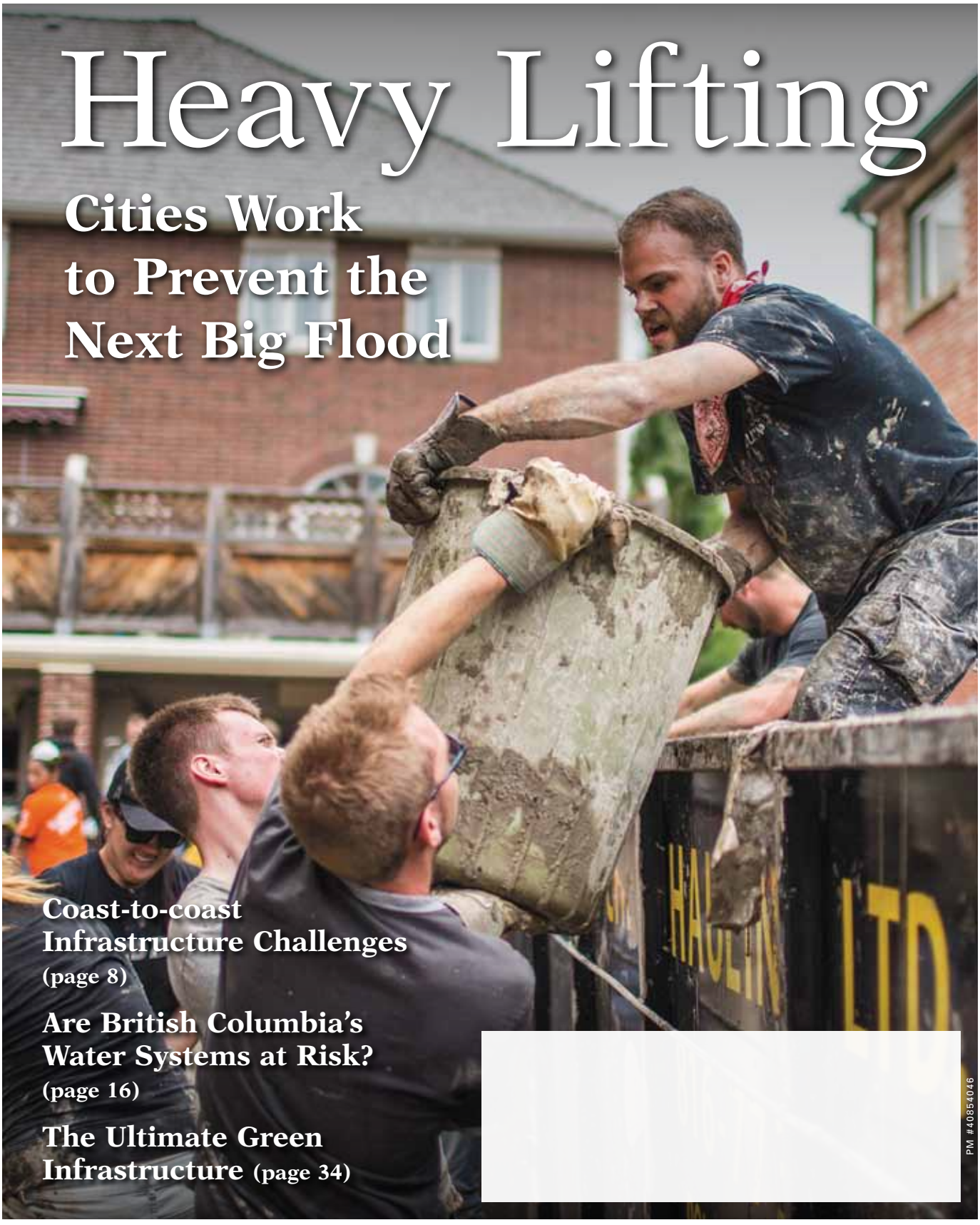
THE COMPLETE WATER MAGAZINE

MARCH/APRIL 2015

WATER CANADA



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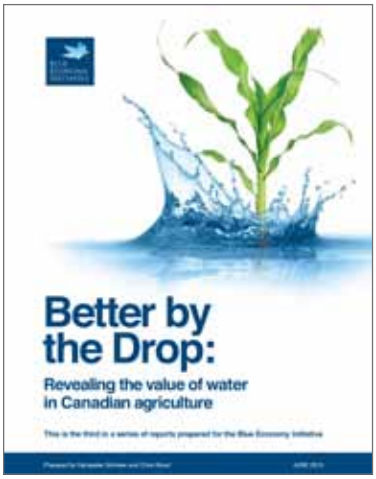
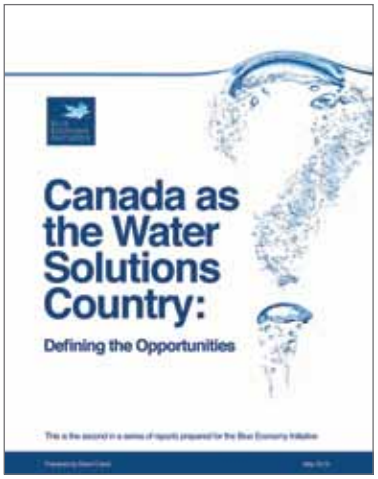


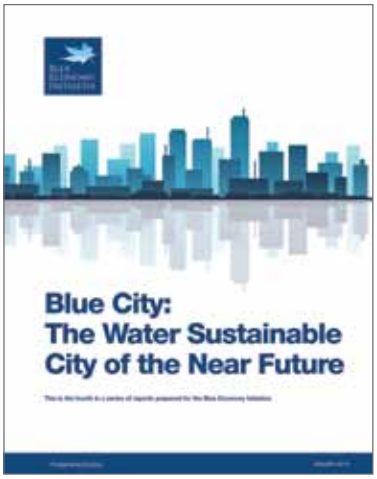
Feed the World

- *Better by the Drop* offers seven recommendations for developing a strategic approach to water use and management in agricultural production.
- Canada's most productive food-growing regions are our driest. Maximize water productivity using water math.
- Recommendations include developing flood contingency plans and providing incentives for innovation in water efficiency.



Solve the Water Crisis

- *Canada as the Water Solutions Country* presents nine ways to become a leader in water sustainability and innovation.
- These include an increasing number of homegrown water companies going global and new forms of water infrastructure financing.
- The report highlights Canada's top six water opportunities, including improving water use in agriculture with innovation and repairing aging infrastructure.



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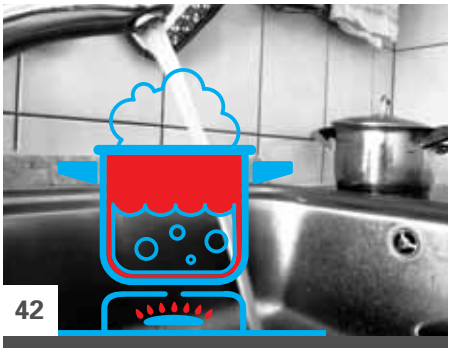
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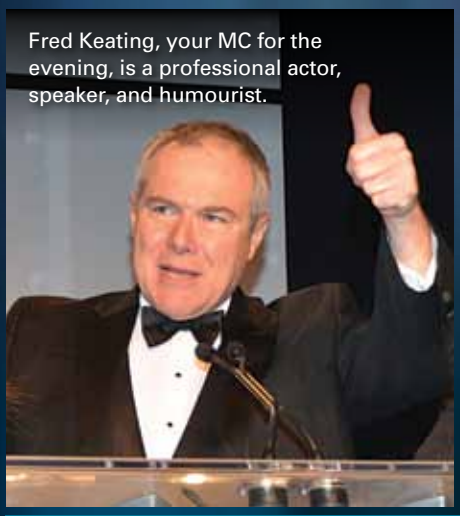

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No Risks, No Rewards

Innovation and political will are essential to closing the infrastructure gap.

BY RACHEL PHAN

WHILE EVERY MUNICIPALITY has its own specific challenges and priorities (*see page 8*), most municipalities—big and small—face one common problem: massive price tags associated with fixing and replacing aging infrastructure.

According to a 2013 paper by the Canadian Centre for Policy Alternatives entitled Canada's Infrastructure Gap, "underinvestment in infrastructure is not a crisis, but a chronic problem in Canada." And the "cumulative effect of infrastructure underfunding means Canada is missing $145-billion worth of infrastructure." The report outlines that it would require an additional $20 billion to $30 billion per year for 10 years on top of current spending to return infrastructure funding to historic levels.

But we can't just focus on the financial aspects of updating our cities' urban infrastructure. We must remember to pay equal attention to other vital questions: what exactly do we want our infrastructure to look like in the future? How will this infrastructure of the future be built?

Many of our current infrastructure systems are decades old, having been built in the 1950s, '60s, and '70s. These systems are simply incapable of handling our 21st century problems—climate change, tightening budgets, pharmaceutical contaminants, and growing urban populations, just to name a few.

The clear answer then is to turn to innovation: emerging technologies that minimize disruption and provide real, cost-saving solutions (*see page 28*), unconventional methods like bringing together groups of hackers (*see page 22*), and research conducted at our universities and colleges (*see page 30*). A Blue Economy Initiative report called Canada as the Water Solutions Country recognizes our incredible potential to be major players on the global water stage. This potential for innovation not only could lead to significant economic gains for Canada, but it will go a long way in closing our massive infrastructure gap.

So, what's the problem? The problem is that the water industry by nature is conservative. Water infrastructure is systemically resistant to change because it is so heavily interlinked with public health and must meet high expectations for reliable service, as well as comply with regulations. To add to this, our water and wastewater systems have long service lives, so there aren't many opportunities for large-scale overhauls in the first place.

True water innovators and leaders, such as Singapore, are often driven by a real fear of running out of water. In California's Orange County, wastewater has been recycled back into the drinking water supply for decades. In Canada, we don't feel that pressure because of our perception of abundance.

Officials are often wary of experimentation because the potential punishment for failure is greater than any possible rewards for risk-taking. But as we see with Philadelphia mayor Michael Nutter and his green infrastructure initiatives, things can certainly happen if (and that's a big if) there's actually political will.

It's evident from previous Water's Next winners (*see page 24*) and the nearly 90 nominations we received for this year's Water's Next awards that Canada is rich with innovative potential. And these innovations can offer immediate savings that could—and should—close the widening infrastructure gap. WC

How is your city using innovation to cut costs? Email **rachel@watercanada.net**

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PG 26

ABOUT THE COVER

After the devastating Alberta floods in 2013, residents of the City of Calgary banded together to help with clean-up efforts. In this issue, we look at ways Canadian cities are tackling their biggest infrastructure challenges and the capacity of people—from utility workers (*page 8*) to politicians (*page 14*) to everyday citizens (*page 22*)—to work together to build resilient communities.

Credit: City of Calgary

NEXT ISSUE: MAY/JUNE

- **Provincial and Territorial Water Policy Updates**
- **Safe Drinking Water for First Nations Act**
- **Water and Municipal Politics**

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FRONT

Credit: Tohru Murakami via Flickr

Researchers say climate change could exacerbate the effects of certain chemicals on species like the zebrafish.

Chemical Reaction

RESEARCHERS from the University of Exeter and biopharmaceutical company Astra-Zeneca have made some troubling discoveries about climate change's compounding effect on aquatic pollution. In a new study published in the Proceedings of the National Academy of Sciences of the United States of America journal, the researchers determined that clotrimazole, a hormone-disrupting chemical found in anti-fungal treatments, had a noticeable impact on the sex-ratio of zebrafish, skewing it in favour of males and increasing their risk of extinction.

While those findings may be worrisome enough (except, possibly, for the remaining female zebrafish), the effects were even more pronounced when the experiment was performed in water warmed to imitate temperatures expected after another 85 years of climate change.

"Chemicals in the environment are usually looked at in isolation, but in reality animals are exposed to multiple stressful events at the same time," said senior study author and professor Charles Tyler of the University of Exeter. "They include changes in temperature, food scarcity, or harmful chemicals. It is important that we understand how these pressures interact if we are to understand the real impact of rising global temperatures and increasing levels of pollution."

Studies of this sort are likely to contribute to tightened European Union restrictions surrounding the disposal of hormone-disrupting chemicals, which will make life more difficult for both pharmaceutical companies and the general public.

"Chemicals, including pharmaceuticals, bring a wide range of benefits to society," said Ross Brown, another lead author of the study, also of the University of Exeter. "Assuring their continued safe and sustainable use requires appropriate testing and assessment, taking into account future projections for the human population and the environment. Climate change is a global phenomenon and in this study we have shown that rising temperatures could exacerbate the effects of certain chemicals in the environment, highlighting the need for appropriate assessments."

As the world's human population continues to expand over the next decades, and the economic and industrial outputs of countries around the globe increases, animals like the zebrafish will be increasingly subjected to environmental pressures, and will face a more uncertain path to survival. WC —Staff

WE ASKED, YOU ANSWERED

In January, Water Canada asked its Twitter followers: What are your community's drinking water challenges? Joanie Walker of Dipper Harbour, New Brunswick, located beside the Bay of Fundy and near the Point Lepreau nuclear plant, answered:

We have been told by locals that there could be salt water or arsenic in our drilled well. It smells like dog urine—even in the washer! I always drink tap water, but couldn't do it here due to the taste and smell.

Our dogs had skin issues when we moved here due to flea allergies, but we noticed later that the cat also had a bald spot on her back so we switched them all to bottled water and they all have hair now.

The arsenic came to mind because a neighbour told us she moved out when she started having problems physically after living next door on a different well. Her doctor said it was similar to arsenic poisoning symptoms, and when she moved, she stopped having muscle pains and discomfort. She wasn't drinking the water, but took long hot baths every night while the rest of the family showered instead and were not affected. Very strange, but it made me wary of taking baths here.

I read that arsenic is common in areas where mining occurred in New Brunswick and we also live on the ocean so it could be salt water if that's possible.

We have been here eight months now and the smell and taste are still there, regardless of whether it's winter or summer. Those are our water woes!

Have an idea what could be in Joanie's water?

Tweet us **@CanadianWater**

or email **rachel@watercanada.net**

TRENDING

Credit: Sherri Koven

Portland, Oregon residents can now turn on their taps and get water and energy for the price of one. Read how the city's new drinking water system captures energy as water flows through the pipes at ***bit.ly/PortlandPipes***

Online at WATERCANADA.NET

VIDEO: Watch John Oliver spotlight crumbling infrastructure on his HBO show, Last Week Tonight, eviscerating the state of America's water assets, dams, and bridges.

bit.ly/JOliverInfra

Credit: Kai Schreiber via Flickr

BLOG: What does it mean to be "engineered against flooding"? Two experts write about managing utility impacts on the Toronto Basement Flooding Protection mega-project.

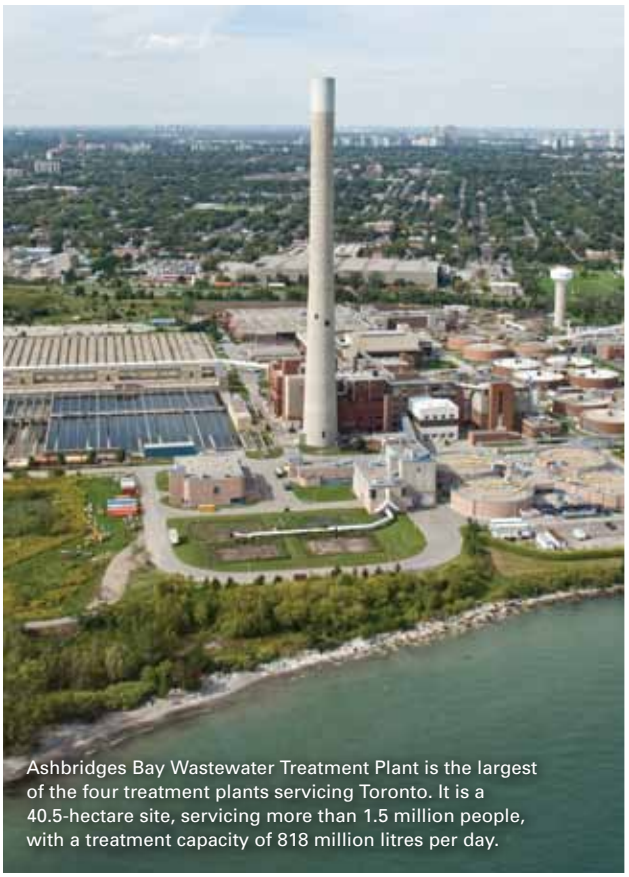
bit.ly/TorontoBFP

INTERVIEW: Water Canada spoke with the City of Cornwall's general manager of infrastructure and municipal works, John St. Marseille, about the Blueprint Initiative, the city's urban water management strategy. ***bit.ly/CornwallBlueprint***

VIDEO: Partners in Project Green sat down with Water Canada publisher Todd Latham to discuss current issues in water resources management.

bit.ly/ToddLatham

Credit: City of Toronto



Ashbridges Bay Wastewater Treatment Plant is the largest of the four treatment plants servicing Toronto. It is a 40.5-hectare site, servicing more than 1.5 million people, with a treatment capacity of 818 million litres per day.

Credit: City of Montreal

The Rosemont drinking water reservoir in Montreal was put back in service for the first time since 1978 at a cost of $73 million.

Credit: City of Calgary

Calgary's Bonnybrook Wastewater Treatment Plant receives headworks upgrades.

Prioritize This

The largest water infrastructure challenges for five Canadian cities.

BY EVE KRAKOW

ACROSS THE COUNTRY, municipalities are grappling with major water infrastructure challenges: aging infrastructure, legacy combined sewer systems, upgrading treatment plants to meet environmental requirements and deal with emerging contaminants, and improving stormwater management in the face of climate change. Here's an overview of what water service managers in five Canadian cities see as priorities for the coming years.

Vancouver

Over the next four years, Vancouver's main focus will be upgrading its sewers from a combined to separated system, said Brian Crowe, director of water, sewers, and district energy for the City of Vancouver. As in many older cities built on large bodies of water, about half of Vancouver's sewers carry both sanitary water and stormwater, which can result in sanitary water getting into the environment during heavy rains. Under the province's Integrated Liquid Waste and Resource Management Plan, combined overflows must be eliminated by 2050.

To date, the city has been putting in a second set of pipes as it carries out its regular maintenance and upgrades, at a pace of about 11 kilometres per year. To meet the 2050 deadline, however, it will need to increase the pace to 15 kilometres (or about one per cent) annually. "At $30 million per year, reconstruction of the sewer system is the city's largest ongoing capital program," Crowe said.

Provincial requirements also call for Metro Vancouver to upgrade its wastewater facilities from primary to secondary treatment. The new $700-million Lions Gate Secondary Wastewater Treatment Plant, to serve the municipalities of North and West Vancouver, is slated to be operational by 2020. Yet the Iona Wastewater Treatment Plant, which serves the City of Vancouver, will also need to be upgraded—a $1-billion project. Crowe explained that, while the regulatory deadline is not until 2030, the city is pushing to have it done sooner for environmental reasons.

One challenge specific to Vancouver: increasing the drinking water system's seismic resistance. As part of its ongoing infrastructure renewal program, the city is deciding what portions should be "hardened." In fact, they're testing a new product imported from Japan: ductile

Credit: City of Vancouver

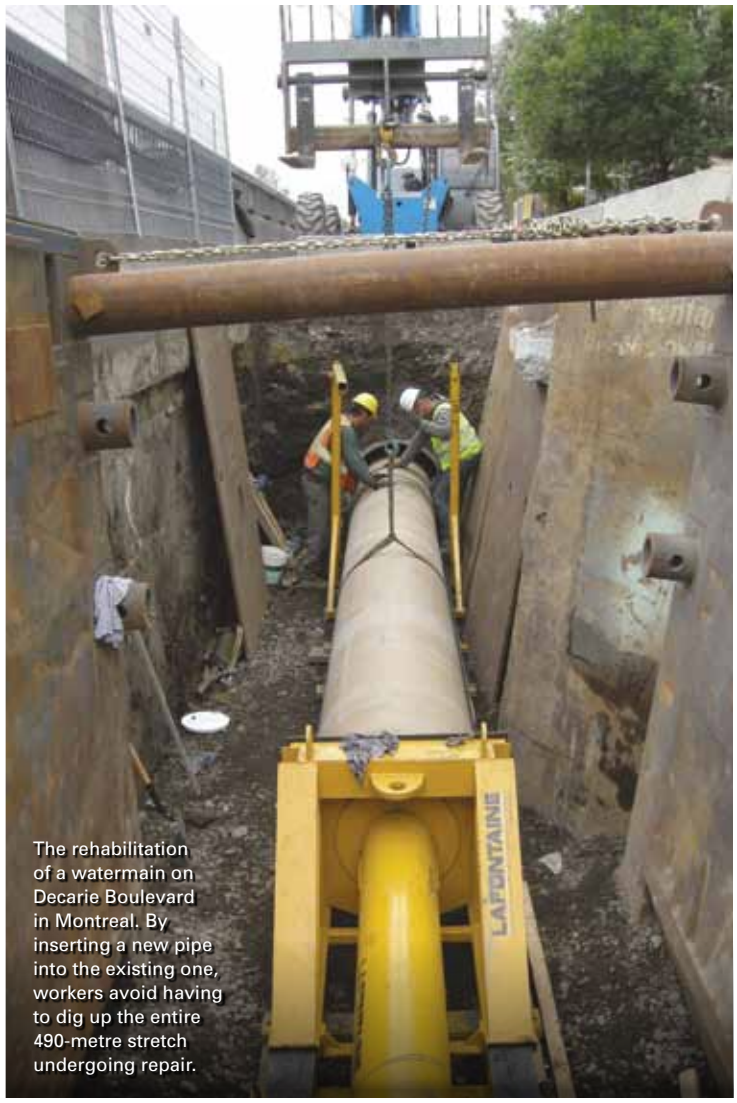
Workers build separated sewers under Vancouver's Main Street in summer 2014.

Credit: City of Calgary

In Calgary, the Artists View feedermain project is part of the city's overall strategy to strengthen the water distribution network to keep up with present and future water demands.

Credit: Maple Reinders Mikrm Joint Venture

In Halifax, upgrades to the Eastern Passage Wastewater Treatment Facility were completed in 2014. The facility is now in compliance with the federal Wastewater Systems Effluent Regulations—a top priority for the city.



Credit: City of Montreal

The rehabilitation of a watermain on Decarie Boulevard in Montreal. By inserting a new pipe into the existing one, workers avoid having to dig up the entire 490-metre stretch undergoing repair.

iron pipe with special joints designed to withstand earthquakes. A trial installation is being conducted over 800 metres.

Calgary

For Calgary, one of the biggest challenges is keeping up with population growth. In 2014, about 39,000 people joined the city, and another 250,000 to 300,000 are expected over the next 10 years. "We need to make the infrastructure investments to be able to service those new Calgarians," said Francois Bouchart, the manager of infrastructure planning for Calgary's water services. "About 50 per cent of our total capital program goes toward supporting the city's growth."

To this end, one major project is the expansion of the Bonnybrook Wastewater Treatment Plant, the city's largest investment project to date. In the initial design stages, the $700-million plant would begin operating by 2019 or 2020.

Canadian cities from coast to coast are looking for cost-effective ways to maintain and renew aging infrastructure.

Maintaining and renewing the city's aging infrastructure is another priority, while also determining the most cost-effective way to do so. For example, Calgary has been relining many of its sanitary mains with a material that re-establishes the pipe's structural integrity, a method that avoids having to dig up and replace the entire pipe. Many of the city's storm ponds are also reaching the end of their useful lives, filling up with sediment. A program is being launched to assess their condition, so as to develop a strategy for cleaning out the ponds and ensuring they meet the city's needs and its regulatory and environmental goals with respect to water quality protection.

Finally, while enhancing drainage and stormwater management in older communities has been underway since the 1990s, in November 2014, city council asked water services to accelerate the program. "We're finding that, if you look at all the environmental, social, and economic benefits compared to the

Maple Reinders Maxim Joint Venture

Halifax's Eastern Passage Wastewater Treatment Facility in 1987 (inset) and in 2014 (pictured here). The facility was originally designed and built in 1974 to serve approximately 18,000 people. In 1986, the facility was expanded in terms of capacity, but the level of treatment was downgraded from secondary to primary.The facility reopened in September 2014 after undergoing upgrades at a cost of $64 million and can now serve up to 50,000 people.

cost of the upgrades, for every dollar spent, we get about five dollars back in benefits," Bouchart explained.

Toronto

Toronto Water's biggest challenge over the past decade has been getting through its State of Good-Repair backlog. That is, carrying out long-overdue maintenance and repair work on the city's $28.2 billion in capital assets: drinking water, wastewater, and stormwater infrastructure. It has raised rates each year for the past nine to cover these costs.

"Our objective was to keep operating costs as stable as possible by finding efficiencies, and to use rate increases to fund an aggressive capital program," explained Lou Di Gironimo, the general manager for Toronto Water. Over the next 10 years, more than half of the capital investments will continue to go toward maintaining infrastructure.

However, now that the backlog is finally decreasing, Toronto Water is also investing more in service enhancement and improvements, such as its basement flooding program, and addressing the problem of combined sewer overflows.

In addition, over the next 10 years, $3.8 billion has been allocated to wastewater treatment and collection systems, including a $1.7-billion investment in the Ashbridges Bay Wastewater Treatment Plant (the largest of four plants servicing Toronto) for new pumping stations, a UV-disinfection system, and other upgrades.

On the drinking water side, a $210-million expansion to the F.J. Horgan Water Treatment Plant was completed in 2012, increasing capacity and adding ozone to the treatment process for primary disinfection. The city will continue to invest $2.9 billion in its drinking water network over the next 10 years.

Finally, while stormwater currently accounts for about only 14 per cent of capital investments, that portion is expected to grow to 30 per cent, with $2.6 billion allocated over the next 10 years. This includes a project to build a large collection tunnel to address the problem of combined sewer overflows in the Don River.

Montreal

For Montreal, one of the biggest challenges is renewing its aging infrastructure—especially the drinking water distribution network. Chantal Morissette, director of water services, said the city plans to invest $1.1 billion in water services over the next three years, compared to $1.5 billion over the past nine years.

"We have about 9,000 kilometres of transmission, distribution, and collection mains and pipes—the equivalent of Montreal to Vancouver and back," she said. The city aims to step up rehabilitation to 100 kilometres per year at a cost of $400 million over the next three years. Like Toronto, whenever possible the city uses "trenchless rehabilitation" methods to save on costs, time, and disruptions.

Major renovations are also under way at the city's drinking water plants. Ozone and UV-disinfection systems have been installed at its second-largest plant (Atwater) and are set to come online this year. A UV-disinfection system was added to its largest plant (Charles-J. DesBaillets, already equipped with ozone disinfection) and has been in operation since December 2014.

One problem that may be specific to Montreal is securing the water supply to certain sectors, by creating more back-ups in the system. Morissette explained that currently, some sectors are served by a single transmission main: if a breakage were to occur, the water supply to that sector would be cut off. To remedy the situation, the city is renovating a decommissioned drinking water reservoir (a three-year, $160-million project) and building several new watermains.

Plans are also continuing to build the world's largest wastewater treatment plant using ozone disinfection. "We're now in the analysis process for purchasing the ozonation systems," Morissette said. First announced in 2008 at an estimated cost of $200 million, the plant is now expected to be in operation by 2017 or 2018.

Halifax

In 2015, Halifax Water's biggest infrastructure challenge will be to make inroads in wet weather management in one of the oldest wastewater systems in Canada. Carl Yates, the general manager of Halifax Water, said the city will take "a holistic approach to the reduction of inflow and infiltration in the wastewater systems with a focus on separated systems."

Yates also added that Halifax—like so many other Canadian municipalities—is working to achieve compliance for its wastewater plants, in line with the new federal Wastewater System Effluent Regulations (WSER).

"Our poster project for WSER compliance is the upgrade and expansion of the Aerotech Wastewater Treatment Facility, which serves the Halifax International Airport," he said. "This project, estimated to cost $21 million, has received preliminary approval through the federal Building Canada Fund program."

The federal, provincial, and municipal governments will equally share the cost of the Aerotech Wastewater Treatment Facility upgrade and expansion. The expansion, which will double the capacity of the plant to 2,600 metres a day, is expected to be completed by the end of 2016, with construction slated to start this year. WC

Eve Krakow is a freelance writer based in Montreal.

Credit: City of Calgary

Calgarians work together to clean up the city after the 2013 flood.

After the Rain

What improvements to stormwater management have Toronto and Calgary made since the 2013 floods?

BY KATIE YANTZI

IN THE SUMMER OF 2013, Toronto and Calgary were rocked by floods that cost each municipality millions of dollars in damage. Flooded cars were stranded on the Don Valley Parkway in Toronto, and the Bow River surged through the streets of Calgary.

Extreme weather events like these force politicians to revisit their region's mitigation and resiliency strategies, and consider climate change's role in our weather. "Climate is the statistics of weather," said David Phillips, senior climatologist at Environment Canada. "If your climate has changed, there's something about the weather that has to have changed." Though our world is getting statistically warmer and weather patterns are changing in intensity and duration, Phillips said proving the causation of specific weather events is difficult.

Regardless of the cause of such floods, Toronto Water's general manager Lou Di Geronimo acknowledged the need for cities to adapt. "We're not here to judge what's causing it; we're reacting to the fact that we're seeing it more frequently and we need to do something about it." Toronto's flood was Ontario's most expensive natural disaster with $850 million in damage to public assets; Calgary has budgeted $409 million for flood recovery. As once-rare rainfall events become more common, Canadian municipalities must be innovative in mitigating flooding and improving stormwater management.

The event in Toronto was one of high intensity and short duration, something Sameer Dhalla, associate director of engineering services at Toronto and Region Conservation Authority (TRCA), said is problematic for the current stormwater mains. "We're starting to see [the] incapability of the municipal stormwater system in conveying those flows to the rivers." Since the 2013 storm specifically, Dhalla said, the TRCA has been working with the city to accelerate some flood remediation projects and to rehabilitate erosion-damaged areas. "The City of Toronto's large focus now is on fixing, from TRCA's perspective, the erosion, and from their perspective, basement flooding."

In 2005, after a heavy rainstorm and extensive flood damage to personal property, Toronto Water implemented the Basement Flooding Protection Program. The program involves assessing and analyzing flooded neighbourhoods in order to determine affordable improvements to make them more resilient. The 2013 flood prompted Toronto Water to recommend proactively taking the program citywide, rather than studying only affected areas. "The evidence we see is that if that storm hits your neighbourhood that's never been hit, you're going to flood too," Di Geronimo said.

City council also changed the storm design standard for water infrastructure so that neighbourhoods are assessed on a 100-year storm level of protection, a drastic increase from the current five-year storm design standard. That way, Di Geronimo said, if it is financially feasible to upgrade to this level, Toronto Water will be authorized to design for it rather than needing to seek additional approvals. Currently, the suggested priority and phasing for the citywide environmental assessments are being ratified, and if adopted, eight new study areas will be added in 2015.

Eventually, all Toronto neighbourhoods will be analyzed at the 100-year level, with construction proceeding on a priority basis. The January budget called for raising the basement flooding program's funding to $1.5 billion over 10 years, which would cover the program's engineering and assessment, as well as upgrades and expansions to storm sewers and a subsidy program for flood-preventative home improvements. The city has already utilized varied methods for improving stormwater management in areas that have flooded, from installing large eight-foot sewers to building underground stormwater tanks beneath parks and streets.

In Calgary, at the time of the flood, many stormwater management structures had just been put into place. These "proved themselves very well," said Carolyn Bowen, program manager of flood resilience and mitigation at the City of Calgary. The city has implemented a number of green infrastructure remediation projects near the riverbanks, and is currently studying the construction of permanent protective barriers, repairing erosion sites, and improving river forecasting tools, monitoring equipment and communication systems. "That's a big piece that we've learned from the flood. […] We know that, while it was good, we can improve," Bowen said.

The sheer force of the water gushing through the Bow and Elbow rivers altered not only the surrounding infrastructure, but the shape of the water flow itself. "Obviously the river has changed and all of our mapping and models need to change," Bowen explained, "so we are just in the process […] of updating [them] to characterize the new flood hazard area."

The city also recognized the need for a "coordinating body" to liaise between government and local business owners and manage funding for recovery projects, Bowen said. The Recovery Operation Centre (ROC) was established to manage Calgary's recovery efforts, though in 2015, the ROC's mandate will shift to developing a corporate resiliency framework.

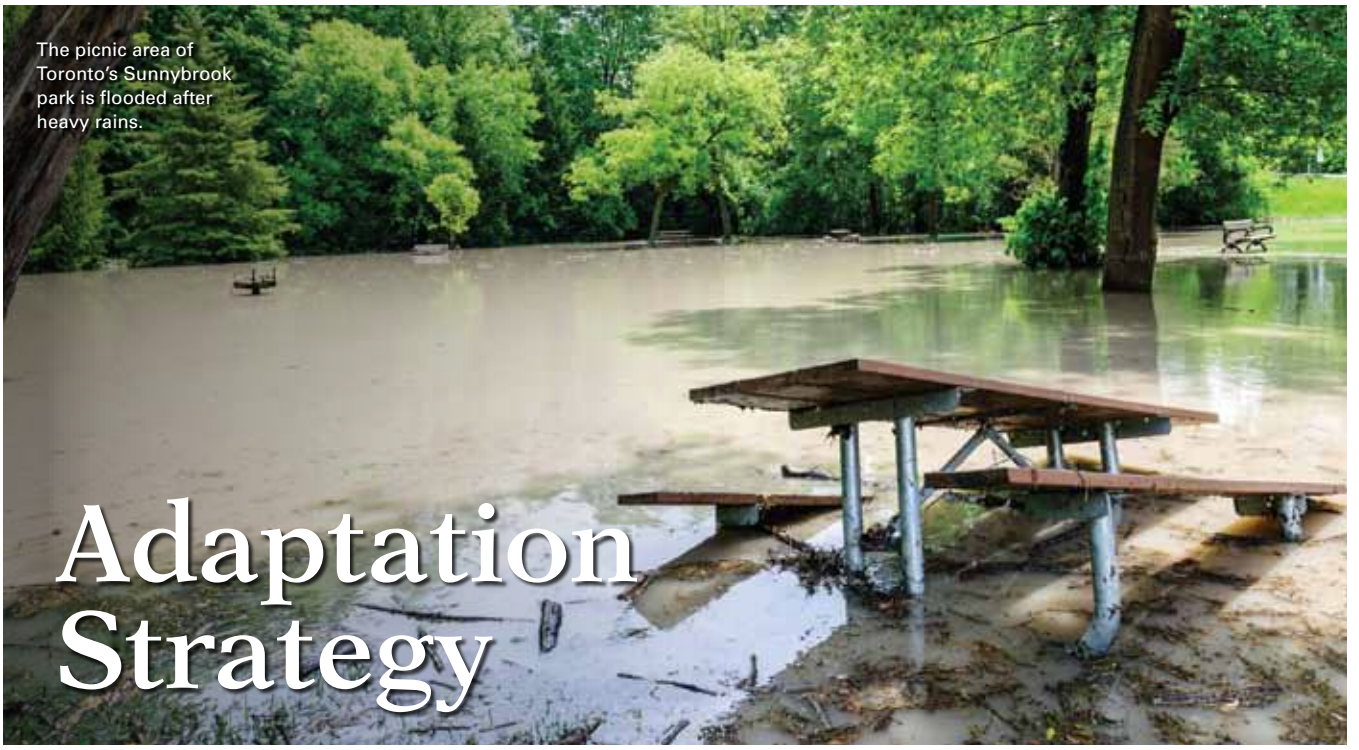
Much of the city's current work is ongoing, including citizen education, strategizing for preparedness, and policy-related improvements. For example, a June 2014 revision to the area's land use bylaw requires any large-scale home renovations in flood hazard areas to include a series of built-in resiliency measures.

City officials in both Toronto and Calgary believe that their regions will be more resilient in the face of future storms. "From a standpoint of planning and having the monies allocated and doing that assessment work, we're well positioned," Di Geronimo said. "And I'd say we've got one of the most aggressive programs of any municipality."

Bowen said that, in Calgary, holistic watershed planning has been emphasized as the city seeks to manage its water supplies, not just floods. "In the future, we're definitely going to be more prepared for floods, but also for drought."

With climatologists affirming the increased frequency of previously rare weather events, cities must be vigilant in preparing themselves—proactively adapting to changing conditions rather than basing design standards on the storms of the past. "Nature's changing; we need to change too," Phillips said. "And by paying attention to the kind of things that have gone on, I think we will be better prepared." WC

Katie Yantzi is a freelancer and publishing professional living in Toronto.



The picnic area of Toronto's Sunnybrook park is flooded after heavy rains.

Adaptation Strategy

Ontario's provincial and municipal governments must adapt stormwater management practices and infrastructure to accommodate higher water flows.

BY JULIE ABOUCHAR

IN 2013, damage from the growing number of extreme weather events resulted in insurance companies paying out a record $3.2 billion to Canadian policyholders. The June 2013 flooding that devastated southern Alberta was the largest and most expensive natural disaster in Canada's history. This resulted in insurance damage of $1.74 billion. On July 8, 2013, Toronto reported 126 millimetres of rain, breaking the previous single-day rainfall record for the city set by Hurricane Hazel in 1954. This flooding event was touted as the most expensive insured natural disaster in Ontario's history, resulting in $940 million in damages. These increasingly more common and costly weather events have forced both municipal and provincial governments to reconsider traditional stormwater management practices and re-evaluate stormwater infrastructure.

Combined sewer overflow

The 2013 Toronto flood overflowed both the city's wastewater treatment plants and stormwater systems. As a result, close to one billion litres of sewage flowed into Toronto's rivers and Lake Ontario. One of the challenges for municipalities in adapting to these storms is dealing with municipal sewer overflow of untreated contaminated water.

In the 1950s, Ontario municipalities began replacing combined sewer systems with separate sanitary and stormwater sewer systems. In most newly developed areas, municipalities provide storm sewers for runoff drainage and sanitary sewers for sewage flow. This approach was adopted to avoid problems associated with wastewater being flushed into receiving waters during flooding events. Although some combined sewer systems still exist in older areas of the province, Ontario stopped approving combined sewer systems in about 1985.

Recently, the Canadian Council of Ministers of the Environment (CCME) released its Canada-Wide Strategy for the Management of Municipal Wastewater Effluent 2014 Progress Report. The strategy was endorsed by a majority of the members of the CCME in 2009 and included 11 commitments that were to be completed by 2014. One of the commitments required the provinces to "ensure that combined sewer overflows and sanitary overflows will not increase in frequency due to development, unless it occurs as part of an approved long-term management plan." The report concluded that Ontario has met this commitment. The report noted that Ontario's policies for combined sewer systems and guidelines for the design of sewage works do not allow the construction of new combined sewers.

Municipalities' role

Ontario municipalities are responsible for urban surface water runoff that is collected in separate municipal storm sewers. Municipalities develop strategies and policies to reduce stormwater pollution at the source by managing the application of fertilizers to lawns and salt to roads. For example, the City of Kitchener recently adopted a stormwater credit policy. In 2012,

the City of Kitchener began providing incentives to property owners who use best management practices to reduce the quantity and improve the quality of stormwater runoff entering the municipal stormwater system. Property owners in Kitchener are now able to apply for stormwater credits of up to 45 per cent of the stormwater share of their utility bill.

Ontario's role

Although stormwater management falls predominately under municipal jurisdiction, many provincial ministries and agencies provide oversight for stormwater management and surface drainage. For example, the Ministry of the Environment and Climate Change (MOECC) is responsible for issuing Environmental Compliance Approvals (ECA) for stormwater management systems. In 2003, the MOECC released the Stormwater Management, Planning and Design Manual to assist ECA applicants with planning, designing, and operating stormwater management facilities. The MOECC manual is also the primary source of technical guidance for the MOECC staff issuing ECAs for stormwater management facilities.

> Close to one billion litres of sewage flowed into Toronto's rivers and Lake Ontario after the city's July 8, 2013 flood.

The 2009 Ontario Expert Panel on Climate Change Adaptation report emphasized the province's responsibility to provide leadership for climate change adaptation. The expert panel recommended a comprehensive review of stormwater management throughout the province.

In 2010, the MOECC completed a review of its policies, acts, and regulations that deal with municipal stormwater management systems to evaluate their ability to adapt to climate change.

In 2014, the MOECC released its Policy Review of Municipal Stormwater Management in the Light of Climate Change – Summary Report.

The MOECC's summary report was developed in response to an Application for Review submitted under the *Environmental Bill of Rights*, 1993, Part IV. The summary report concluded that "the *Ontario Water Resources Act* and the *Environmental Protection Act* are anticipated to provide a sufficient legislative framework for implementing adaptation to climate change for municipal stormwater management, through approvals, general prohibitions, orders, penalties, and regulation making authority for environmental protection." However, the summary report found that the MOECC approvals process for municipal stormwater management "requires review to include identifying measures to encourage source control best practices for municipal stormwater management." In addition, the summary report addressed the need to update the 2003 Stormwater Management, Planning and Design Manual to include additional best practices for climate change adaptation for municipal stormwater management.

Moving forward

As severe weather events increase in frequency, experts predict that insurance rates will rise and that some weather liabilities will not be covered at all. The majority of Ontario's stormwater infrastructure is old and municipalities face a deficit of close to $7 billion for the repair and replacement. Moving forward, an effort from both Ontario's provincial and municipal governments is needed to ensure that stormwater management practices and infrastructure adapt to accommodate higher anticipated water flowsfrom extreme weather. WC

Julie Abouchar is a partner at Willms & Shier Environmental Lawyers LLP in Toronto.

An Eye on B.C.

Are British Columbia's water systems at risk?

BY TANJA MCQUEEN

RELIABLE WATER, sewer, and stormwater systems are essential to public health, a clean environment, and a strong economy. But these essential systems may be at risk—aging infrastructure, growth, strengthened regulations, and climate change are driving the need for significant upgrades and re-investment in the pipes, pumps, and equipment that are used to treat, deliver, and remove water safely from our homes and businesses. At the same time, fiscal restraint and public complacency impede the ability of local governments and water utilities to secure the financial resources required to sustain our water infrastructure assets.

Financial sustainability is a key principle for safeguarding water, sewer, and stormwater systems so they continue to protect public health and the environment, and contribute to economic development. It means having adequate funds to pay for the current cost of operating and maintaining our water and wastewater systems, and proactively planning to ensure there will be funds to eventually renew and replace systems as they come to the end of their useful life.

The British Columbia Water & Waste Association (BCWWA), together with Urban Systems, recently assessed the financial capacity of the province's local governments to maintain, renew, and replace their water and wastewater infrastructure. The analysis used four financial indicators based on data from the 2013 audited financial statements for local governments in British Columbia. The indicators were selected based on a review of best practices in other jurisdictions, available information, and advice from knowledgeable professionals in the asset management field.

The assessment addressed the following questions:

- Are B.C. municipalities financially well positioned to meet their existing water and wastewater infrastructure investment needs to maintain current levels of service?
- Are water and wastewater rates recovering the full cost of service, including infrastructure renewal and replacement?
- How much investment is needed to sustain our water and wastewater infrastructure?
- Are municipalities financially resilient to withstand sudden or unexpected changes in revenues or costs for water and wastewater systems?

The results point to four conclusions about the financial sustainability of British Columbia's water and wastewater systems:

1. Water and sewer fees are not covering the full costs of service delivery in many communities; in the worst cases, rates would need to nearly double in order to reach financial sustainability.

2. Many communities are vulnerable, as they have not set aside sufficient reserves to buffer against unexpected changes in operating costs or revenues.

3. Smaller communities have greater financial gaps than larger communities, as costs are shared across a small base of users.

4. British Columbia requires $13 billion of additional investment to renew and replace water and wastewater infrastructure when it comes to the end of its useful life.

The cumulative effect of decisions, policies, and actions over a long period of time has influenced the financial status of B.C.'s systems. Some of these factors include reliance on government grant funding for capital projects, lack of asset management planning, deferral of maintenance and investment, urban sprawl, and a lack of public support for full-cost pricing.

Building financial sustainability will take time. While the financial risks to our water and wastewater systems are not immediate for all communities, it is important to make sound choices today about priorities for existing tax dollars, and setting rates so that they cover the full cost of operating, maintaining, and replacing systems. Communities can take the following steps to strengthen their financial capacity to meet current and future water and wastewater infrastructure needs:

1. Adjust water and wastewater rates to cover the full cost of service, including the cost to renew and replace systems.

2. Develop and implement integrated asset management processes that assess the state of infrastructure, evaluate risks, and set priorities for investment in renewal and replacement of water and wastewater assets.

3. Rank water and wastewater renewal and replacement projects as top priorities for capital investment.

4. Adopt "smart growth" principles.

5. Foster collaboration among all levels of government to support communities to become fiscally self-reliant.

The BCWWA-Urban Systems report, entitled Are Our Water Systems at Risk? is the first of a series of annual assessments that will be used to evaluate trends in the financial position of British Columbia's water and wastewater systems over time. It is intended to inform dialog among elected officials, utility managers, and the public about policies and priorities for infrastructure renewal and investment, and provides recommendations aimed at enhancing the fiscal sustainability of our water, sewer, and stormwater systems to ensure public water and wastewater systems continue to protect public health and the environment for generations to come. WC

Tanja McQueen is the CEO of the BC Water & Waste Association.

To access the report, go to **bcwwa.org**

One Year In

A look at the first year of the New Building Canada Fund and its impact on municipal water infrastructure projects.

BY CLARK KINGSBURY

FEDERAL INFRASTRUCTURE MINISTER Denis Lebel officially launched the New Building Canada Fund (NBCF) on March 28, 2014 to a lukewarm reception. While the plan is certainly ambitious—a $14-billion fund supporting national, regional, and local public infrastructure projects over the next decade—several high-profile names have openly criticized the plan.

Federation of Canadian Municipalities (FCM) then-president Claude Dauphin wrote of "serious concern about the gaps in the design of the New Building Canada Fund." Calgary mayor Naheed Nenshi voiced worries about the lack of funding for cultural and recreational facilities. Liberal leader Justin Trudeau complained that the Conservatives "have slashed the available funding by nearly 90 per cent in its first year."

Despite the criticism, however, Ottawa has thus far committed more than $35 million toward 27 drinking water and wastewater infrastructure projects nationwide, and more federal contributions are expected in the coming months.

Starting out west, here are some of the highlights:

British Columbia and Alberta

In November 2014, members of Bowen Island's council agreed to pursue funding for the construction of a $7.5-million water treatment plant on the island municipality, which is part of the Greater Vancouver Regional District. The municipality is seeking a $2.5-million investment from both the federal and provincial governments.

The City of Prince Rupert, meanwhile, has identified its raw water supply project, a $15 million to $16 million undertaking, as its priority for any funding received from either the NBCF or Gas Tax General Strategic Priorities Fund. The project involves a total replacement of the city's water supply system.

In the northwest Alberta City of Grand Prairie, mayor Bill Given announced in June 2014 that he will support a NBCF application from Aquatera Utilities, who provide water and wastewater treatment to the city. The application seeks funding for two projects: the development of the Wapiti River facility, including the construction of a new water intake and expansion of the raw water storage capacity; and the completion of the 116 Street trunk line sewer.

The Prairies

Perhaps no province has been more active in securing NBCF funding for water and wastewater projects than Manitoba. Numerous municipalities in several regions of the province have already had their applications accepted.

In the Rural Municipality of Rosser, lying directly to the northwest of Winnipeg, Phase 1 of the Cartier Regional Water Co-Operative Expansion Project will receive a maximum of $14.5 million from the federal government, including up to $12.1 million under the NCBF's Provincial-Territorial Infrastructure Component – National and Regional Projects (PTIC-NRP).

This ambitious project will service CentrePort Canada, Manitoba's large inland port, and several nearby municipalities. It includes the construction of a new water treatment plant in the Rural Municipality of Headingley, and is one of the most high-profile water projects to have been approved for NBCF funding thus far.

Several other Manitoba communities have also been promised funding through the NBCF's Small Communities Fund (SCF). In Steinbach, Manitoba's third-largest city, Phase 1 of the Underground Water and Wastewater Infrastructure Renewal project will receive equal funding from the federal, provincial, and municipal governments, while the Rural Municipality of Ritchot, south of Winnipeg, will receive financial help in upgrading its drinking water infrastructure.

While Saskatchewan hasn't been as prolific in securing NBCF funding as Manitoba, the province is home to several municipalities actively pursuing federal assistance. Communities like the City of Estevan, the Village of Buena Vista, Lac des Iles, and the towns of Nipawin and Delisle have all decided to submit applications for funding. Projects include wastewater treatment plant upgrades, drinking water infrastructure improvements, sewage transmission projects, the construction of a water treatment plant in Nipawin, and storm sewer system installation.

Atlantic Canada

In Eastern Canada, the upgrade and expansion of the Aerotech Wastewater Treatment Plant in the Halifax Regional

Municipality will receive up to $7 million through the NBCF. The $21-million project will include an overhaul of the sewage treatment plant near Halifax's Stanfield International Airport. The federal government's contribution to the project represents a third of the total cost, with the remaining $14 million to be split between provincial and municipal governments. Upgrades will increase the capacity and treatment levels of wastewater effluent at the plant, which will help end a long freeze on development in the Aerotech Business Park.

In Sackville, New Brunswick, officials submitted two applications to the NBCF-SCF: one to upgrade the municipal sewage lagoon, and another to divert stormwater from Lorne Street. While the sewage lagoon project is still several years from being implemented, and neither project currently has a price tag attached, town engineer Dwayne Acton summed up the scope of the projects in telling the Sackville Tribune Post: "We're talking in the millions of dollars."

The City of Charlottetown has submitted a list of five important projects to the province, hoping to receive funding for each. Three of the five projects are related to the water and sewer system in Prince Edward Island's capital city, including a new water source and storm and sanitary water separation projects.

With a growing number of NBCF water infrastructure projects popping up across the country, the federal government's massive 10-year plan seems to be rolling to cautiously optimistic start. Despite criticisms from political opponents and scattered confusion over funding eligibility, it can't be argued that funding applications are being submitted and accepted from coast to coast. However, just one year into a decade long plan, it's far too early to either dismiss or validate the critics. Municipal, provincial, and federal officials will have their hands full as they attempt to distribute billions of dollars fairly and practically between communities in need across Canada. WC

Clark Kingsbury is Water Canada's assistant editor.

Fixing the Leaks

A look at smarter solutions for water loss management.

BY MIKE LAUCHLAN

WATER LOSS MANAGEMENT is becoming an ever more prevalent issue in many communities, as aging infrastructure is being increasingly taxed by growing populations. Every litre of water lost due to leakage or to system inefficiencies costs our communities money and unnecessarily wastes resources. Ultimately, the goal is to improve resource conservation and minimize the costs of water distribution. Although much of this is a matter of judicious asset management, a utility's ability to do so effectively depends a great deal on how well it is able to prevent and detect leaks.

Leak prevention and detection

Effectively managing capital assets is crucial for preventing leaks. If a utility can identify vulnerable sectors, it can deal with them before a major leak occurs. But understanding yearly capital replacement commitments represents a challenge, since it requires detailed knowledge of asset inventories and long-term asset performance analyses—a difficult task to accomplish when infrastructure is buried out of sight.

To meet this challenge, many utilities currently rely on asset management tools. These tools give utilities easy access to accurate spatial data and temporal network information. They also help utilities maintain a complete library of pipe segment data that allows them to analyze long-term failure profiles based on historical trends. This in turn enables utilities to forecast year-by-year capital replacement commitments, better plan for capital costs, and reduce the likelihood of major leaks occurring.

In terms of detecting leaks, performing emergency burst repairs are of main concern since they represent the biggest operation and maintenance (O&M) costs. To minimize these costs, utilities currently employ a number of early detection strategies known as active leakage control (ALC). One of these strategies is to sponsor leak detection surveys, in which condition assessment contractors deploy a host of sophisticated equipment and techniques on all or a set of "at-risk" sectors of the network to detect and locate the presence of small leaks in sections of interest. Other techniques include fixed metering strategies (i.e. the district metered areas approach proposed by the International Water Association in the 1980s and the use of acoustic meters), as well as mathematically based approaches that rely on a number of sophisticated models that analyze variance to detect leaks.

Falling short

Although current leak prevention and detection methods have been useful thus far, they are unfortunately not without shortcomings. Asset management data can indicate network sectors requiring attention, but cannot reveal where individual leaks will occur. Active leakage control strategies, though highly effective in identifying and locating leaks, are often found to be too localized, too time consuming, and too expensive for use in a continuous leak management program. And fixed metering and mathematical approaches seem promising, but are not yet widespread enough to know for certain if they are effective.

Ideally, utility operators would be able to remotely detect and locate significant leaks anywhere on the network in near real-time since the efficiency with which a utility can identify, report upon, and repair a leak will ultimately determine the total volume of water lost and thus the amount of energy wasted in the process. With near real-time detection, semi-automated systems could then evaluate and dispatch maintenance crews to deal with problems prior to the issue becoming serious.

Solutions for improving leak prevention and detection

Leak detection

There are many informational touch points throughout the utility that can play a role in increasing the efficiency with which a utility responds to a leak.

The SCADA system is one of these touch points. It is the central information broker for field truth and contains raw network state data, pressure values and valve and pump states standing ready for analysis and contextual presentation. Customer information systems also contain potentially useful information from customers, like low pressure or turbidity complaints, that could help identify leaks. And computer maintenance management systems offer another touch point, providing insight into network asset maintenance history, which is valuable information for determining potential leak locations.

With near real-time detection, semi-automated systems could evaluate and dispatch maintenance crews to deal with problems prior to the issue becoming serious.

The ideal would be for a utility to deploy systems that can mine and interpret relevant data from all of these disparate systems into an integrated whole. Doing so would enable them to provide early leak warnings as well as location estimates based on the available information. A geospatial information system can be a powerful complementary tool in this respect for placing all of the relevant information into a unified visual context.

A well calibrated real-time hydraulic model can be another valuable resource for leak detection—applying

historical consumption models with field telemetry inputs to accurately calculate in-pipe conditions such as pressure, velocity, and age. Measured variances in earlier state calculations can indicate leak presence.

Leak prevention

In addition to increasing the efficiency with which utilities respond to leaks, it is also important to focus on decreasing the occurrence and severity of leaks altogether. This can be achieved by implementing a network pressure optimization system (POS).

A POS reduces pipe pressure in low demand hours and manages pressure at peak times to achieve no more than the minimum mandated pressure. This has proven to both extend asset life and to reduce overall energy consumption, which reduces both capital and O&M costs and also decreases the frequency and severity of leaks.

A POS also helps reduce the severity of leaks by controlling network pressure. A leaking pipe under high pressure will lose water at a greater rate than a pipe under lower pressure, but by controlling network pressure, a POS ensures that the volume of water lost during a leak will be minimal relative to the demands being placed on the system at the time.

Moving forward

Despite there being a number of potential solutions available for improving the ways in which we manage water loss, Canada's generally low tariff rate and tax subsidies do not provide a great enough incentive for really pushing these solutions further. However, by implementing comprehensive metering and full cost recovery on utility operations, we can increase incentives for leakage control programs and make water production and delivery more cost efficient. In doing so, we will improve water resource conservation, decrease the cost of managing water loss, and ultimately increase benefits for all. WC

Mike Lauchlan, P.Eng., is the business development manager at Schneider Electric.

AquaHacking

A new event brings hackers together to develop real-life solutions for pressing water issues.

AQUAHACKING 2015 is the first of a series of events that will address the preservation and restoration of regional waterways in Canada. Defined as a "stimulating get-together in which technology is put to work for water," the event will bring hackers together to develop real-life solutions for water problems in a designated region. Water Canada talked to Katherine Adams, the director of AquaHacking, about the inaugural event and how technology and computer specialists can contribute to solutions for water issues.

Water Canada: What exactly is AquaHacking?

Katherine Adams: The very first AquaHacking 2015 – Ottawa River Summit is a two-day event dedicated to the health of the Ottawa River and the issues it faces. People with different technical backgrounds [will] come together, form teams around a topic, and collaboratively code a unique solution from scratch that generally takes shape in the form of websites and mobile apps.

Our approach includes discussion beforehand between various key stakeholders. These interdisciplinary discussions allow us to identify the various challenges [in the selected watershed] and to reflect on possible technological solutions that will be developed by hacking teams before the event during six coding days and four meet-ups.

The hacking teams will then have the opportunity to present the fruits of their labour at AquaHacking 2015 – Ottawa River Summit. A jury will determine the top three finalists that will share $15,000 in prize money and the public will be invited to vote for the people's choice award. All the technological solutions developed during AquaHacking 2015 – Ottawa River Summit will be offered to the community.

WC: What are the primary goals of the AquaHacking event?

KA: The primary goal of AquaHacking is to trigger a movement by putting technology at the service of water across Canada that will allow all of the country's waterways to benefit from this kind of initiative.

We want this project to have a practical focus. That's why one of our goals is to pull together the combined talents of various groups of digital professionals to develop functional technological solutions—mobile applications mainly—that will address issues identified beforehand by the water milieu. The excellent news about this approach it that, from one event to another, the local community will not only benefit from the new technological solutions developed, but also from the solutions created during previous AquaHacking events since most rivers face similar issues.

WC: How can technology and computer specialists contribute to solutions for water issues?

KA: In today's world, we enjoy many technological advances for every aspect of our lives. However, our water management structures do not always reflect this progress. We feel it is essential to reduce this gap by fostering the emergence of innovations through technology. This would ensure more effective preservation and a better conversation about our waterways. It would also contribute positively to its restoration in order to maintain the integrity of its ecosystem and water quality.

Also, hackers feel the need to contribute positively to their community and the best way for them to do is probably by doing what they do best—hack, program, code, design—all in the name of a great cause!

WC: Are there hopes to spread the program in Canada or internationally?

KA: AquaHacking 2015 – Ottawa River Summit is the first of a series of events [that will benefit other] watersheds across Canada. As a matter of fact, we are already planning for the next event. So stay tuned for some official announcements sometime next summer.

AquaHacking 2015 – Ottawa River Summit will take place on May 29-30 at the Hilton Lac-Leamy in Gatineau, Quebec.

This interview has been edited for print. To read the full interview, go to bit.ly/AquaHacking WC —Staff

WRAIN
WATER RESEARCH AND INNOVATION NETWORK

wrain.ca

Business inquiries: info@wrain.ca

The Water Research & Innovation Network announces collaboration with Good Harbour Labs to help foster innovation and commercialization in Ontario's water sector

Good Harbour Laboratories (GHL) is pleased to be collaborating with the Water Research and Innovation Network (WRAIN) who will promote our services to companies in the Ontario water sector. The GHL team of scientists and engineers operates a hydraulic and analytical lab in Mississauga, Ontario that assists clients with ensuring that their products perform to their desired specifications. Formerly, GHL was the dedicated Research and Development lab of a water treatment technology manufacturer. During that time, the GHL team became very familiar with successfully designing, developing, and commercializing new products. Now independent, GHL offers third-party performance testing and validation for innovative technologies from lab scale to commercial scale. Data obtained under controlled, repeatable laboratory conditions can complement or even explain data collected at a demonstration site provided by WRAIN.

"This collaboration and partnership is proving to be instrumental for WRAIN" says Numair Uppal, WRAIN's Economic Development Officer. "WRAIN, Good Harbour Labs and Monteco are now working collaboratively to identify and assist small and medium sized companies with their commercialization objectives and help foster innovation in Ontario.

Good Harbour Labs is part of the Monteco group of companies. Monteco is a strategic capital firm that acquires/invents technologies and builds and grows them into sustainable Canadian middle market companies. Monteco maintains a suite of growth infrastructure assets that supports its portfolio, including R&D capabilities, strategic business and technology guidance, sales and marketing direction, corporate finance and accounting, human resources, and IT infrastructure support and services.

WRAIN is the innovation arm of the Economic Development department of the City of Kawartha Lakes. Its main objective is to help accelerate market adoption of new water and wastewater treatment technologies. This is accomplished by facilitating access to real time, real operational municipal facilities for pilot and demonstration. WRAIN works with small and medium sized (SME) water technology companies by providing them with business development support, marketing solutions, and strategic planning. The pilot and demonstration of the technology is used as a commercialization platform and to help validate the efficiency and effectiveness of the technology. WRAIN is servicing a commercialization segment in Canada by allowing new water and wastewater companies to test and verify their technology before introducing these SMEs to an international market. WRAIN works collaboratively with several partnered organizations including Fleming College's Centre for Alternative Wastewater Treatment (CAWT), Good Harbour Labs, The Bloom Centre, and Ontario Clean Water Agency (OCWA). In addition, WRAIN is a joint-effort on behalf of numerous stakeholders who help foster innovation in Kawartha Lakes. WRAIN is responsible for assisting in addressing water quality issues for 250 lakes and rivers, as well as operational and infrastructure issues for six wastewater plants and 21 water treatment facilities.

Dr. Greg Williams, Managing Director for Good Harbour Labs, joins WRAIN's Board of Directors. Dr. Williams has been involved in technology development and verification in the water business for more than 15 years. He has co-authored five patents and has considerable experience in evaluating technologies, project management and intellectual property management. Dr. Williams received his Bachelor's and Master's degrees from McGill University and his PhD from the University of Toronto.

All partners are looking forward to working collaboratively to help foster growth and innovation in the water sector in Ontario.

water's next Winners Revisited

Updates on the previous Water's Next award winners.

Okanagan Water Supply and Demand Project

THE OKANAGAN Basin Water Supply and Demand Project began its modeling and data collection in 2006 to measure current and future water needs in British Columbia's Okanagan valley. But Anna Warwick Sears, the executive director of the Okanagan Basin Water Board, said that data is "not enough."

"We always said that the important thing about understanding your watershed is that you can't just do a bunch of studies and walk away," she said. "It's critical to work out permanent data collection and management systems, and help them grow through the years."

Since winning a Water's Next award for Collaboration in 2013, Warwick Sears said the project has undergone some necessary changes. "The environment keeps changing, the population and how we use the land and water keeps changing, so we have to be willing to adapt our water information systems or become obsolete. That's where our project is right now—refining our ongoing supply and demand monitoring systems and databases so we keep up with changing conditions."

The team is now in talks with the province about using the project's water supply and demand models to inform and support a new water licensing decision support tool. Since water licensing is one of the most contentious issues in British Columbia, Warwick Sears said, "The most important thing is to work collaboratively and to leverage all the existing systems and resources so that the project can deliver reasonably accurate information in a relatively efficient form."

Credit: Andrew Barton, 2014

The Okanagan Water Stewardship Council received the 2013 Council of the Federation Award for Water Stewardship in British Columbia for the Okanagan Water Supply and Demand Project and related initiatives. Here, they celebrate passing on their $1,000 award to the Okanagan College to provide a bursary to the next generation of water leaders.

She added that the new tool will have to be easily adapted since groundwater regulations are yet to be phased in with the implementation of British Columbia's new *Water Sustainability Act*.

To read the Okanagan Water Supply and Demand Project's Water's Next 2013 winner profile, go to ***bit.ly/WNOkanagan***

Pure Technologies

SINCE WINNING a Water's Next award for Business in 2013, Pure Technologies has shifted its focus: the company now looks at entire pipeline networks instead of focusing on the management of a single pipeline.

"By looking at entire pipeline networks, Pure has encountered some exciting new opportunities that help us develop and refine solutions while we continue to challenge the status quo in traditional pipeline management," said Reid McDougall, Pure Technologies' VP of the Canadian region.

Pure Technologies was recognized for its minimally disruptive leak detection, condition assessment, and monitoring technologies. The company's work with the Lake Huron Primary Water Supply System and City of Ottawa was also highlighted.

"As a Canadian company, Pure takes pride in promoting the Canadian technology industry as a leader in the development of innovative solutions for infrastructure management," McDougall said. "In addition to the company recognition, we were very excited to recognize two of our Canadian clients for their proactive pipeline management. Having the opportunity to showcase the success of these clients in a well-known Canadian publication provides other municipalities with a great example to follow."

Credit: Pure Technologies

A Pure Technologies worker inserts insert the tethered Sahara leak detection tool that identifies leaks on live watermains.

In the past two years, the business has grown steadily, especially as water and wastewater utilities across North America continue to proactively manage their aging infrastructure woes. Moving forward, McDougall said Pure Technologies wants to continue promoting the theme of sustainable infrastructure management to water and wastewater utilities.

"Our goal is that all utilities will manage their infrastructure proactively to decrease the infrastructure financing gap and reduce pipeline breaks and leaks," he said. "Pure is also committed to continuing our research and development efforts to provide utilities with cost-effective, valuable solutions for their pipeline networks."

To read Pure Technologies' Water's Next 2013 winner profile, go to ***bit.ly/WNPureTech***

WatrHub

WHEN WATRHUB received its Water's Next award for Innovation in 2013, the company's data coverage was limited to a handful of wastewater treatment facilities in southern Ontario. Now, its coverage has grown to tens of thousands of water and wastewater systems across Canada and the United States, prompting the opening of a U.S. office in Milwaukee.

"Our customer base now includes young, innovative water technology startups all the way up to $1-billion-plus equipment manufacturers who rely on us to make empowered decisions about where and how to sell and market their water technologies and services," said WatrHub CEO Ahmed Badruddin.

WatrHub, the brainchild of Badruddin and chief product officer Sunit Mohindroo, makes water information "accessible and actionable" by using natural language processing algorithms to search, sort, and filter information. With this data, customers gain insights into their target markets.

The company has since received recognition from Water Environment Federation, American Water Works Association, ImagineH2O, CNN, and Washington Post, but Badruddin said he and Mohindroo will "always remember Water's Next as our first water industry recognition."

"Water's Next gave us a vital stamp of approval in our early days," Badruddin said. "It reinforced our belief that we are on the right track in pursuit of our vision that the water industry can grow stronger through transparency, action-ready research, and a shift towards data-driven decision-making."


Credit: Layrna Meyer

Ahmed Badruddin (left) and Sunit Mohindroo started WatrHub in 2011.

Badruddin said many organizations continue to take notice of the company's seemingly limitless potential. "Our customers are constantly brainstorming new ways of using analytics to streamline their business processes. This is driving development of new WatrHub applications of data analytics in the water sector, which we are excited to unveil soon. We're just getting started."

To read WatrHub's Water's Next 2013 winner profile, go to ***bit.ly/WNWatrHub***

Small Demands

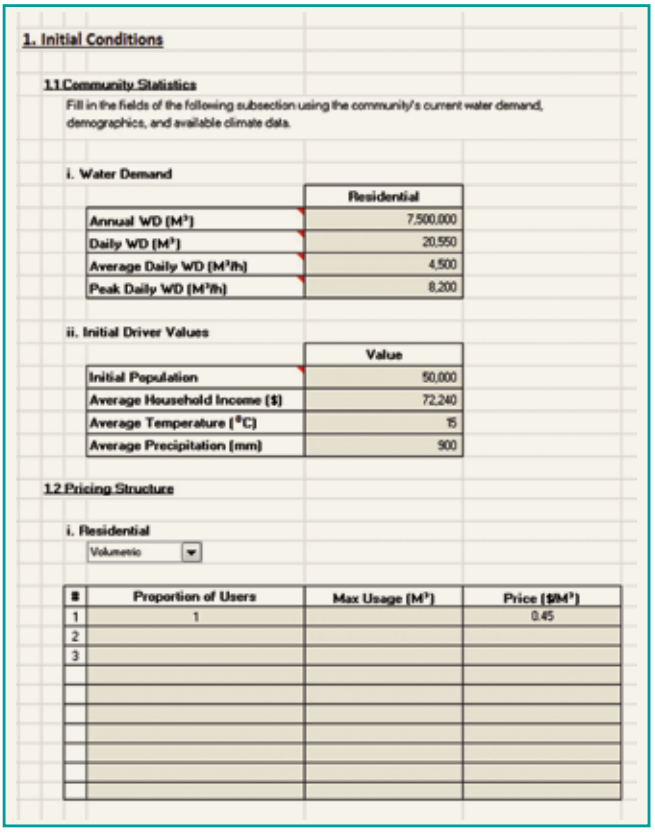
How to bring water demand forecasting to small utilities.

BY DIANE DUPONT, JAMES PRICE, AND STEVEN RENZETTI

RISING WATER DEMANDS are putting increasing pressure on many water agencies' infrastructure and thus signaling the possible need for greater capital investments. A key ingredient in knowing when these investments will be needed, as well as their scale, is having a good forecast of the likely future trends for water demands. Forecasting water demands can be labour, data, and time intensive—especially for smaller water agencies.

Compounding the challenge of demand forecasting is the following situation found in many water supply agencies: it's not uncommon for one division to be responsible for forecasting demand growth and planning infrastructure development while another office is responsible for the design of demand-management strategies. If the two offices don't communicate, then one office's successes in managing demands could throw off another office's long-run demand projects and related investment plans.

Figure 1: Screen capture of simulation model



1. Initial Conditions

1.1 Community Statistics

Fill in the fields of the following subsection using the community's current water demand, demographics, and available climate data.

i. Water Demand

	Residential
Annual WD (M^3)	7,500,000
Daily WD (M^3)	20,550
Average Daily WD (M^3/h)	4,500
Peak Daily WD (M^3/h)	8,200

ii. Initial Driver Values

	Value
Initial Population	50,000
Average Household Income ($)	72,240
Average Temperature (°C)	15
Average Precipitation (mm)	900

1.2 Pricing Structure

i. Residential

Volumetric

#	Proportion of Users	Max Usage (M^3)	Price ($/$M^3$)
1	1		0.45
2			
3			

This is not an abstract problem. A 2008 American Water Works Association survey indicated that most North American water utilities forecasted water demands by multiplying future population estimates by historical per capita water use. The problem with this approach is that it fails to account for other demand drivers, such as income, prices, and household appliance holdings. Unfortunately, in order to incorporate these demand drivers, a water agency often must gather significant amounts of data and deploy staff to carry out the forecasts. This isn't always feasible, and the lack of data, resources, and institutional capacity pose important challenges to many smaller water utilities that prevent them from adopting more enhanced demand simulation and forecasting methods.

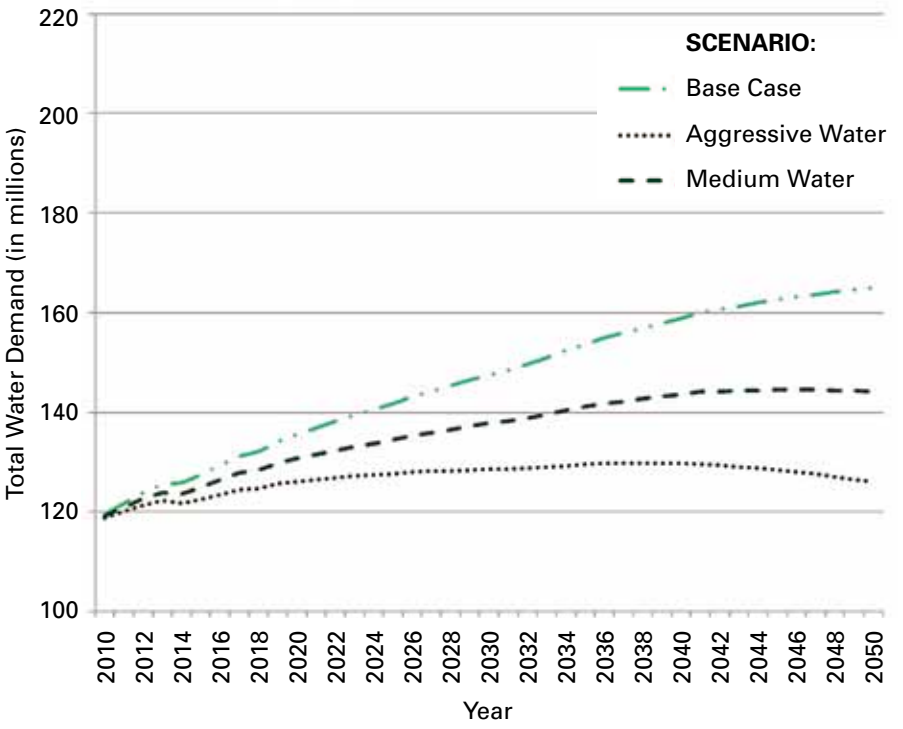
Researchers at Brock University are working with industry partners to address this issue. Led by water economist Steven Renzetti and funded by the federal government (through the Canadian Water Network and the Water Economics, Policy and Governance Network), the initiative aims to develop a user-friendly, spreadsheet-based demand forecasting and simulation tool that can provide water utilities with the capacity to forecast medium-term demands while simultaneously accounting for planned or expected changes in important demand drivers.

Using price and income elasticities estimated from their own customer data or from preset default values, the forecasting program provides several concrete benefits to water agencies:

1. Develops the capacity to produce more accurate water demand forecasts;
2. Allows agencies to assess likely impacts of pricing and other policy measures through sophisticated planning tools;
3. Provides the capacity to improve integration of capital investment planning and demand growth and to assess benefits of demand-side management measures in terms of the values avoided through deferral of investments; and
4. Helps to engage their stakeholders (such as city councils and members of the public) in discussions regarding the relative merits of alternative conservation measures.

Figure 1 is a screen capture of one of the program's user interfaces. It demonstrates that the user may input a number of important utility-specific data points, such as average

Figure 2: Simulations of impacts of alternative pricing policies



daily consumption, average household income, and the current price schedule. Other interfaces allow the user to set the time horizon for the simulations and the assumed values for price and income elasticities. The user then selects assumed rates of change for water prices, income, climate variables, and other important demand drivers. The program simulates the demand responses and displays the simulated future impacts of the demand drivers on average and total water demands over the time period chosen.

An early version of the model was used in work in partnership with York Region. In that case, population and income growth were projected to boost water demands and thus put pressure on existing infrastructure. Figure 2 shows the future demand growth scenarios developed under a specific set of assumptions about households' price and elasticities of demand and several pricing rules. The "base case" continues the recent practice of 0.4-per-cent annual water price increases (adjusted for inflation). The "medium water" and "aggressive water" scenarios show the potential impacts on water demand growth of two- and 3.5-per-cent annual water price increases (adjusted for inflation). These projected impacts show the potential of pricing policies for curbing demand growth and infrastructure needs, but they, of course, cannot predict the future with certainty.

This spreadsheet-based model is not designed to replace more sophisticated integrated asset management software. Instead, it is meant to provide smaller water agencies with the capacity to conduct water demand scenario analyses and share the results with its stakeholders. WC

Diane Dupont is a professor in the economics department at Brock University. James Price is a postdoctoral research fellow for the Water, Economics, Policy and Governance Network at Brock University. Steven Renzetti is a professor in the department of economics at Brock University.

Questions? Contact Steven Renzetti at **srenzetti@brocku.ca**

The crew unloads a wet-out tube. Wet out is the process of impregnating a high-quality felt tube with a calculated amount of catalyzed resin.

A liner bag is inserted for installation.

Credits: Liqu-Force

Cutting Costs

A town in southern Ontario experiences major savings with a trenchless program.

BY MIKE NEAR

UNDERGROUND INFRASTRUCTURE throughout North America is rapidly reaching the end of its design life. In recent years, there have been increases in public infrastructure investments, but the decay of infrastructure is occurring more quickly than it is being repaired. One current challenge is helping municipalities seek innovative technologies to replace, renew, or extend the life of their systems.

One such municipality is Halton Region. Located in southern Ontario, Halton is composed of the City of Burlington and the towns of Oakville, Milton, and Halton Hills. The region is known as a leader in the promotion of trenchless technology, and in 2014, it took another step in that direction.

A tender for the wastewater main replacement and rehabilitation on Pinegrove Road, Pinedale Avenue, and Woodale Avenue in the Town of Oakville was tendered and awarded to the low-bid contractor at an initial tender value of $2.2 million. The infrastructure in these areas was installed in the mid-1950s and, through condition assessments completed by the region, formed the basis for the tender. The condition assessments showed areas of structural defects as well as active infiltration.

It became clear to the general contractor early on that the region was looking for innovative methods to complete this project. After the tender close, the Town of Oakville requested that the Halton Region search for alternatives for replacing most of the wastewater main on Pinedale Avenue due to the street's mature trees and concrete road. Oakville was concerned about the potential costs of replacing the road surface throughout the project areas. The social costs of road closures and noise from general construction were also of concern to both the region and the Town of Oakville. Dealing with construction obstructions, loss of trees, traffic delays, and the general disruption to entire neighborhoods was deemed unacceptable.

After discussions with the region, a complete reassessment of the project area was undertaken to determine the condition of the underground assets. Many of the services still had remaining useful life, which led the contractor to provide the region with an alternate to the original tender. This allowed for select areas to be replaced and much of the project to be completed using cured-in-place pipe (CIPP) lining.

The region reviewed the proposed changes and realized that the trenchless options would greatly reduce the social costs or construction footprint that typically would be required by traditional open-cut underground construction. With changes to the contract, a totally trenchless solution was utilized wherever it was possible. One by-product of utilizing trenchless technology is the reduction of the carbon footprint, which is a factor in all projects throughout Halton Region. Through the use of CIPP lining, it is estimated the carbon footprint was reduced by more than 50 per cent for this project.

The project occurred in areas of Oakville where many homes had elaborate landscaping and mature trees that would cause problems if conventional digging methods were implemented. No excavations were required on private property roadways and residents were not inconvenienced for long periods of time. It is particularly

noteworthy that no trees were removed during this project, which was a mandate of the Town of Oakville.

With the completion of the amended contract, the region and town enjoyed significant cost savings. While the original cost as bid by the general contractor was $2.2 million, the project as completed, including the rehabilitation of 37 manholes, was $1.75 million—creating a savings of more than $450,000.

In these times of infrastructure deficits, it is important that more municipalities like Halton Region continue to rethink traditional attitudes toward underground infrastructure and realize the full cost-saving potential of available alternative technologies. WC

Mike Near is the business development and technical representative of LiquiForce Services.

Expected Benefits

By reducing the amount of extraneous or infiltration flow into the wastewater system, there is the benefit of creating additional capacity for actual sewage, which delays or eliminates the need for increased infrastructure capacity to accommodate future growth. This reduction in flow also benefits downstream system capacity, pumping, and treatment; the cost savings benefits may be significant.

Wastewater collection system improvements:

Since a significant component of this project involved sewer relining, there is a benefit to extending the life of existing assets. The reduction in infiltration delays structural degradation of the infrastructure, which further extends the life of the system.

Improvement to the reliability and performance of the wastewater collection system:

Pipe renewal will increase system capacity by eliminating extraneous flows, as well as improving performance. CIPP relining generally increases flow capacity, addresses infiltration, and reduces damage caused by tree roots. These aspects will result in the increased life of the asset.

Trenchless in-place pipe renewal techniques, in comparison to traditional open-cut pipe replacement projects, present a significantly lower carbon footprint in operations. Other green and attainable advantages of trenchless technology include the reduction or elimination of noise, dust, traffic, and the other social economic impacts typically associated with traditional open-cut construction activities.

One Health

Alberta researchers collaborate to better understand potential microbial hazards in rural drinking water. BY SYLVIA CHECKLEY

RESEARCHERS from the University of Calgary and University of Alberta in collaboration with Alberta's Provincial Laboratory for Public Health (ProvLab), Alberta Health Services, and FoodNet Canada will be using a "one health" lens to assess water quality and waterborne pathogens in rural Alberta. The "one health" approach recognizes that the health of people, animals, and the environment are all intrinsically linked.

When bacteria like *E. coli* contaminates our water supply, it can greatly affect human, animal, and environmental health. Approximately 450,000 Albertans depend on private wells (or water systems) as a source for drinking water. Twenty to 40 per cent of these water systems fall short of current drinking water quality standards, as outlined in the Guidelines for Canadian Drinking Water Quality. Guidelines recommend that private systems should be tested two to four times per year for microbial water quality, depending on type and treatment; however, testing is voluntary. A well water survey in Alberta published in 2010 indicated that only about 60 per cent of Albertans will test their water over a five year period. Most rural residents rarely or never test their water quality despite this service being offered at no cost to the well owner.

We know that there are disease causing agents such as bacteria and viruses from human septic systems, animal waste from livestock and wildlife, and other environmental microbial contaminants that can contaminate rural ground. The factors that influence the possibility of microbes contaminating a well water supply are many and varied,

but important factors include climatic conditions, local soil, and aquifer properties; well characteristics such as type, depth, condition, and age of the well; age of the septic system; manure storage; and livestock housed on property in last 12 months.

The public health authority currently looks at water quality indicators to determine if the water is safe. Currently, total coliforms (any bacteria in the coliform family) and *E. coli* are used as indicators of fecal contamination in a water supply. An *E. coli* or total coliform positive water sample is considered abnormal and is brought to the attention of the public health authority so they can discuss the results with the home owner and recommend appropriate actions such as well shock chlorination and resampling. Research has shown that drinking untreated or improperly treated groundwater can be associated with the transmission of disease causing agents. When untreated groundwater is used for irrigation, it can also be a threat to food safety especially through fruits and vegetables which might be eaten raw. Monitoring *E. coli* and total coliforms in drinking water based on current microbiological standards does not provide a reliable assessment of risk related to viral pathogens in the water systems. This issue has been previously identified by Health Canada (Guideline for Canadian Drinking Water Quality) and the Alberta groundwater quality assessment guideline. They also may not be good indicators for other disease causing organisms

A well water survey in Alberta published in 2010 indicated that only about 60 per cent of Albertans will test their water over a five year period.

This project, funded by the Alberta Livestock and Meat Agency and Alberta Innovates Environment and Energy Solutions, as well as FoodNet Canada, brings together professionals from different disciplines such as economists, engineers, environmental health officers, epidemiologists, microbiologists, physicians, veterinarians, and virologists to provide a robust assessment and interpretation of different aspects of well water quality. We are collaborating at local, provincial, and national levels to understand, manage and inform risk mitigation at the animal-human-environment interface. Stakeholders will be engaged throughout the process. Our partner, FoodNet Canada, is a federal program that uses a comprehensive surveillance at sentinel sites across Canada to reduce the burden of gastrointestinal disease in people. The newest surveillance site will be located in Alberta.

This project has been developed to describe the patterns of disease causing *E. coli* and other bacteria, viruses, and antimicrobial resistant organisms in well water across Alberta, both seasonally and annually. We will be able to compare the traditional water quality indicators to newer monitoring methods looking directly for disease causing agents through molecular and other means. This will tell us how well the indicators work and provide evidence to support future changes to testing protocols. The study results will be applied to assess if there are associations between well water contamination and well characteristics, land use (septic systems, manure storage), environmental (climatic, geologic) and animal husbandry risk factors using our broad team's expertise in this "one health" approach.

We will also examine livestock producers' perceptions of water quality, water contamination, and the influence of their perceptions on the management practices they choose that prevent water contamination by animal waste. Engaging stakeholders in the process will help to provide robust evidence-based information that will be used to inform rural water users, livestock producers, decision makers, and the general public on the implications for human, animal, and environmental health. WC

Sylvia Checkley is an assistant professor in ecosystem and public health in the Faculty of Veterinary Medicine at the University of Calgary. She is also a program lead in environmental surveillance at the Alberta Provincial Laboratory for Public Health.

For more on FoodNet Canada, go to **bit.ly/FoodNet**

Credit: Landmark Municipal Services

Water towers come in a variety of shapes and sizes, but they all serve the same purpose: supplying water even during power outages and providing emergency storage for fire protection.

Tried and True

The water tower has been a small-town staple since the 19th century because it provides real economic benefits.

BY DAVID BAKER

ALMOST EVERYONE that has traveled through small towns by car has seen them, and many have asked themselves what they were, or how they worked.

They quite often have the name of the town painted on them, which is handy for rural navigation, and occasionally they are painted to look like something that represents the town—like golf balls or fruits and vegetables. But sometimes they are just plain ugly, painted a colour that might have been considered attractive back when televisions were only black and white.

The reason water towers have not gone the way of black and white TVs is simple: economics. Water towers have utilized green technology long before there was green. Water towers employ free gravity and can reduce pump use by 50 per cent.

They come in an endless array of shapes and sizes, some rather utilitarian and others elegant, but they almost all serve the same purpose, which is to provide extra water at acceptable pressure when it is needed most. The most economic type of tower is also the most aesthetically pleasing: the steel welded composite tank, which has a life expectancy of more than 100 years and beyond thanks to the use of steel for its tensile strength, replaceable linings, and concrete for its compressive strength.

Most water towers hold treated or potable water, which is provided by a water treatment plant. The raw water that feeds the plant can come from surface sources, such as lakes and rivers, or from below ground via wells, or even a mixture of both.

The treatment plant removes impurities such as suspended particles and dissolved minerals using sand or membrane filters, and chemicals that cause suspended particles to settle out called flocking agents. In order to keep harmful coliforms and bacteria like *E.coli* from proliferating in the water, disinfectants such as chlorine and ammonia are added, and sometimes ultraviolet light is used as well.

This treated water is pumped into the distribution system, which is basically a network of underground pipes that supply our homes and industries. The water supply demand can vary greatly depending on the time of day and the season, with the heaviest morning usage between 6 a.m. and 9 a.m. when many people shower and flush toilets before work, and then after work, around 4 p.m. when there is another spike in demand as people arrive home and wash cars and water lawns. If the pumps that fed the system had to keep up with peak demand volumes and pressures, they would have to be very large and they would use a lot of energy. Because water cannot be compressed, there would be pressure surges if everyone turned off their hoses at the same time, which would result in watermain breaks and exploding toilets all over town. To smooth out these variations in volume demand and pressure, a water tower is installed somewhere within the supply piping (in a T type connection for simplicity sake) and a simple rule of hydraulics is employed, which states that for every foot a volume of water is raised above a given altitude, the pressure will increase by about 0.43 psi.

> If a major power outage occurs, the water tower usually has enough stored volume to maintain household pressure for up to 24 hours.

The average household enjoys 30 to 50 psi of water pressure, so by raising the water tower 100 feet above the supply line, a constant pressure of about 50 psi is exerted, but with the added benefit of acting as a buffer to fast variations in

pressure. In this way, other advantages are realized as well; the pumps that supply treated water to the system can be much smaller and therefore less expensive to buy, maintain, and run. The tower can provide the increased volume and pressure needed to accommodate peak demand times, and the smaller pumps can slowly re-fill the water tower during low demand times, such as at night when electricity is cheaper as well. If a major power outage occurs, the water tower usually has enough stored volume to maintain household pressure for up to 24 hours, or at least until back-up diesel generators can be started to power the water plant and the pumps. Large volumes of water are also needed to fight fires, so calculations are made to establish worst-case demands for fighting large or multiple fires. This consideration helps to determine the needed volume of water that should be stored for daily peak usage and emergencies.

Not all towns and cities use water towers, especially if there are great differences in elevation within the area. In that case, an underground reservoir situated on a hill serves the same purpose. Other cities use high-tech pumps that have variable flow rates to feed underground reservoirs that act as pressure relief when a pump doesn't slow down quickly enough, and to store the extra volume as well.

Largely populated areas like the City of Toronto have many water towers situated in and around the city, which provide pressure and volume to individual sectors or hubs. The hubs are kept somewhat independent so that large demands in one hub don't affect the one next to it, thereby minimizing the effect of watermain breaks and differences in demands caused by industry. These different hubs can often be manipulated to bypass pressure "holes" that might exist because of maintenance or main breaks, the ideal situation being that there is always water at the tap for our everyday use as well as water at the hydrant to fight fires.

Water towers have been around for a long time; some are more than 100 years old and still in use. Depending on the design and initial quality of construction, the use of modern coatings coupled with regular and proper maintenance can ensure that a water tower lasts indefinitely. The cost of maintenance for most water towers is relatively low because it uses gravity as its main energy source and reduces the need for complicated and expensive pressure and volume regulation systems. This good value is why most small towns around the country have one, and while their simplicity reinforces their benefits, they have earned the right to proudly display our regional identities. WC

David Baker is the head of technical support and new business development at Landmark Municipal Services in Burlington, Ontario.

A tractor moves a cattail bale at Pelly's Lake, Manitoba. The cattail will later be turned into pellets and burned for bioenergy.

Credit: Karla Zubrycki

Nature's Resource

Are prairie wetlands the ultimate green infrastructure?

BY MARLO CAMPBELL, CAROLYN KOSHELUK, AND KARLA ZUBRYCKI

NOT ALL INFRASTRUCTURE is made of concrete. Around the world, wetlands are both environmentally and economically beneficial green infrastructure. These unique ecosystems reduce the severity of both flooding and drought, provide useful natural resources such as bioenergy products, and clean our water. They also act as carbon sinks, storing greenhouse gases, and are home to thousands of plant and animal species—including one-third of Canada's species at risk.

The characteristics and benefits of wetlands haven't always been understood, but today are well researched and widely accepted by governments and the science community. Despite that knowledge, research by Ducks Unlimited Canada shows that we continue to lose 15 acres of wetlands daily in southwestern Manitoba alone, drained for agriculture, industry, and other forms of development.

Flood mitigation

One of the primary benefits provided by Canada's wetlands is flood mitigation. A 2014 report from the University of Saskatchewan demonstrates the significant impact of wetlands on water levels during flooding. The report, titled Improving and Testing the Prairie Hydrological Model at Smith Creek Research Basin, details several scenarios in the southeastern Saskatchewan watershed, including changes that would occur if wetlands were restored to their historic levels and if they were drained completely.

Led by John Pomeroy, director of the university's Centre for Hydrology, the study shows that during the flood of 2011—one of the worst flooding events in Saskatchewan and Manitoba's history—previous wetland drainage from 1958 to 2008 increased peak water flows by 32 per cent. It also found that levels would be 78 per cent higher if today's existing wetlands were completely drained.

"One result that surprised me was that wetlands, even in a flood year, still had the capacity to hold more water," Pomeroy said.

Flooding has environmental, social, and economic costs to everyone. Those with affected farms, businesses, and homes see their lives come to a halt and property damaged. Others see tax dollars

Credit: Ducks Unlimited Canada

Wetland loss is a contributing factor to flooding on the Prairies.

used for compensation, repairs, and construction of related infrastructure.

Pomeroy acknowledged that wetlands aren't the only contributing factor in flooding. They do, however, comprise a critical component of water management and flood mitigation.

Fuelling innovation

At Pelly's Lake, Manitoba, the flood and nutrient-control benefits of wetlands can be seen firsthand. Located southwest of Winnipeg, the low-lying 627-acre area features constructed flood-retention structures to hold back spring runoff and reduce downstream flooding.

In the last century, 50 per cent of the world's wetlands have disappeared. Canada is fortunate to have about 25 per cent of the world's remaining wetlands.

The land dries out enough by late summer to allow large-scale machinery to enter the site and harvest the healthy crop of cattail that grows each year. This activity is part of a project spearheaded by the International Institute for Sustainable Development (IISD) to capture phosphorus and transform cattail into "bioenergy," or renewable energy made from plant materials. So far, IISD and its partners have turned cattail into a range of products including fuel pellets, cubes, and synthetic gas. IISD is also exploring how to turn cattail into bioethanol or biobutenol, which means it could eventually run everyday machinery like cars.

"We are working with cattail because harvesting this plant produces many benefits. In addition to producing bioenergy, we are buffering against floods, capturing nutrients in harvested cattail, and creating economic development," said Richard Grosshans, senior research scientist with the water program at IISD.

This work is timely. Manitoba is phasing out coal by 2017, requiring those who still burn it to switch to other energy sources. Energy from plants is one viable option and because cattail has comparable heating values to other bioenergy sources, such as wood, IISD sees high potential to commercialize cattail with other bioenergy products.

Freshwater filtration

Wetland vegetation also plays a vital role in keeping freshwater ecosystems healthy. Cattail and other species of plants filter out nutrients like phosphorus that would otherwise end up in rivers and lakes. Excessive amounts of nutrients can lead to the growth of potentially harmful algae blooms, the result of a condition known as eutrophication.

Increasingly, Manitoba's Lake Winnipeg has become a poster child for eutrophication as a result of nutrient pollution. The 10th largest freshwater lake in the world received international attention in 2013 when Global Nature Fund designated it the Threatened Lake of the Year due to the increasing size and frequency of blue-green algae blooms on its waters.

Protecting Manitoba's remaining wetlands will help protect the health of Lake Winnipeg, which is why "Keeping Water on the Land" is the first of eight actions identified in the Lake Winnipeg Health Plan. Led by the Lake Winnipeg Foundation, this plan aims to restore the balance of this important ecosystem by reducing phosphorus loading and can serve as a model for other jurisdictions dealing with eutrophication.

Protecting nature's resource

With a diverse set of environmental and economic functions, the benefits of wetlands are significant and far-reaching—and they exist for us with no effort or expense.

In the last century, 50 per cent of the world's wetlands have disappeared, along with the benefits they provide. Canada is fortunate to have about 25 per cent of the world's remaining wetlands. By protecting what we have left and working to restore what's been lost, we can positively influence flooding and drought events, water quality, climate change, resource availability, biodiversity, and more. WC

Marlo Campbell is the communications director of the Lake Winnipeg Foundation. Karla Zubrycki is a project and communications manager at the International Institute for Sustainable Development. Carolyn Kosheluk is the communications coordinator at Ducks Unlimited Canada

Close Collaboration

It will take a multi-pronged approach—and working together—to tackle our infrastructure challenges.

BY ROBERT HALLER

WE ARE ALL AWARE of the tremendous infrastructure challenges before us. We need to replace aging pipes, upgrade treatment plants to meet new standards, expand for growth, and deal with the effects of climate change and security. These are not so much technological challenges as they are financial challenges. Given unlimited budgets and authority, utility leaders could easily address all their concerns within their own department, but that is not a reality. Rather, we work in a competitive environment where each community must compete for federal and provincial funds, and then each department within a community competes against each other for limited tax dollars. These funding decisions are made by elected officials, but they in turn are answerable to their electors. So to address these infrastructure challenges, we need a three-pronged approach.

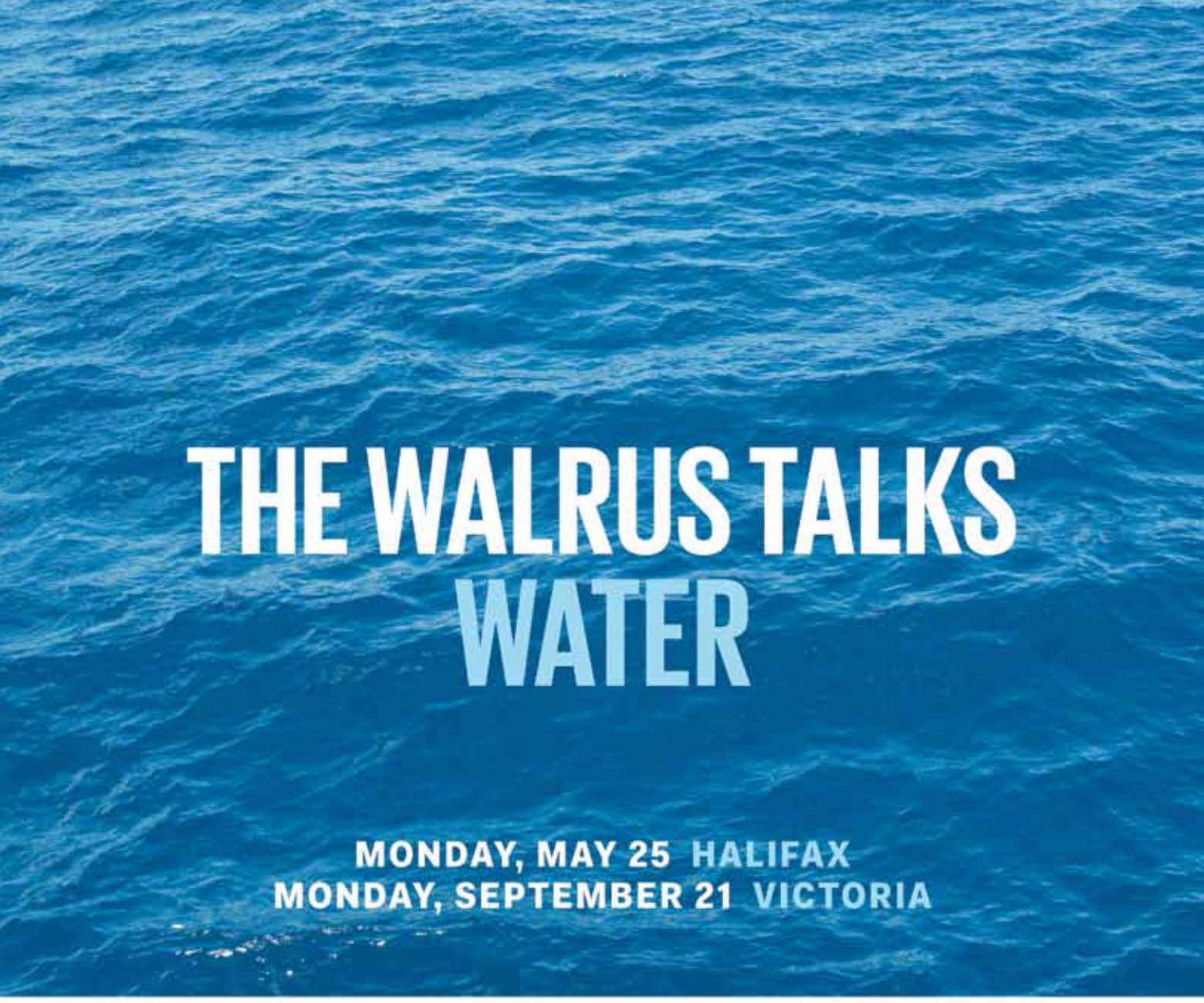
The Canadian Water and Wastewater Association (CWWA) started at the federal level, speaking on behalf of all municipal utilities to the federal infrastructure round tables. Close to one billion litres of sewage flowed into Toronto's rivers and Lake Ontario after the city's July 8, 2013 flood. While we were pleased with the billions of dollars committed to infrastructure over the next 10 years, we were disappointed that water and wastewater were not designated as priorities and that the gas tax was opened for even greater competition.

The focus now shifts to the provincial and municipal levels and how we get those levels of government to use the federal infrastructure funds for water and wastewater projects. Crossing into provincial territory, the CWWA does not go alone. Rather, we work closely with the provincial and regional associations. Working with the Canadian Affairs Committees of both the Water Environment Federation (WEF) and American Water Works Association (AWWA), we are commencing an infrastructure project. This project is just in the beginning stages, but the concept is to provide support and tools for utility leaders that they can use to educate their elected decision makers. This could include the concepts of inventories, asset management, priority identification, infrastructure renewal, technological options, financing options, pricing, and more. A lot of this information already exists, so we hope to compile what is out there and make it more easily accessible to the utility leaders.

The last prong has to address the general public. Utility leaders know what has to get done to ensure safe, reliable, and sustainable services to their community. Even if they can convince their local councils and boards, those elected officials need to know they will get the support of their electors and not be thrown out of office for choosing a watermain replacement over a new arena or for approving a significant increase to water rates. To initiate a national discussion within our industry on how to affect public attitudes, CWWA conducted a survey and facilitated a round table with industry leaders in 2014—leading to the release of our report, Public Attitudes Project 2015: Changing Public Attitudes on the Value of Canada's Water System Infrastructure. This is not a final communications plan, but a framework for those looking to develop a public relations plan in their community or a starting point for any national effort. This report will feed into the larger Value of Water Coalition work with AWWA, WEF, and others. Meanwhile, CWWA is representing Canadian municipalities on the latest Infrastructure Report Card with the Federation of Canadian Municipalitiesand we are providing advice to the RBC team on their Water Attitudes Survey for 2015—both reports to be released this spring.

This three-pronged approach is not merely a suggestion. It's absolutely essential if we want to successfully tackle our country's water and wastewater infrastructure challenges. WC

Robert Haller is the executive director of the CWWA.



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ACQUIRED

WaterTrax, which offers cloud-based data management software products for water and wastewater utilities, acquired Linko Data Systems, a supplier of industrial pretreatment fats, oil, and grease, and liquid hauled waste software to municipal utilities in the United States.

ESTABLISHED

The Southern Ontario Water Consortium (SOWC) established its Industry Advisory Committee (IAC) in January. The IAC will provide strategic direction and advice regarding SOWC's priorities, sustainability, and business development activities.


John Vogan


Rob Andrews


Dave Ellis


Linda Gowman


Emily Moore


Geoff Riggs

Members of the IAC are: **John Vogan** of ARCADIS Canada Inc.; **Rob Andrews** of the Ontario Clean Water Agency; **Dave Ellis** of Geosyntec Consultants; **Linda Gowman** of Trojan Technologies; **Emily Moore** of Hatch Ltd.; and **Geoff Riggs** of IBM Canada.

More news items can be found at **watercanada.net/topics/news**

JOINED


Anne Baliva

Anne Baliva has joined the Canadian Water Quality Association as program manager reporting to the board of directors. Anne will help in managing, coordinating, planning, and providing support to the board and several committees. She has more than five years of association management experience working at the Water Environment Association of Canada.

IN MEMORIAM


Phil Stefanoff

It is with deep sadness that we say goodbye to **Phil Stefanoff**, who passed away on January 17, 2015 at the age of 45. Phil was the business development director for Kisters North America and a dear friend of Water Canada. We will miss you, Phil.

For more information on how to donate to a trust fund set up for Phil's children, please email rachel@watercanada.net

IISD Water Gala
Toronto, ON

Credit: George Pimentel Photography

L-R: Glen Murray, Minister of Environment and Climate Change; Gail Beggs, former deputy minister, Ministry of Environment; and Gord Miller, environmental commissioner of Ontario.

L-R: Scott Vaughan, IISD president; Ontario Premier Kathleen Wynne; and Mike Vukets, IISD Canadian vice-chair.

On February 19, the International Institute for Sustainable Development (IISD) hosted a special Water Gala in Toronto. The event celebrated Canada's unique research facility, the Experimental Lakes Area (IISD-ELA), which has been managed by IISD since April 2014. More than 100 leaders from business, government, academia, and NGOs gathered at The Royal Conservatory. Ontario premier **Kathleen Wynne** discussed the importance of science, innovation, and leadership in protecting Ontario's water, and **Thomas Lovejoy** of the United Nations Foundation delivered a keynote address on biological diversity, planetary boundaries, and the implications of climate change on water. There was also a musical performance by the Cowboy Junkies.

A key theme of the Water Gala was the role of science in watershed protection and policy decision-making. IISD Experimental Lakes Area is one of the world's most influential freshwater research facilities. It features a collection of 58 small lakes and their watersheds in Northwestern Ontario. By manipulating these small lakes, scientists are able to examine how all aspects of the ecosystem—from the atmosphere to fish populations—respond. In April 2014, IISD, the Government of Ontario and the Government of Canada signed three agreements to ensure the facility's long-term operation.

Credits: Debbie Yea/OPWA

The incoming 2015 OPWA board of directors.

Former Mississauga mayor Hazel McCallion.

Water Canada publisher Todd Latham.

OPWA's Annual Conference & Awards Luncheon
Mississauga, ON

The Ontario Public Works Association's Annual Conference & Awards Luncheon took place on January 29 at the Mississauga Grand Banquet & Convention Centre. ReNew Canada publisher Todd Latham moderated sessions and introduced lunch speaker **Hazel McCallion**, who served as the mayor of Mississauga from 1978 until 2014.

Project of the Year Award winners included the Rumble Pond adaptive stormwater project (Richmond Hill); Middleton water supply system upgrades (Waterloo); Keswick Wastewater Pollution Control Plant expansion; Burlington–Oakville interconnecting watermain; North Oakville East Wastewater Pumping Station; Durham/York Energy Centre; Hannon Creek realignment and Dartnall Road extension (Hamilton); Buttrey Street sewer outfall (Niagara Falls); Ottawa WWTP Raw Sewage Pump Station emergency bypass pumping; and construction of the Kirkland Lake Wastewater Treatment Plant.

Recognize Our Rights

Safe, clean drinking water still out of reach for far too many Canadians.

BY KAITLYN MITCHELL

As of December 31, 2014, there were 134 drinking water advisories in effect in 91 First Nations communities across Canada, excluding British Columbia.

WHILE CANADA JOINED the international consensus and recognized the right to water at the United Nations Conference on Sustainable Development in 2012, it is still failing to live up to that ideal within its own borders.

At any given time, there are thousands of Canadians who cannot safely drink the water out of the taps in their homes. In some extreme cases, they may not even have indoor plumbing. And for many, help isn't on the way.

Canada lacks a national water law and rigorous, enforceable water quality standards. Instead, it relies on an uneven patchwork of provincial water policies to protect drinking water. From coast to coast, drinking water is not equally protected. And while most major Canadian cities have relatively sophisticated water treatment facilities, many rural, low-income, or First Nations communities lack such infrastructure and rely on untreated or minimally treated water.

Perhaps nothing can illustrate this startling inequity better than what happened in Manitoba in January. Winnipeg was put under its first city-wide boil-water advisory. However, for Shoal Lake 40, the First Nations community whose territory is home to Shoal Lake, Winnipeg's drinking water source, it was just business as usual; the community has been under a boil-water advisory for more than 17 years.

Two days later, Winnipeg's advisory was lifted. To this day, Shoal Lake 40 residents still can't safely drink the water out of their taps.

In the absence of a national water law and adequate funding, communities under federal jurisdiction, such as First Nations reservations, have virtually no legal protection of their drinking water. In fact, according to a 2009 study by the United Nations, First Nations homes are 90 times more likely to be without safe drinking water than other Canadian homes.

And so, it is hardly surprising that more than 100 First Nations communities across Canada were under a drinking water advisory as of November 2014. Ironically, labour laws compel the federal government to provide safe water to its employees who live and work on First Nations reserves—even if residents are forced to go without clean, safe drinking water in their homes.

Non-First Nations communities can also be impacted. My client Melissa King lives in Harrietsfield, Nova Scotia, where years of industrial activity have contaminated the well water on which her family depends. It is so laden with toxic chemicals that her two-year-old son has never had a bath at home. She lives just a 20-minute car ride outside of Halifax.

Canada has no laws that address the concept of environmental justice—the fair and consistent distribution of environmental benefits and burdens, without discrimination on the basis of socio-economic status, race, ethnic origin, or residence on an Aboriginal reserve. This is one reason why, from Shoal Lake 40 to Melissa King and her family, we are confronted with example after example of environmental injustice within our own borders.

It is hard to believe that these injustices still persist in our country. It's even harder to believe that although 181 of the 193 countries in the United Nations support a human right to live in a healthy environment, which includes access to clean, safe drinking water, Canada is not one of them.

It should be. It is time for Canada to recognize our right to a healthy environment in the Charter of Rights and Freedoms. A Charter right would give us a new, powerful legal tool to fight environmental injustices and ensure that even the most vulnerable and isolated among us can assert their right to turn on the tap and drink the water that comes out of it.

Our highest law must recognize that environmental rights are human rights. Until then, the injustices in Shoal Lake 40, Harrietsfield, and far too many other Canadian communities will continue—and the fight to right these wrongs will not get any easier. WC

Kaitlyn Mitchell is a staff lawyer at Ecojustice.

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