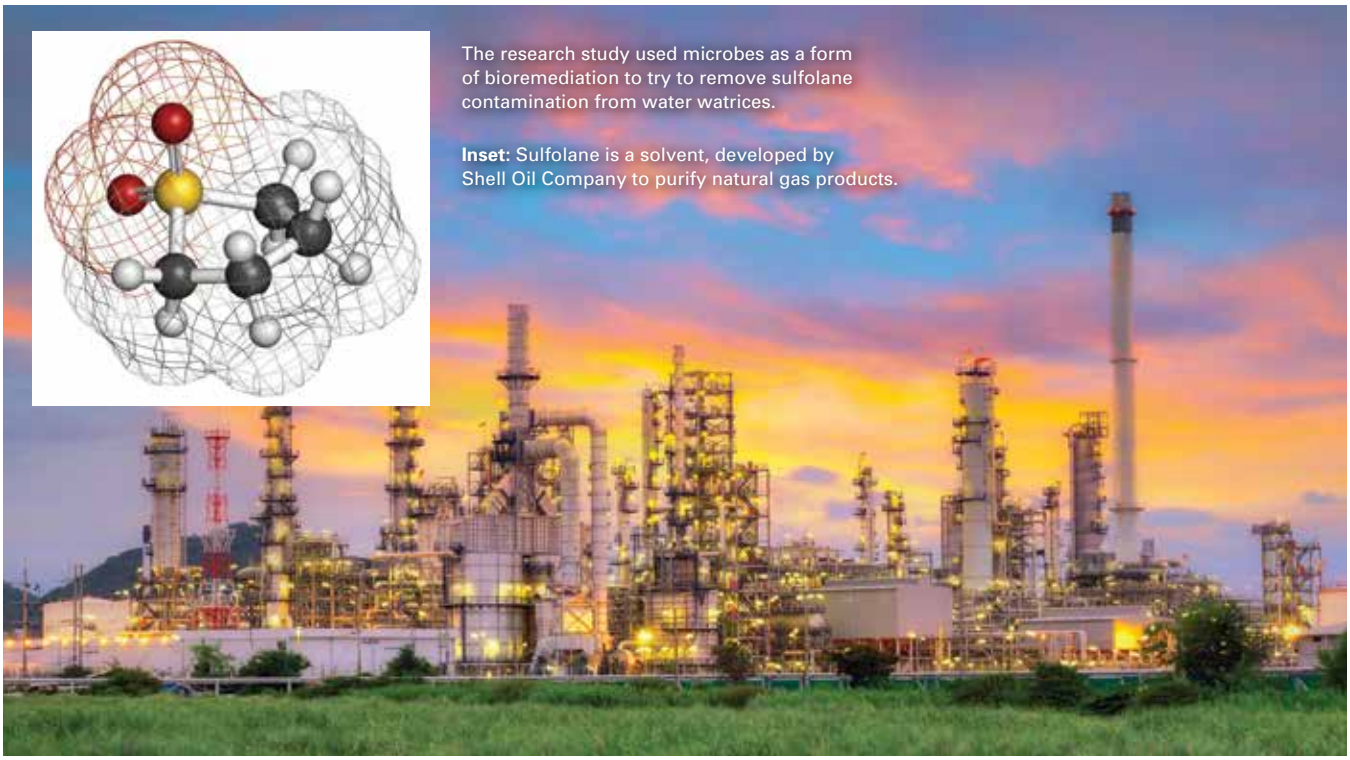
The small data wins can help organizations make real strides towards reaching the four key water data management milestones:

1. Water data fusion to break down data silos.
2. Water data analysis to turn raw data into actionable insights.
3. Internal knowledge sharing across organizations, government departments, and international bodies.
4. External knowledge sharing with industry and the public to educate, inform, and encourage respect for our most important resource.

The more our infrastructure deteriorates, the more cost it takes to fix. We have to fix it, or the risk of contamination increases, and the supply continues to decrease. In order to budget, we need data. As long as that data remains hidden or unused, we won't be able to surface it to rationalize budgets. And without technology, we'll spend an increasing amount of time trying to get the data we need while our resources continue to shrink and the cost to repair and build for the future rises.

It's critical that municipalities have a clear data roadmap and recognize that the true power comes from sharing our insights and collectively creating and protecting a clean water world. WC

Edward Quilty is the founder, president, and CEO of Aquatic Informatics.



The research study used microbes as a form of bioremediation to try to remove sulfolane contamination from water watrices.

Inset: Sulfolane is a solvent, developed by Shell Oil Company to purify natural gas products.

Remediating Sulfolane

New research looks at opportunities for bioremediation.

BY ROBERT LACEY

SULFOLANE, also known as tetramethylene sulfone, is an organosulfur compound. It is a colourless liquid commonly used in the chemical industry as a solvent for extractive distillation and chemical reactions. Sulfolane was originally developed by the Shell Oil Company in the 1960s as a solvent to purify natural gas products specifically related to the removal of H_2S and CO_2.

Initially implemented in Texas in 1964, the use of sulfolane quickly spread among aromatic hydrocarbon processors across continental USA and Canada. Over the coming decades, improper storage, disposal, and management of sulfolane led to contamination issues. Sulfolane contamination is difficult to remediate due to its high solubility in water (1,000 g/L Canadian Environmental Quality Guidelines) as well as the fact that it is also gravimetrically heavier than water. Today, environmental scientists assessing former gas plants are often encountering downgradient groundwater with sulfolane; in some cases, sulfolane can be found kilometers from the source.

Given that sulfolane is a polar aprotic solvent and readily soluble in water, most sulfolane contaminated sites are broad in both scope and complexity. Complicated situations require creative solutions so the concept of utilizing bioremediation as a treatment method for sulfolane was strongly considered by University of Calgary's research group led by Gopal Achari. In October of 2017, Delta Remediation, an environmental technology company from Edmonton, Alberta, was introduced to Dr. Gopal Achari and his team of researchers who were leading the bioremediation studies of sulfolane in water.

Research objectives and methodologies

In January of 2018, Delta Remediation and the University of Calgary became formally engaged through a successful NSERC grant focusing on the specific treatment of sulfolane contaminated waters using integrated biotechnology combined with nanotechnology. The focus of the project was integrating biological treatment (using Delta's microbial cultures) with nano-photocatalysis to develop a robust method to treat sulfolane in water. This was achieved through the following three specific objectives conducted in separate phases:

Phase 1: Evaluation of BioLogix microbes on sulfolane degradation in water

Delta's microbes, namely pseudomonas and archaea, as well as (lab cultured) indigenous microbes, were tested aerobically biodegrade sulfolane in water.

Phase 2: Photocatalytic degradation of sulfolane using nano-structure TiO2

Photocatalytic degradation of sulfolane was studied using different nano-structured TiO2 photocatalysts under varying light conditions. The three TiO_2 photocatalysts were: (1) a TiO_2 nano-powder, (2) an anodized titanium plate and (3) a TiO_2-Graphene (TiO_2-Gr) nano-composite synthesized in-lab.

Phase 3: Integration of BioLogix and TiO_2 photocatalysis

Building on the findings from phase 1 and phase 2, the best option from each technology was selected and integrated using BioLogix as a pre-treatment followed by a nano-photocatalytic treatment.

In Phase 1 highly concentrated strains of lyophilized pseudomonas and archaea powder was prepared using the technology protocols. Simultaneously, indigenous microbes were cultivated from aquifer sediments collected from sulfolane contaminated sites. The sediments were incubated with air and nutrients to ensure microbial activity would continue to occur until they were used. Batch experiments were conducted in 500-millilitre jars capped with perforations to allow contact with air. The experiments were conducted in duplicates for statistical confidence.

The photocatalytic reactions for Phase 2 were carried out in batch mode in a photoreactor lined with the lamp of interest. A Luzchem reactor was used for the mercury UVC, UVA, and visible lamps. An LED photoreactor lined with UVA-LED's was used for the LED experiments. TiO_2-P25 powder (D=50nm) was used without modification and as a composite integrating with graphene.

With Phase 3, the sulfolane groundwater samples were treated with the (pseudomonas) BioLogix product, as Phase 1 determined that these were the most successful microbes in degrading sulfolane contaminated groundwater (100ppm).

The results

All three microbes exhibited sulfolane degradation potential; however, the rate of degradation differed with each culture. For Pseudomonas, sulfolane was degraded to below detectable concentrations within 100 hours. It was also found that Pseudomonas have a lag period around 70 hours before the onset of sulfolane biodegradation. Comparing the half-life of three microbial cultures, Pseudomonas demonstrated a much faster degradation (15 hours) than Archaea (693 hours) and indigenous microbes (37 hours) indicating the effectiveness of utilizing pure cultured microbes in treating sulfolane contaminated water.

The results of pseudomonas and archaea's sulfolane degradation performance augmented with indigenous microbes were interesting, as augmenting the pure cultures with indigenous populations increased the degradation rate by at least two times for both augmented cultures. These observations show that microbial diversity plays a key role in degradation of sulfolane with higher diversity resulting in faster rates of degradation. The impact of water quality and presence of co-contaminant on the BioLogix microbes were also studied. Deionized (DI) water, groundwater, and groundwater spiked with 100 ppm DIPA (common co contaminant) were used in the comparison. Through this aspect of the study, it was be observed that pseudomonas are capable of effectively degrading sulfolane in all three circumstances.

Through the results of the photoreactor studies, it was determined that TiO_2 nano-powder in combination with UVA-LED light source was the most energy efficient and sustainable option to be used as a polishing step in the treatment of sulfolane. It should also be noted that the presence of dissolved organics and ions in various water matrices negatively impacted the photocatalytic degradation of sulfolane. Overall, both photocatalytic and biodegradation process using BioLogix show promise for decontamination of sulfolane in water matrices.

An extension of this research is currently being developed in collaboration with Delta Remediation that will focus on the testing of this treatment process in field pilot studies. WC

Delta Remediation would like to thank the project team for their work in this important environmental research including Dr. Gopal Achari, Dr. Linlong Yu, Yiqiao Yang, and Sripriya Dharwadkar from the University of Calgary as well as James Ehizojie, Faith Fayoyin and Robert Lacey from Delta Remediation Inc.

Robert Lacey is the president of Delta Remediation.

THE GREAT LAKES PLAST

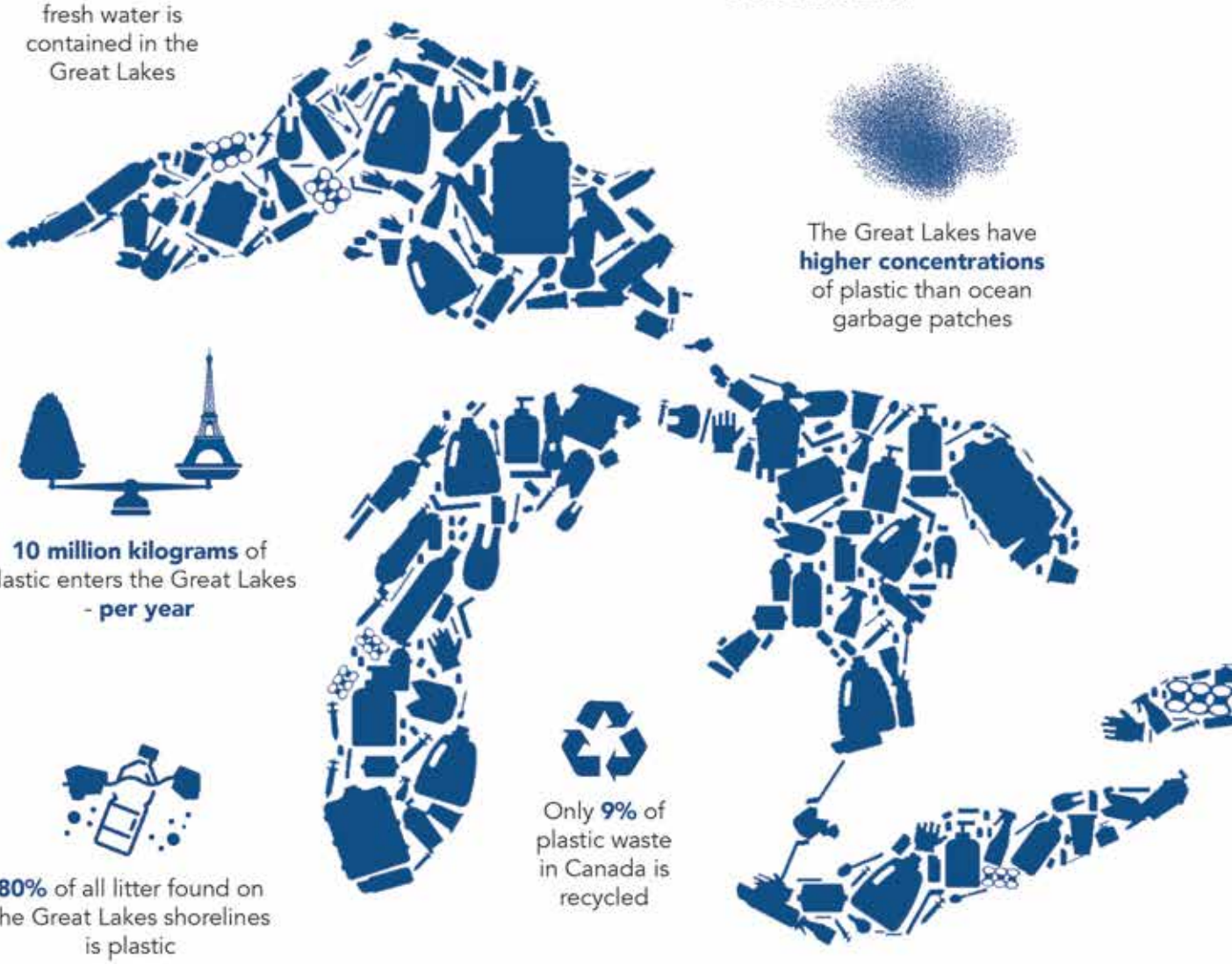
CGLR
COUNCIL OF THE GREAT LAKES REGION
BUILDING OUR FUTURE TODAY
Discover. Connect. Influence.

POLLUTION PROBE
CLEAN AIR. CLEAN WATER.

21% of the planet's and **84%** of North America's surface fresh water is contained in the Great Lakes

107 million people live in the Great Lakes region and rely on the ecosystem services the lakes provide

3500 species of plants and animals live in the Great Lakes Basin



The Great Lakes have **higher concentrations** of plastic than ocean garbage patches

10 million kilograms of plastic enters the Great Lakes - **per year**

Only **9%** of plastic waste in Canada is recycled

80% of all litter found on the Great Lakes shorelines is plastic

TICS CLEANUP

THE CHALLENGE

Millions of kilograms of plastic reach the Great Lakes every year, doing damage to fish and wildlife, polluting the water, and affecting the millions of people who live in the region and are dependent on the largest freshwater system in the world. Research on plastic pollution pathways and long-term environmental impacts is evolving rapidly, and studies show it could cost as much as $400 million annually to clean up and curtail plastic pollution.

THE MISSION

Pollution Probe and the Council of the Great Lakes Region, thanks to generous funding from Environment and Climate Change Canada and help from our dedicated partners, have launched the Great Lakes Plastics Cleanup project, a first-of-its-kind initiative that will utilize innovative technology to quickly remove plastics at marinas from Lake Ontario to Lake Superior and everywhere in between. The litter collected will be analyzed so that we can learn more about plastics pollution in the Great Lakes. Valuable plastics will be recovered and redirected back into the recycling system, creating reuse opportunities and closing the loop. Throughout, we'll be working with lake communities and businesses to keep plastics out of our environment and waterways to protect the Great Lakes, now and for future generations.

THE TECHNOLOGY

SEABINS

Trash skimmers that collect floating litter, using the natural flow of water in the lakes.

LITTATRAPS™

Installed in storm drains to collect plastic in stormwater before it can reach the lakes.

OUR PARTNERS

This project was undertaken with the financial support of:
Ce projet a été réalisé avec l'appui financier de :

Environment and Climate Change Canada
Environnement et Changement climatique Canada

PORALU MARINE

U of T Trash Team

ENVIROPOD

PORTS TORONTO

Boating Ontario

GET INVOLVED!

The Great Lakes Plastics Cleanup is growing fast! Marinas, businesses and partner organizations are coming on board to expand the scope of our work across the Great Lakes. To find out how you can get involved and support the project, contact us at greatlakesplasticscleanup@gmail.com

An Evolving Education

Adjusting the students' education on the fly, and still being able to provide course work that would be valuable for a future career in the water sector, was a challenge at the University of Toronto's Mississauga campus.

Learning about water efficiency and sustainability at the start of the COVID-19 era.

BY ERIC MELITON

FOR THE LAST THREE YEARS, I have had the pleasure of serving as an instructor for University of Toronto Mississauga's Masters of Science in Sustainability Management (MScSM) program. This program has been an inspiration for my professional career pathway, allowing me the opportunity to explore effective ways to share insights gained from 13+ years working in the water industry in North America to aspiring young sustainability professionals.

The Advanced Sustainability Management course is designed to provide knowledge and applications of advanced aspects and tools related to sustainability management. It includes aspects focused on carbon measurement and accounting, energy use in different industrial sectors, and water efficiency and conservation. Drawing from my years of experience in both public and private water industry settings, the focus of the water module this year was to inform students about the holistic approach to water footprint analysis in both industrial and commercial applications.

This course module on water stewardship and efficiency has evolved over the years, previously including elements focused on stormwater management, North American industry growth trends, and national challenges related to drinking water and wastewater treatment. However, designing a four-week module to encompass more than a decade of industry experience in the equivalent of 12 hours of lecture material, definitely has its drawbacks.

This year was going to be different. 2020 was going to be different. I had spent the Fall of 2019 designing a completely different module, taking into account, constructive feedback received from the previous two cohorts of students. I decided to draw from elements focused on water efficiency—one of the core responsibilities of my current role as program manager at the Toronto and Region Conservation Authority's (TRCA) Partners in Project Green program. Ambitiously, I wanted to build within the program group exercises, mock site audit planning and development, complex footprint calculations, review of capital implementation case studies, sectoral challenges and pitfalls. Ultimately, I wanted to link the four-week module with an existing water efficiency program (City of Guelph, Region of Peel, City of Toronto, Region of Waterloo, and York Region) to develop a business case pitch presentation for senior leaders of a selected corporation within one of Ontario's five municipalities. There was even an established contingent of guest advisors from the Ontario water industry—stakeholders gracious enough to provide their time, knowledge, and expertise to assist groups in their pitch presentation efforts and to complete an effective water footprint analysis.

Since the goal of the MScSM program is to provide training for graduates to act outside the traditional disciplinary black boxes, integrate knowledge from social and natural sciences to address sustainability challenges, and develop leaders to make lasting contributions in sustainability management, I believed that this iteration of the Advanced Sustainability module would go without a hitch. Maybe a bad joke here or there.

As luck would have it, the water efficiency module was selected for the March 2020 portion of the Advanced Sustainability Management course execution. This gave me ample time to prepare my course presentation materials, line up guest advisory support schedules, and provide a complex summary of references to guide students in their high level understanding of applying water efficiency best practices to the industrial, commercial, and institutional landscape in Ontario. The first lecture was used to select groups and companies with which to conduct mock audits. With five municipal water efficiency programs in Ontario, five groups were selected—each needing to identify a company or organization suitable for their four-week exercise, with an aim to process real world insights and challenges and mock footprint audit results. The hope was that even with a short window of time, the group would have the capacity to complete some supplementary research on their own, with the hope I could facilitate introductions to strategic champions in my acquaintance within these companies.

Core reference material shared with the student groups included case studies

and the Municipal Water Efficiency Eco-Cluster Summary Report, published by Partners in Project Green, with supportive funding received from the Independent Electricity System Operator's Education and Capacity Building Program. This eco-cluster convened from February 2017 to December 2018 and was built to showcase capital projects derived from the implementation of water and energy best practices from a holistic utility management perspective.

By week two, the world as we know it had changed. At the conclusion of the first lecture, there were grumblings that the Advanced Sustainability Management course would be paused entirely if there wasn't an ability to shift the content and materials to an online delivery format to ensure physical distancing for the students during the early days of the coronavirus pandemic. The students adjusted in stride, leveraging lecture time to complete group exercises through group chats, submitting clarification questions via phone and email, and working diligently in a new era of higher learning.

I was quite proud to see the student groups complete their assignments, develop effective business case pitch presentations, learn how to complete complex water footprint calculations, and apply for regional and municipal incentives for companies selected in each of the five Ontario municipal water efficiency programs. They also received direct constructive feedback from our guest advisors, who served as virtual judges to their pitch presentations. As a bonus for their hard work and dedication to complete the Advanced Sustainability water efficiency module, there were offers established to introduce each student group to their selected company champions (since each company selected had a network within the broader water industry).

This cohort of industry leaders will have a greater perspective on the importance of sustainability as their career paths unfold. WC

Eric Meliton is a program manager of Partners in Project Green, a program of Toronto and Region Conservation Authority.

water's next awards 2020

Celebrating Canadian water leaders and champions

Water's Next winners received a plaque and an individually hand crafted glass pin by artisan glassblower Aaron Calenda of Guelph, Ont.

Welcome to Water's Next 2020

THE 11TH ANNUAL Canadian Water Summit celebrated the winners of the 2020 Water's Next Awards on June 11, 2020.

The Water's Next Awards program is the only national program that honours individuals, projects, and technologies that have made significant contributions to the water industry in Canada.

The presentation of the 2020 Water's Next Awards, which was hosted by Water Canada's Managing Editor Andrew Macklin, took place virtually during the 11th annual Canadian Water Summit.

"This year's Water's Next award finalists and winners reflect the very best of the Canadian water sector," said Macklin. "The people, projects, and technologies recognized show the incredible work being done to improve the quality of our drinking water, the health of our water systems, and the resilience of our communities."

A big thank you goes out to the members of the Water's Next selection committee for their involvement. They poured through the nominations to select the winners of the awards across 12 categories. The members of the selection committee then selected the Project of the Year and the Water Steward of the Year.

Congratulations to all the winners. We'd now like to present the winners of the 2020 Water's Next Awards. WC

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watersnext.com @WatersNext

Credit: Brock University

Academic Leader:
Julia Baird, Brock University

JULIA BAIRD, who is an assistant professor at Brock University, started to appreciate the value of water resources at a young age.

"My early experiences with water were agricultural," said Baird. "I grew up on a farm in southern Manitoba and the conversation around the dinner table was always about water—either there was too much or not enough, or we were in 'good shape' (as my father would say) but anticipating that it wouldn't last long! The critical nature of water was ingrained in me early, and my interest grew over time."

Julia's early interest in water led to a career in academia. According to Ryan Plummer, director of the Environmental Sustainability Research Centre at Brock University, Julia "uses resilience as a lens for her research—with the underlying assumptions that human-environment systems operate in complex and interconnected ways."

The resilience lens is evident in Julia's work, including her role as the Canada Research Chair in Human Dimensions of Water Resources and Water Resilience. "Her research focuses on identifying and testing approaches to improve water governance at the level of the individual, community, watershed, and nation," noted Plummer.

Why is this important? "The approaches we have used in the past to govern our water resources (largely command-and-control) are insufficient to address contemporary and future water challenges," according to Plummer. "Dr. Baird's innovative 'Human Dimensions of Water Resources and Water Resilience' program of research tackles this paramount problem of our time head on." WC

Credit: Peterborough and the Kawarthas

Business Leader:
John Gillis, Innovation Cluster, Peterborough and the Kawarthas

JOHN'S desire to keep fresh water safe and healthy to drink led to his career in the water industry.

"I was born in Peterborough where our waterways are so important to life and the community," said Gillis. "I wanted to see it last for generations."

After graduating with a degree in electrical engineering, John started working at a multi-national corporation. While he was working there, John made a decision to start his own business.

"John created a business in process instrumentation and automation, which quickly grew into a multi-million-dollar company (Milltronics)," said Rachel Stark, a communications coordinator at Innovation Cluster—Peterborough and the Kawarthas, who nominated John for a Water's Next Award. "He then partnered with two young entrepreneurs and two successful business people to start up a technology company (Aclarus) in the water and wastewater market."

After several years of business, John joined the Innovation Cluster as the cleantech innovation specialist. He moved up in the organization and is now the president of the Innovation Cluster.

What's the most interesting part of John's job? "In Peterborough, we have a lot of working parts coming together that involve clean technologies and startups in the water and wastewater markets," said Gillis. "It has been important to our community that all these working parts come together. We have the Innovation Cluster, Fleming College with the Centre for Advancement of Water and Wastewater Technologies (CAWT), and Trent University with Cleantech Commons all coming together to make a positive impact in our community for the water and wastewater sector." WC

Credit: City of London

Government Leader: **Barry Orr,** City of London

"TOILETS ARE NOT TRASH CANS."

That's the message that Barry Orr, a sewer outreach and control inspector at the City of London, has been championing.

Over the past 10 years, one of the issues that Barry has been raising awareness about is the impact of so-called 'flushable' wipes on municipal sewer systems. Many wipes are marketed as 'flushable.' However, they are not safe to be flushed because they don't fall apart quickly like toilet paper. Since wipes don't break down easily, flushing them can lead to blockages in pipes and damage to wastewater treatment equipment.

Barry's advocacy led to an opportunity to work with Ryerson University, which in turn led to the development of a research facility called the Ryerson Flushability Lab.

"This lab has had students from various disciplines help research the performance of various products that are flushed down toilets," said Orr. "We have been able to research how products perform on a number of everyday conditions (e.g. low flow toilet, private drain connection, etc.)."

"The evidence obtained at the lab shows us that the toilet papers and wipes we tested from Japan and Scotland are safe for sewer system flushing," said Orr. "However, most wipes from the rest of the world are not safe to be flushed down a toilet for various reasons."

So how can we ensure that only products that are safe for publicly funded sewer systems are flushed down toilets? According to Barry, "government regulation is the only way to solve what is safe to be flushed." WC

Credit: Conservation Ontario

Non-Government Leader:
Chitra Gowda, Conservation Ontario

A SAFE SUPPLY of clean drinking water plays an important in protecting public health. But what happens if a tragedy like the Walkerton crisis occurs? What if source water becomes contaminated?

One of the important lessons learned from the Walkerton crisis was that source water need to be protected. In 2006, Ontario's Clean Water Act was passed to protect sources of municipal residential drinking water systems.

"The legislation established 19 multi-stakeholder, decisions-making source protection committees," according to Conservation Ontario. This includes "municipalities and 38 source protection authorities comprised of Ontario's conservation authorities."

This is where Chitra Gowda comes in. Chitra was selected as the Water's Next Award winner in the Non-Government Leader category for the work she did in her role as the source water protection lead at Conservation Ontario.

"Chitra leads 36 conservation authorities and two other organizations to implement the requirements of the Clean Water Act, 2006 in Ontario," according to Diane Bloomfield, manager of source water protection at Conservation Halton. "Her collaborative approach to tackle implementation challenges provides fair representation from all regions of the province and includes stakeholders and partners to ensure smooth delivery of the program."

According to Gowda, the coordination of the source water protection authorities has been the most interesting initiative that she has worked on in her current role. "This is both a humbling and tremendous opportunity: to support not only day-to-day operations but also provide strategic direction and recommendations for program growth," said Gowda. "Every day is different, and brings new adventures in source water protection!" WC

Credit: Westbank First Nation

Operator:
Krista Derrickson, Westbank First Nation

"KRISTA SERVES AS an inspiration to First Nation peoples as well as all women."

This is what Kalpna Solanki, chief executive officer of the Environmental Operators Certification Program, had to say about Krista Derrickson, the manager of utilities and public works in Westbank First Nation.

"I originally started my career out by going to school at the Centre for Indigenous Environmental Resources in Winnipeg and was planning on coming back to my community, Westbank First Nation, to be the environmental officer," said Derrickson.

"However, the opportunity presented itself for me to apply to become a utility operator and I took it as a way of being able to help protect the environment," added Derrickson. "I quickly fell in love with the job and industry in general. Within my first year I wrote my first certificate exam and passed, becoming the first Female First Nation Operator certified in North America."

After working as a utility operator and environmental officer in Westbank First Nation, Krista went on to work for the B.C. regional office of Indigenous Services Canada (formerly known as Indigenous and Northern Affairs Canada). While working at Indigenous Services Canada, Krista supported operator training and certification programs—including the Circuit Rider Training Program and Operator Training Program.

Krista worked at Indigenous Services Canada for seven years. After that time, Krista went back to her community and started working as the manager of utilities and public works.

"My community's branding includes three words: community, leadership, and pride," said Derrickson. "This is something I feel every day when I come to work." WC

Credit: Ryerson University

Young Professional: **Anum Khan,** Ryerson University

ANUM KHAN, a graduate student in the civil engineering program at Ryerson University, has gained early recognition for her work on 'flushable' products.

"The assumption that a 'flushable' product is safe to flush down the toilet has caused significant damage to our wastewater collection systems," said Khan. "At Ryerson University, I tested 101 different products for 'flushability' to assess their performance in wastewater collection systems, which led me to co-author a report that has since been internationally-renowned."

The report—Defining 'Flushability' for Sewer Use—came out of the Flushability Lab that's hosted by Ryerson Urban Water at Ryerson University. The report indicated that none of the 101 wipes tested, 23 of which were labelled as 'flushable,' were able to fall apart. This means that if the so-called 'flushable' products are flushed down toilets, they could negatively impact household plumbing and municipal sewage infrastructure.

"Over the last two years, I have been able to attend several conferences that have presented me with the opportunity to showcase my research and garner further interest in the future work of the project," said Khan.

The report presents the need for a legislated standard, according to Barry Orr who co-authored the report alongside Anum and Darko Joksimovic.

"Defining 'Flushability' for Sewer Use clearly highlights the need for a legislated standard definition around the term 'flushable' that ensures a product is safe to be disposed of down the toilet," said Orr. "This will in turn lead to imposing stricter regulations for the labelling of products." WC

Credit: City of Waterloo

Credit: Sanexen

Conveyance:
City of Waterloo

SERVICE EXCELLENCE is one of the guiding principles in the City of Waterloo's 2019 to 2022 Strategic Plan, so it's natural that the City is working on continually improving its water distribution system.

As part of its commitment to service excellence, the City of Waterloo wants to be proactive and find ways to reduce leaks in its distribution system. For this reason, it is undertaking a project using Digital Water Solution's (DWS) Smart Hydrant.

"The goal of the project is to identify leak and pressure events that happen within the water distribution system," said Todd Chapman, the manager of programs (water services) at the City of Waterloo. "The significance of the areas chosen is to test the technology across different pipe materials. The technology is seeking to address holistic network monitoring in the form of leaks, bursts, pressure management, pressure transients, and water temperature."

One of the benefits of the technology is that it can work across asset classes. "Typically, acoustic leak detection technology works well in concrete and metal pipe but struggles in PVC," said Chapman. "DWS's Smart Hydrant works across all materials."

What advice does the City of Waterloo have for other cities that are thinking of undertaking a similar project? "The three main keys to a successful implementation are: 1) knowing what characteristics of the distribution system you wish to monitor; 2) having the operational support required to maintain the system; and, 3) analyzing and setting the various thresholds for different characteristics," said Chapman. WC

Drinking Water:
Sanexen

THE NEED TO REPLACE AGING INFRASTRUCTURE with an effective solution led to the development of Sanexen's second-generation water lining technology.

"Aging water infrastructure needs to first be renewed and second be more resilient at the same time," according to Martin Bureau, vice president of innovation at Sanexen. "To reach the first objective, investments needed are estimated in the tens of billions for potable water infrastructure alone, which raises the urgent need for cost-effective solutions."

"Given the costs of the resilient solutions based on open trench pipe replacement, which are more than three times more expensive than regular pipe replacement, developing a trenchless solution for both pipe renewal and pipe resiliency constitutes a fantastic challenge," added Bureau.

This is where SANEXEN's Second Generation Trenchless Structural Cured-In-Place-Pipe (CIPP) technology comes in.

"The proposed solution offers a less disruptive, less costly, more environmentally friendly, and physically superior alternative to the outright replacement of aging or deteriorated water main pipes," according to Marie-Chantal Savoy, vice president of strategy and communications at Logistec, which is the parent company of Sanexen.

According to Sanexen, one of the operational benefits of its technology is that can be deployed quicker than alternative solutions. "From an operational standpoint, our second-generation water lining technology can be deployed to achieve pipe renewal and pipe resiliency up to ten times faster than the leading resilient solution based open trench pipe replacement," said Bureau. WC

Credit: Bishop Water and The Nation Municipality

Early Adoption: Bishop Water and The Nation Municipality

THE NATION MUNICIPALITY, which is located 45 minutes east of Ottawa, is upgrading the capacity and performance of the Limoges Wastewater Treatment Facility (WWTF) using Bishop Water's BioCord Reactor system.

"The upgrade will enable the municipality to better accommodate community growth and ensure compliance with treatment regulations," said Kevin Bossy, chief executive officer of Bishop Water Technologies. "Bishop BioCord Reactors are a fixed-film biological treatment process that uses strands of densely arranged loops of polymer fibers suspended from free-standing frames."

"This media provides a massive surface area on which preferred, naturally occurring bacteria can grow," added Bossy. "Sixty BioCord reactors will be installed into two new lagoon cells that will be created by dividing a large existing cell."

To meet the requirements of anticipated residential and commercial growth in the community, many treatment options were considered by The Nation Municipality and the project engineer R.V. Anderson Associates Limited.

"The Nation Municipality is always striving to introduce new technologies that will result in lower capital and maintenance costs, and provide a higher quality effluent from the Limoges Wastewater Treatment Facility," said Mayor Francois St Amour.

Bishop BioCord Reactors were ultimately selected because "the project will enable The Nation Municipality to extend the life of its wastewater lagoon system and avoid the need to replace it with a costly mechanical treatment plant," said Bossy. "BioCord Reactors are a made-in-Canada solution that is tested and proven to provide low-energy, self-regulating nutrient removal throughout the wide range of seasonal operating conditions that a plant experiences." WC

Credit: BQE Water

TIED WINNERS Wastewater: BQE Water

SELENIUM is an element that is found naturally in the environment. Despite this, high concentrations of the element have proven to be toxic to aquatic life.

"In mining, extraction and processing activities accelerate selenium release into the environment," according to David Kratochvil, president and CEO of BQE Water. "And in power generation, the ash waste from coal fired power plants that is stored in coal ash ponds often contains elevated levels of selenium."

Regulations were introduced to minimize the harmful effects of selenium on aquatic life. As a result, the mining industry needed access to technologies that could help it meet regulatory requirements.

"Mining companies turned to biological selenium treatment from power generation despite concerns that […] different conditions exist between the two industries," said Kratochvil. "Selen-IX™ addresses the limitations of biological systems to treat selenium in the mining industry." WC

Credit: Sentry

TIED WINNERS Wastewater: Sentry

THE NEED FOR real-time, reliable, and robust data for operators and process optimization specialists led to the development of SENTRY.

"Existing water quality monitoring solutions are cost prohibitive and labour intensive, requiring manual sample analysis or significant sensor cleaning and maintenance," said Patrick Kiely, CEO of Island Water Technologies.

To address this, SENTRY alerts operators of process imbalance or toxicity events. "SENTRY was developed as a robust, all-ways on, bio-electrode based monitoring platform that tracks microbial activity and notifies operators of key process upset events," said Kiely. SENTRY is supporting a number of clients across Canada. "On daily basis, we are helping our industrial wastewater treatment clients to identify and eliminate biological imbalance events," said Kiely. "We are also engaged with municipal clients to identify cost savings (reduced aeration or chemical dosing) or increased revenue generation though maximized organic loading or biogas generation." WC

Credit: Aclarus Ozone

Water Resources: Aclarus Ozone

"SUSTAINABLE AND EFFECTIVE TREATMENT OF GROUNDWATER, green-roof, and rainwater from buildings for non-potable reuse is growing in importance due to anticipated water shortages," according to Adam Doran, vice president of sales and marketing at Aclarus Ozone.

Doran noted that one of the benefits of reusing water is that it reduces the demand for potable water in cases where non-potable water can be used (e.g. toilets). This led to the need for a system to that can provide treatment onsite.

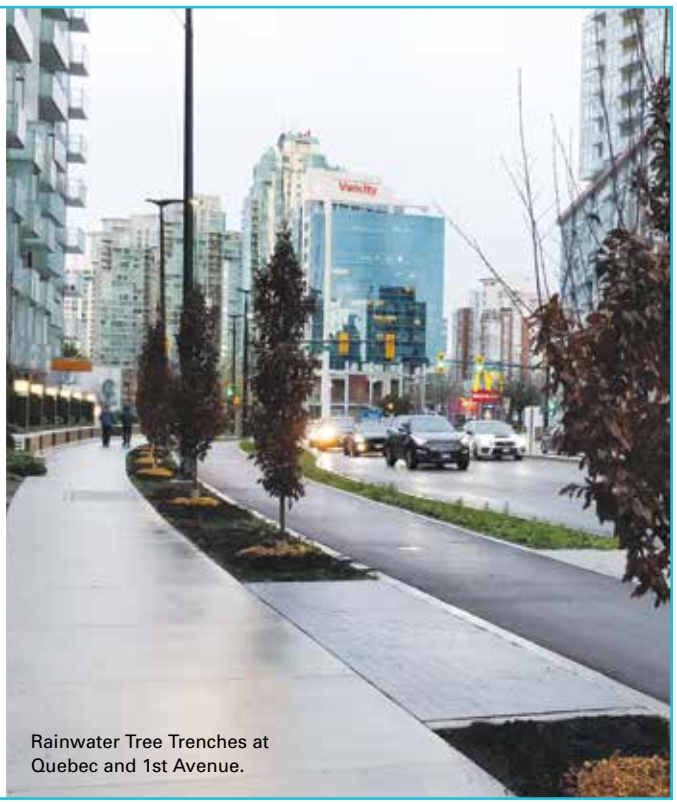
"Aclarus systems offer ultra-low operating costs (approximately five cents per 1,000 litres) [and] minimal maintenance or downtime," said Doran. A system "can include remote monitoring, which makes it attractive to building owners to be environmentally responsible and [adhere] to guidelines [at the same time]."

Another driver for the development of Aclarus' technology was that the company "was approached by a major construction firm in Toronto for treatment of highly contaminated groundwater," said Doran. "This project and relationship led to the firm recommending our technology to their competitors facing similar issues as well to building design firms. This evolved to our system being hard-specified for multiple projects for reuse for buildings within the Greater Toronto Area (GTA)."

The company has established itself as a leader in ozonation, according to Doran. "Aclarus Ozone now has over 900 systems across Canada and nine countries, all of which solved water issues and replaced potential chemicals from being used." WC

All photos: Rain City Strategy

Bioswale at 63rd Avenue and Yukon.



Rainwater Tree Trenches at Quebec and 1st Avenue.

Stormwater and Project of the Year:

City of Vancouver's Rain City Strategy

LIKE MANY CITIES, the City of Vancouver is dealing with pressures associated with urban densification, aging infrastructure, and climate change. The City developed the Rain City Strategy to help address these challenges.

"Vancouver is facing many water-related challenges including the climate emergency, water quality, combined sewer overflows, aging sewer and drainage infrastructure, and population growth," said Wendy de Hoog, a senior planner with the Green Infrastructure Branch at the City of Vancouver. "The Rain City Strategy is an opportunity to address many of these challenges through integrated planning processes and the use of green rainwater infrastructure."

According to de Hoog, the Rain City Strategy provides an outlook to 2050 and a 30-year road-map to transform Vancouver into a city that "values water as a resource." The strategy also aims to change rainwater management in the city using approaches that integrate grey and green infrastructure.

The Rain City Strategy has three main goals:

1. To improve and protect Vancouver's water quality.
2. To increase Vancouver's resilience through sustainable water management.
3. To enhance Vancouver's livability by improving natural and urban ecosystems.

The strategy also set two performance-based outcomes. The first outcome is to capture and treat a minimum of 90 per cent of Vancouver's average rainfall. The second is to manage urban rainwater runoff from 40 per cent of imperious areas in the city by 2050.

"The Rain City Strategy is one of the most ambitious green rainwater infrastructure strategies in Canada," said de Hoog. "It adopts a design standard to capture and clean 48-millimetres of rainfall per day on both public and private properties and sites. This strategy will not only create more economic opportunities and green jobs for the Canadian water industry, but also encourages innovation in rainwater management products and design."

This is in part because the implementation of the Rain City Strategy will require a workforce that can design, construct, inspect, operate, and maintain green infrastructure, according to information provided by Julie McManus who is a planner at the City of Vancouver.

What advice does the City of Vancouver have for other cities that are thinking about developing and implementing a similar strategy?

"Up until now, most rainwater in Vancouver has been managed through a conveyance only system using a network of pipes," said de Hoog. "Green rainwater infrastructure brings rainwater management back to the surface of our city through for instance implementing biorentention, permeable pavement wetlands, tree trenches, and blue-green roofs."

"As a project focused on changing business as usual processes at the City of Vancouver, collaboration is key!" added de Hoog. "While it may be challenging, taking the time to listen to many opinions, break down silos, and create a shared, collaborative vision is key to creating a long-term and lasting change." WC

Image Credit: City of Vancouver

Water Steward of the Year:

Melina Scholefield, City of Vancouver

A VARIETY OF FACTORS—including urban densification, aging infrastructure, and changing weather patterns—have been putting pressure on Vancouver's sewer and drainage utilities. To address these pressures, the City of Vancouver approved the Integrated Rainwater Management Plan (IRMP) in 2016.

This plan "recommended the creation of the Green Infrastructure Implementation Branch to help guide the application of green infrastructure (GI) on public, private, and park lands," according to Julie McManus, a planner at the City of Vancouver.

"Under Melina Scholefield's leadership, this branch developed the Rain City Strategy, which goes beyond regulatory obligation of the IRMP to address many of the stresses and pressures facing the City of Vancouver," added McManus.

Since September 2016, Scholefield has been the manager of green infrastructure implementation at the City of Vancouver. In that role, she has helped shift the narrative around rainwater and green infrastructure.

"Early on in our process, few people recognized or appreciated the potential of green infrastructure approaches to water management," said Scholefield. "They were mostly described as a 'nice to have' while the traditional grey systems do the essential work."

"Since then, the view has shifted significantly," added Scholefield. "Now, there is widespread understanding of how green infrastructure not only delivers water management performance outcomes but also cost-effectively provides many co-benefits for climate resilience, urban ecology, place making, and public health."

Part of this change has come from the fact that Scholefield has prioritized engagement with the public, industry, academia, local First Nations governments, and subject matter experts.

"Melina always makes time to participate in public engagement sessions [and] conference presentations […] to share the City's efforts in advancing the Rain City Strategy," said McManus. "She sees these relationships as reciprocal—a chance to educate people on water related challenges and solutions, as well as a chance to collaborate on the solutions."

The impact of Scholefield's work extends beyond Vancouver. She is involved in the Green Infrastructure Exchange network. She has also taken the time to share best practices with other cities that have interest in developing their own green infrastructure programs.

"By sharing Vancouver's own transformation journey through the Rain City Strategy, I hope that other cities can leverage our approach, lessons learned, and vision for the future to make change in their own communities," said Scholefield. "The more people striving to advance the state of practice around green infrastructure and integrated water management, the more we can help each other and make progress towards sustainable, equitable, and resilient water systems."

Seattle is one of the cities that has benefitted from Melina's insights. "The City of Seattle has learned a great deal from the exchange through Melina," said Leslie Webster from Seattle Public Utilities. "She has generously shared the creativity, innovation, and technical excellence that is characteristic of her leadership style. Her tireless energy and enthusiasm for her work is contagious and an inspiration to those who get to work with her." WC

APPOINTED

CAROL SAAB

Bill Karsten, president of the Federation of Canadian Municipalities (FCM), issued a statement announcing **Carole Saab** as the organization's next chief executive officer following the retirement of **Brock Carlton**.

"On behalf of the FCM Board of Directors, I am excited to announce that Carole Saab will serve as FCM's next CEO.

"Canadian municipalities have a strong champion in Carole Saab. She brings to the role of CEO a clear and ambitious vision for Canada's municipal order of government as a force on the national and international stage. Repeatedly recognized as one of Canada's Top 100 Lobbyists, Carole has relentlessly forged new paths for local government as advocates and as builders through innovative programming."

JEANHY SHIM

Catherine McKenna, minister of infrastructure and communities, made a statement on the federal reappointment of **Jeanhy Shim** to the Waterfront Toronto Board of Directors for a three-year period.

"I am happy to announce that Jeanhy Shim has been reappointed to the Waterfront Toronto Board of Directors. Over the past three years, she has brought valuable knowledge and experience to the Board, and her reappointment will ensure continuity as Waterfront Toronto embarks on the next phase of waterfront revitalization.

"Ms. Shim is an important trailblazer in Canada's real estate industry. Over the last 28 years she has been providing strategic market advice on hundreds of residential and mixed-use projects across Toronto, the GTA as well as projects in other areas of Ontario, Canada, and USA."

JEAN BOUDREAU

Engineers Canada has elected **Jean Boudreau** as president for the 2020–2021 term. In this role, she will join the organization's board in working with regulators to advance the profession.

A professional engineer and senior consultant at GEMTEC Limited, she has over 30 years of experience in civil engineering, highway planning and design, and civil construction projects, with the largest portion of her work over the last 25 years comprised of highway and hydraulic structures design projects.

Additionally, Boudreau has been an active volunteer in a variety of community as well as professional organizations. As the director for Engineers Canada from New Brunswick, she is a member of the executive team of the Association of Professional Engineers and Geoscientists of New Brunswick.

NICK REID

Nick Reid is the new president of the Ontario Water Works Association. Reid takes over the role from Reg Russwurm, who takes the role of past president.

Reid has been the executive director of Ryerson Urban Water of March 2016. Prior to joining Ryerson, Reid spent 21 years at the Ontario Clean Water Agency, most recently holding the position of vice president of strategic partnerships.

Jaime Boutillier, an associate partner and manager of field services at CIMA+, has taken over the role as the association's vice-president.

Saugeen Conservation announced that **Jennifer Stephens** became the new general manager/secretary—treasurer effective June 1, 2020.

"We are very pleased that Ms. Stephens will be joining our team and look forward to her building on our strong foundation which has been established over the past 70 years," said **Dan Gieruszak**, chair of Saugeen Conservation.

Stephens brings over 15 years of progressive experience to her new role. She excels in the areas of strategic planning, change management, and leadership. She has a proven track record of stakeholder engagement, collaboration, and developing service driven teams that have clear priorities and expectations. Further, Stephens has detailed knowledge of conservation authority programs, administration, and finances, having worked with Conservation Ontario and directly with nine conservation authorities.

COVID-19 and the Canadian Water Industry

The conversations in the Canadian water industry have shifted since the initial outbreak of COVID-19. While we know more now than we did in March 2020, there is still a lot of uncertainty that remains.

How have conversations shifted over the past few months?

BY SIMRAN CHATTHA

A NUMBER OF IMPORTANT CONVERSATIONS have occurred in the Canadian water industry since March 2020, which was when the initial COVID-19 outbreak started affecting communities across the country.

Initially in March, there were questions about how the COVID-19 pandemic would impact water service delivery. More specifically, what would happen if an unplanned water service disruption were to occur? To find out, Water Canada reached out to experts in the Canadian water industry—including the Canadian Water and Wastewater Association (CWWA), EPCOR, and the Ontario Water Works Association (OWWA). The information provided by these stakeholders indicated that there would be added challenges but that municipalities would consider alternative means (e.g. bulk water deliveries) to continue providing safe drinking water.

In March, there were also concerns about the impacts that so-called 'flushable' wipes were having on municipal sewer systems. This became a heightened issue when stores ran out of toilet paper due to an influx of people buying the product. This led to people buying alternative products, like 'flushable' wipes, which were then being flushed. Municipalities in Canada, and the United States as well, urged residents to not flush these alternative products because they were leading to blockages in and causing damage to wastewater equipment.

In April 2020, conversations started taking place about how testing sewage could lead to insights about the spread of COVID-19 in communities. At the time, there was also uncertainty about how to accurately translate the number of COVID-19 particles found in wastewater into how many people were infected with the virus in a community. Since then, a number of researchers have started looking into how the implementation of a new method or methods of wastewater monitoring could help with early detection and flare-ups in communities.

In May 2020, discussions started taking place about reopening buildings that had been shut for a prolonged period of time. There were concerns that waterborne pathogens and harmful disinfectant by-products could build up overtime in stagnant water. As a result, the Canadian Water and Wastewater Association (CWWA) released guidance for building owners on what they could do to ensure the safety of drinking water in their buildings. CWWA also prepared guidance for water utilities because they needed to be prepared for the increased flushing that would take place in buildings.

In June 2020, conversations started revolving around the role that the Canadian water industry could play in the country's economic recovery. Michael Drescher, an associate professor at the University of Waterloo, and Lucas Mollame, a master's candidate at the University of Waterloo, wrote an article for The Conversation that highlighted the role that green infrastructure could play to "jump-start" the economy. Generally speaking, there were also discussions about the role shovel-ready projects could play in restarting the economy.

As a result of the pandemic, I've been hearing conversations about how we can't return to the old 'normal.' There have been calls for issues like climate change to be at the forefront of Canada's economic recovery. There isn't any certainty about how things will pan out over the coming months so we'll have to wait and see what happens. WC

Simran Chattha is the associate editor of Water Canada.

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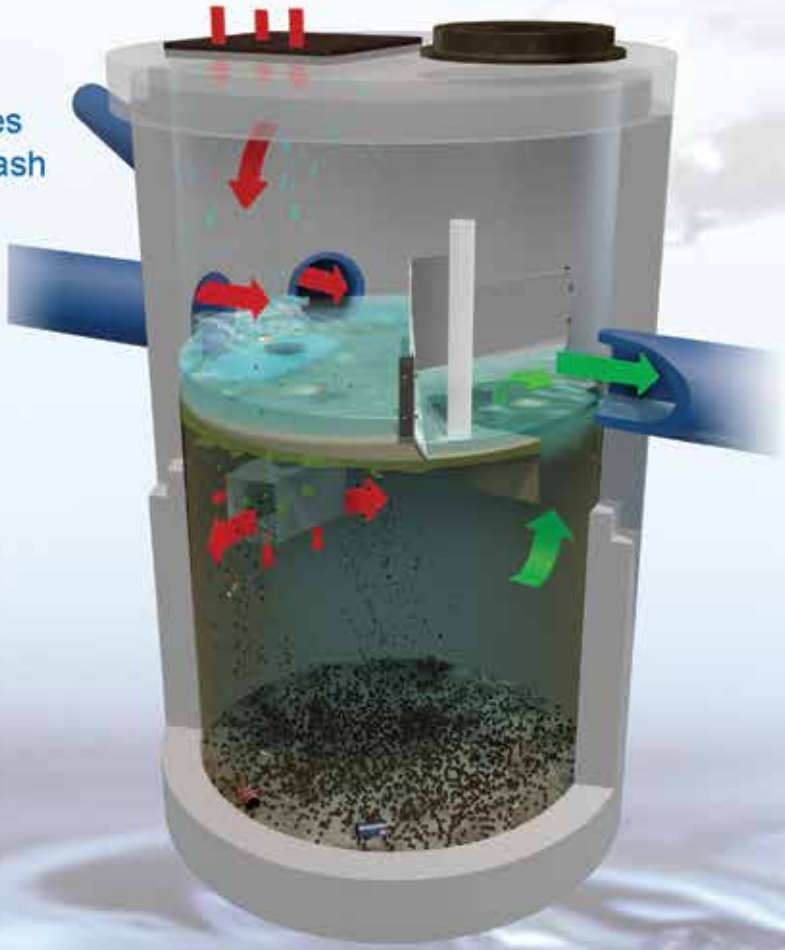

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