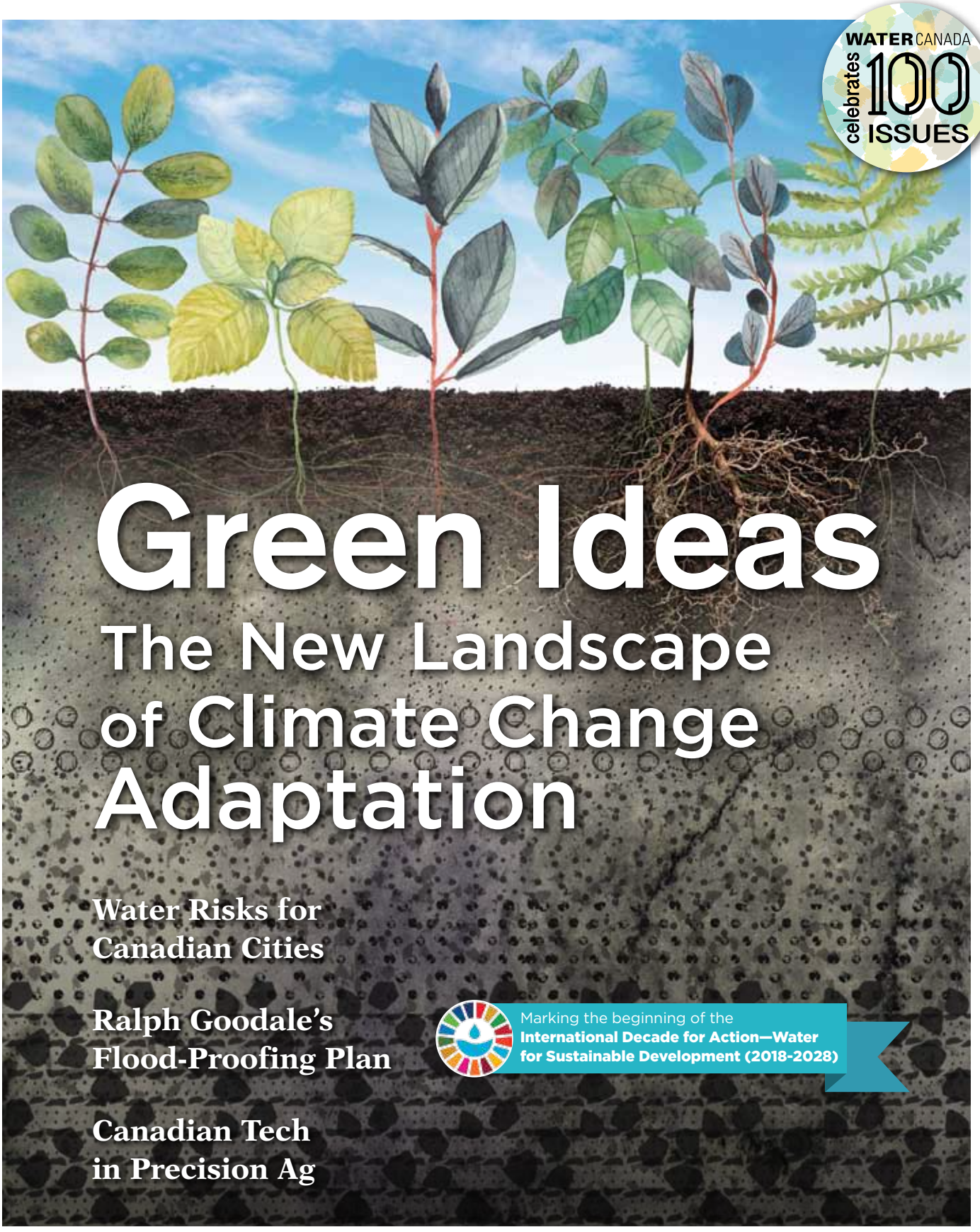
THE COMPLETE WATER MAGAZINE

MAY/JUNE 2018

WATER CANADA



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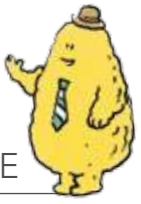

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EDITOR
Katherine Balpataky

PUBLISHER
Todd Latham

ASSOCIATE PUBLISHER
Jane Buckland

ART DIRECTOR & DESIGNER
Donna Endacott

ASSOCIATE EDITOR
Andrew Macklin

CONTENT AND MARKETING MANAGER
Todd Westcott

CONTRIBUTING WRITERS
Zafar Adeel, Sarah Boon, Robert Haller, Eve Krakow, Stephanie Merrill, Alexis Morgan, Robert Patrick, Kevin Quigley, Todd Westcott

ADVERTISING
Jane Buckland jane@actualmedia.ca

AUDIENCE ENGAGEMENT INTERN
Jacquelyn Mayo

ADVISORS
Nick Reid, James Sbrolla

WATER AMBASSADOR
Lee Scarlett

actualmedia

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Ushering in the New Water Decade

BY KATHERINE BALPATAKY

CANADA'S ROLE in the world is changing. Global projections regarding future demands for food, water, land, and shelter—along with the fact that Canada has room to grow—raise questions concerning Canada's ethical obligations. However, a recent survey by the Environics Institute shows that Canadians are aware of, and concerned about, these issues and that they desire to be part of the solution—even if policy frameworks and programs have not yet caught up with their feelings of compassion.

Adopting climate refugees into our country may be necessary, but in the same way that responding to climate change requires a two-fold approach of mitigation and adaptation, Canadians also have the choice to help the adaptation process abroad so that people can continue to live in their birthplaces.

March 22 marked the beginning of the new UN International Decade for Action: Water for Sustainable Development 2018–2028. This Water Decade, adopted by the UN General Assembly in December 2016, aims to support the implementation of water-related goals and targets under the 2030 Agenda for Sustainable Development. These goals are a powerful framework for humanity, because they are proving to be a successful in rallying efforts across governments, civil society organizations, corporations, Indigenous groups, and citizens. Climate change adaptation is an intrinsic part of nearly all the Sustainable Development Goals (SDGs), as is water. For this reason, Water Canada is very proud to support a new alliance of Canadian research institutions and related organizations aiming to jointly host the secretariat for the Water Decade. We believe that Canada has the research heft, innovation capacity, governance expertise, and public support to be an even greater positive force in the world.

In this issue—our 100th edition—we document a number of innovative and distinctly Canadian programs, policies, technologies, and areas of social innovation that are facilitating climate change adaptation at home and abroad. On page 10, Eve Krakow highlights three Canadian companies that provide solutions to trends in water scarcity and growth in food demands; on page 14, Sarah Boon speaks to groups involved in developing a comprehensive flood risk plan for Canada; on page 22, Alexis Morgan presents a new information tool that allows cities and industries to address climate risk globally; and on page 42, Dr. Zafar Adeel describes a vision for Canada's role in the new Water Decade—the International Water Decade Alliance. Our capacity as a nation to address water and climate challenges is steadily increasing and must continue to do so.

It will stretch our science, technologies, and our cultural resiliency—a nation-building exercise requiring serious and sustained leadership. WC

Contact Katherine at 416-444-5842 ext. 116 or email katherine@watercanada.net

All back issues of Water Canada are available for download at watercanada.net/issues

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NATHAN T. WRIGHT
Nathan is a freelance illustrator and artist based in Des Moines, Iowa, USA.
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STEPHANIE MERRILL
Stephanie is a research associate with the Global Water Futures Program in the Global Institute for Water Security at the University of Saskatchewan.
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ZAFAR ADEEL
Zafar is a professor of resource and environmental management, and the executive director of Simon Fraser University's Pacific Water Research Centre.
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ABOUT THE COVER

Capturing water is one of the most important roles that soils play in our ecosystem. With the help of technology, farmers can now be incredibly precise in their application of water and fertilizers, working with data on soil physics, temperature, air moisture, and a host of other parameters. When soils are healthy, there is less erosion, which is good news for crops as well as surface water quality and ecosystem services.

Commonwealth and the Blue Economy

BY KATHERINE BALPATAKY

PRIME MINISTER JUSTIN TRUDEAU announced on April 19th that Canada will endorse the Commonwealth Blue Charter—an initiative aimed at protecting and conserving the world's oceans. The Blue Charter includes a proposal to reduce our dependency on single-use items such as thin plastic bags, plastic water bottles, straws, and cutlery, also found in freshwater bodies.

Secretary-General Patricia Scotland delivered the proposal that entails 16 principles and values, including environmental protection, good governance, justice and peace, human rights and gender equality, and recognition of the needs of vulnerable nations and young people.

To give it practical effect, a knowledge and innovation hub and series of best practice toolkits will be developed, complementing the existing support provided by the Commonwealth Secretariat to its 45 coastal member countries.

"Sustainability and development through mutual support and towards shared goals are at the heart of all Commonwealth cooperation and connection, and the ocean is the truly matchless symbol and reality of our global togetherness," said Secretary-General Scotland.

Vincent Meriton, vice president of Seychelles and co-host of the Blue Common wealth side event, led a round of applause for the Commonwealth as he highlighted the support provided to Seychelles in crafting its national blue economy roadmap. "Since we embarked on this journey in 2014 we have had the benefit of the support of the Commonwealth," he said.

As part of the proposal, U.K. Prime Minister Theresa May has pledged to eradicate avoidable plastic waste by 2042 as part of a "national plan of action" and announced £60 million (CDN $$100.7 million)-worth of funding to develop new ways to address the problem.

Fisheries and Oceans minister Dominic LeBlanc led a Canadian delegation to the first ever UN Ocean Conference. Also known as simply the Commonwealth of Nations, the Commonwealth is an intergovernmental organization of 53 member states that are mostly former territories of the British Empire. WC

Katherine Balpataky is Water Canada's editor.

More information is available at **thecommonwealth.org/commonwealth-blue-charter**

Source: climateatlas.ca/maps/canada/fig_2050_85#

Climate Communications

ON APRIL 4, the University of Winnipeg's Prairie Climate Centre (PCC) launched the Climate Atlas at the Royal Ontario Museum in Toronto. The Atlas is one of the only tools in the world that integrates climatology and cartography with interactive web design and cinema to connect scientific data with personal experience in compelling and easy-to-use ways.

"Our climate researchers are at the forefront of climate mapping, communications, and citizen engagement nationally and internationally," said Dr. Annette Trimbee, president and vice-chancellor of the University of Winnipeg.

"The Atlas is a resource that I can imagine drawing upon in my own effort to inform the public and policymakers about the reality and threat of climate change," said Dr. Michael Mann, climatologist with Penn State University. "[…] It looks a bit more comprehensive than anything in the U.S."

The Atlas explains what climate change is, how it affects Canada, and what these changes mean in our communities. Various aspects of climate change can be explored using maps, graphs, and climate data for provinces, local regions, and cities across the country. Plain-language descriptions and analyses make climate science more understandable and meaningful.

Documentary videos, collaboratively developed with local and Indigenous knowledge holders, as well as other experts, help make the global issue of climate change more tangible. These voices of lived experience provide personal perspectives that complement the climate data.

The Atlas was funded by the Province of Manitoba, the Social Sciences and Humanities Research Council (SSHRC), Great-West Life, Environment and Climate Change Canada (ECCC), and the University of Winnipeg.

"This is a made-in-Manitoba solution. A made-in-Winnipeg solution. It provides something you don't see anywhere else around the world," Minister McKenna said. WC

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FEATURE: Five lessons cities can learn from Cape Town. ***bit.ly/DayZeroLessons***

NEWS: National grant available for municipalities to hire climate change adaptation staff. ***bit.ly/ClimateHIRE***

BLOG: The first deputy minister of Energy and Water Resources of the Republic of Tajikistan talks about the new Water Decade and why Canada should care. ***bit.ly/CDNWaterDecade***

VIDEO: Watch 13-year-old Autumn Peltier from the Wikwemikong First Nation, Manitoulin Island address leaders at the UN about the new Water Decade. ***bit.ly/PeltierUNDecade***

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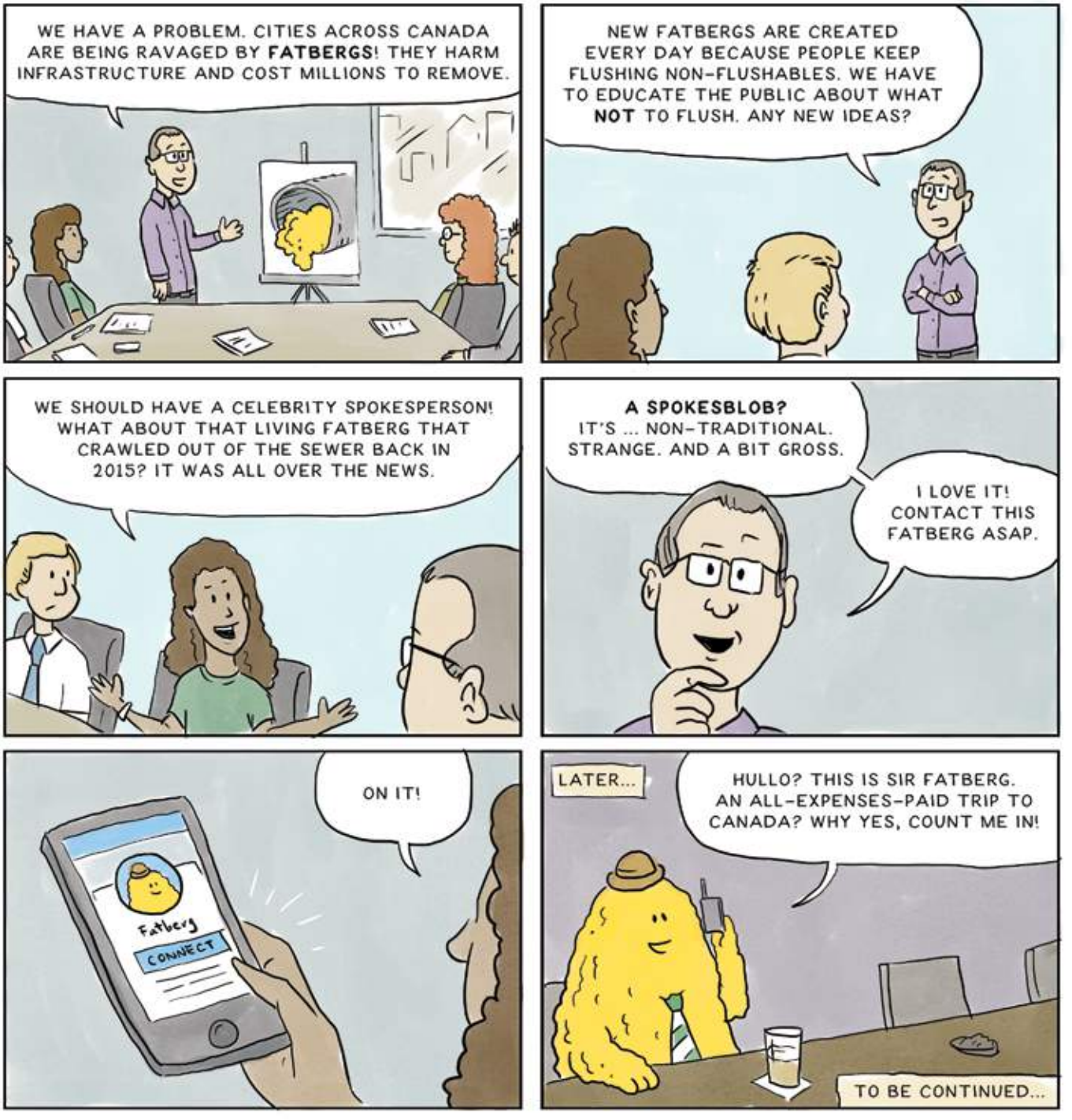

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Nathan T. Wright is a freelance illustrator and artist based in Des Moines, Iowa, USA.

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Feed The World, Wisely

Canada is in a position to grow our agriculture and technology sectors to address global demands for food. BY EVE KRAKOW

JOCELYN BOUDREAU'S relationship with water started early. When he was growing up in Quebec, his father often welcomed people from McGill University onto the family farm to do research. "As a kid, I was already taking measurements for them, taking water samples," he chuckled. "I always thought it was fascinating to understand what was going on below surface."

That fascination led to studies in agricultural engineering and soil science, where he met agronomist Jean Caron. In 2002, they founded Hortau, offering precision irrigation management systems and services for agriculture. The company has become an industry leader in what is becoming an increasingly vital field: precision agriculture.

Global demand for food is set to double by 2050, yet few nations have the land and water resources to provide for these demands. Meanwhile, climate change is expected to increase the risk and severity of droughts in Canada, the United States, and elsewhere. Warmer temperatures can increase water demands and evaporation, putting greater stress on water supplies. Last year in Canada, a large portion of the southwestern region, from the British Columbia Interior to the southeastern Prairies, experienced the driest summer in 70 years.

The fact that Canada currently has the land and water resources to deliver on global food demands is at the fore of Canada's trade discussions with many countries, especially Asia where protein consumption is rising. Therefore, interests to develop Canada's capacity in technologies that enable farmers to use water and fertilizers more efficiently, in step with increasing yields, is also growing rapidly. As the fifth largest agricultural exporter in the world, Canada has a tremendous opportunity to be a global leader in this field.

Pascal Lanctot is manager of screening and evaluation at Sustainable Development Technology Canada (SDTC). An arm's length foundation of the federal government, SDTC funds clean-tech projects that deliver both environmental and economic benefits. "We've seen a large number of agriculture-related proposals in the last few years," said Lanctot.

Precision agriculture employs technology to tailor actions to the specific, real-time needs of plants and crops. It begins with sensors on the ground (or in the trees) to monitor real-time conditions regarding factors such as moisture, nutrients, weather, pests, and disease. It then uses machine learning and artificial intelligence to combine that information with a myriad of other past and present data, analyze it, and make decisions. Alerts and recommendations are sent to the farmer's smartphone or tablet, or actions can be automated, turning irrigation pivots on or off, modifying fertilizer rates and schedules, and much more.

When it comes to water, precision

Semios staff install their network system in a tree canopy of a pistachio orchard.

A Semios solar panel captures energy from the sun to connect sensors wirelessly across fields, to be managed from online devices.

Credit: Semios

Jocelyn Boudreau co-founded Hortau with Dr. Jean Caron in Québec in 2002.

Credit: Hortau

Hortau field staff install real-time field stations in a cherry operation. The solar-powered devices can measure everything from soil tension to weather parameters, reporting field data in real time to growers via mobile devices.

Credit: Hortau

agriculture not only to leads to significant water and energy savings, but it also reduces contamination of water supplies from fertilizer leaching and runoff.

Hortau, Farmers Edge, and Semios are three Canada-based market leaders in the field. Farmers Edge and Semios were among the 2018 Global Cleantech 100, a list of private companies best positioned to solve tomorrow's clean tech challenges and most likely to make a market impact within the next five to ten years. Hortau made the 2017 Global Cleantech 100 top "companies to watch" list.

All three companies note that Canadian government support played an important role in the development, demonstration and scale-up of their technology. And while each began in its own niche, they are all moving to a more holistic approach that uses a wide range of data to make intelligent decisions to support growers.

Hortau: monitoring soil tension

Based in Quebec, Hortau was founded in 2002 by agronomist Jean Caron and agricultural engineer Jocelyn Boudreau. They were interested in determining how to best use water to produce a better crop, while also avoiding issues related to fertilizer availability, disease, and pests. Working together in soil physics at Université Laval, the researchers found that soil tension was a more useful indicator than just the percentage of water in the ground. "Different soils have different retention capacities, and the plant has to fight that retention to get its water," explained Boudreau, now the company's CEO. "Soil tension tells you how hard the plant has to work to extract the water. This is directly linked to the plant's metabolism and growth."

> Most of the time, people apply too much water for the retention capacity of the ground, or they wait too long between irrigations. Either way, you end up using a lot more water than needed. Using the technology, water savings range from 20 to 35 per cent.

While this was the foundation for Hortau's technology, the company's sensors now also measure air temperature, humidity, frost, and a host of other parameters. This data is sent to a cloud-computing platform, where it is analyzed and processed using decision-making tools. Increasingly, predictive analytics combine real-time information from the soil with weather forecasts and other data to predict water needs of the crop for the next week, 10 days, etc., and produce irrigation schedules.

Water savings typically range from 20 to 35 per cent. "Most of the time, people apply too much water for the retention capacity of the ground, or they wait too

Credit: Hortau

Using real-time soil tension data, grape growers can ensure their crop remains at optimal crop stress levels throughout the season.

Credit: Hortau


A Hortau support representative works with an almond grower to understand real-time soil tension and weather data from the field to help maximize his crop production.

Credit: Semios

A Semios sensor in the canopy of fruit tree.

long between irrigations," Boudreau noted. "Either way, you end up using a lot more water than needed."

With just over 80 employees in Canada and the United States, Hortau focuses on high-value irrigated crops such as fruits, berries, vegetables, and tree nuts. In 2017, Hortau received a $5.9 million investment from SDTC to further accelerate the development of its precision agriculture platform.

Farmers Edge: a vertically integrated platform

Farmers Edge began in 2005, when agronomists Wade Barnes and Curtis MacKinnon set out to explore the possibilities of variable rate technology with growers in Pilot Mound, Manitoba. Since then, their system has developed into a "completely vertically integrated decision and digital agronomy platform," said Ron Osborne, Chief Strategy Officer. Their core focus is wide-row crops. In the last few years, the company has grown to 450 employees.

Daily satellite imagery allows a farmer to see thousands of acres from their desk or smartphone, instead of driving around to check on the status of a crop. But that's just one piece of the puzzle. Famers Edge owns and operates 4,000 proprietary weather stations worldwide, set up on customers' fields. It also connects all of the farmer's machinery, recording real-time data from almost 10,000 machines, such as tractors, planters, sprayers, and harvesters. Finally, the company owns and operates soil laboratories to analyze the samples collected from customers' farms.

All this data is used to create variable-rate schedules for fertilizer applications and irrigation on a zone-by-zone basis, so as to optimize crop yield without wasting inputs. Using machine learning, the company also crunches this data to develop benchmarks, analytics and new insights to manage and mitigate risks.

When it comes to water management, "for the farmer, the benefit is profitability. For the environment, it's sustainability: not polluting water supplies by making sure the plant gets the nutrients and not the water table," said Osborne.

When it comes to water management, for the farmer, the benefit is profitability. For the environment, it's sustainability: not polluting water supplies by making sure the plant gets the nutrients and not the water table.

In 2015, Farmers Edge received $6 million from SDTC to continue developing its farm management platform, which now includes a wide array of decision-making tools. The company is also a member of the new Protein Industries Supercluster, one of five superclusters announced in February 2015 by the Canadian government.

Semios: in the tree canopy

Semios began just seven years ago in British Columbia. "We were looking at specialty crops, and how to collect data within the tree canopy," said Michael Gilbert, founder and CEO. With funding from Agriculture Canada and SDTC ($4.9 million in 2011), they set out to build a

data collection infrastructure and develop a scalable wireless network for big canopy crops (e.g., almonds, pistachios, citrus, apples, pears, stone fruits).

Initially, Semios focused on insect management and disease modelling. They developed a pest management system that uses mating-disrupting pheromones, offering a more environmentally friendly and cost-effective method than traditional pesticides. When customers started asking about irrigation, that became the next logical step. "The biggest technology hurdle and cost is putting in the communication infrastructure," Gilbert explained.

Sensors and flow meters measure the amount of water in the ground, coming in, and leaving (evapotranspiration). But as with Hortau and Farmers Edge, these sensors—whether in the ground or hanging from the trees—are just the starting point. Semios has a team of scientists examining the data streaming in from different farms. "That is where the true innovation is coming," said Gilbert. "We now have 500,000 sensors worldwide in key areas, reporting every ten minutes. This feeds into a database that looks for trends and relationships. We use this to create products to offer customers."

While a web browser interface allows customers to monitor their orchards and fields, most of the company's focus in now on sending farmers alerts on their phones when a decision or action is required. Semios is also offering to take over more and more control of different aspects of the farm's management, but that level of trust will likely take a few more years to earn, Gilbert notes.

Big Data to drive sustainability

When Hortau started in 2002, "there were no smart phones, you couldn't transmit data over a cell network," recalls Boudreau. "We had to install software on customers' PCs in their offices." Now everything is online and available on a smartphone or tablet. Customers pay by subscription for a service rather than purchasing technology or hardware.

Osborne says it is this collection and aggregation of data that allows Farmers Edge to generate efficiencies. "We're using data science and machine learning to create new analytics, new insights, and valuable reports that we offer back to customers as additional options."

As a scientist, Gilbert is a huge believer in the power of big data. "The Old Farmer's Almanac is not cutting it anymore," he said. "We need data-driven decisions." While each customer pays for their own package, they get the leverage effect of the whole network. "In the years to come, I think sustainability will be driven by data." WC

Eve Krakow is an Ottawa-based freelancer and regular contributor to Water Canada.

Credit: Tom Ryako

A Toronto GO Train sits stranded in the downpour that flooded the city on July 8, 2013. The Insurance Bureau of Canada reported the damage of the storm topped $859 million, setting a new record for the province. Since then, the City of Toronto has increased its spending on programs meant to compensate for extreme weather, including $3.1 billion over 10 years to improve wastewater and storm water collection systems.

Safety Net

Canada coordinates its efforts to managing flood risk. BY SARAH BOON

FLOODING IS A SERIOUS CHALLENGE in Canada. In the 1980s, Canadian insurers spent approximately $400 million on weather-related insurance payments and, over the last ten years, those numbers have risen to in excess of $1 billion. In 2017 alone, overland flooding resulted in over $590 million in insured damage across Canada, with spring flooding striking B.C.'s Thompson-Okanagan region and heavy rains causing flooding in Saskatchewan, Ontario, Quebec, and Atlantic Canada.

Because flooding is a transboundary issue, and provinces and territories have jurisdiction over different areas of water management in Canada, flooding is difficult challenge to manage and requires the involvement of many stakeholders.

As a first step towards developing a national strategy to manage flood risk, Public Safety and Emergency Preparedness Minister Ralph Goodale hosted a National Roundtable on Flood Risk in Regina in November of 2017. In the Capital Ballroom at the DoubleTree by Hilton, Public Safety Canada (PSC) staff, the Insurance Bureau of Canada (IBC), and representatives from the Canadian Water Resources Association (CWRA), Canadian Water and Wastewater Association (CWWA), Federation of Sovereign Indigenous Nations (FSIN), International Institute for Sustainable Development (IISD), Federation of Canadian Municipalities (FCM), and federal and provincial/territorial government leaders met to discuss the many considerations for such a strategy.

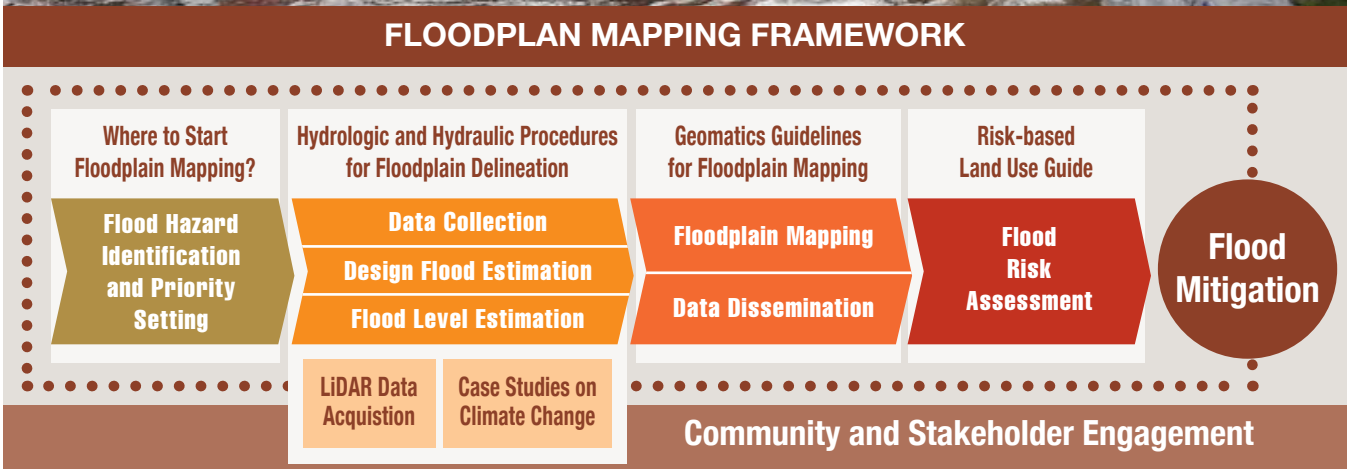
Minister Goodale also requested that the IBC chair a working group on financial risk and consumer awareness, with a mandate to provide options to the federal/provincial/territorial ministers of Public Safety on May 25, 2018. The working group, which included all major Canadian insurance companies, underwriters, realtors, banks, and mortgage lenders, met at the end of March. Their task was to begin construction of a roadmap for creating the necessary conditions to transfer affordable/insurability risk to the private sector prioritizing increased consumer awareness options for restructuring Disaster Financial Arrangements to address residual residential/commercial risk and public infrastructure in a financially sustainable manner.

Integrated approach

Canada is a signatory to the UN's Sendai Framework for Disaster Risk Reduction, which is a voluntary, non-binding agreement adopted by UN member states in 2015 that recognizes that "the State has the primary role to reduce disaster risk [and] that responsibility should be shared with other stakeholders including local government [and] the private sector." To ensure that Canada is flood-ready and meets its obligations under the Framework, the federal government established a National Disaster Mitigation Program (NDMP) in 2014 to address rising flood risks and costs and a Technical Working Group on Flood Mapping (TWGFM) in 2015. In 2017, they also released a Federal

Credit: Frederic Wut

Heavy rains, combined with melted snow, engulfed homes and business in eastern Ontario, western Quebec, and parts of New Brunswick in May 2017. This photo was taken on Rue Cousineau, in the Cartierville neighborhood of Montreal, May 8, 2017. For the first time since the ice storms of 1988, the city of Montreal declared a state of emergency due to flooding.



Source: Government of Canada

Floodplain Mapping Framework under the leadership of the Flood Mapping Committee, a partnership between PSC, Natural Resources Canada, National Research Council of Canada, Defence Research and Development Canada, and Indigenous and Northern Affairs Canada. Drawing on the government's geospatial and national mapping expertise, the goal is to develop a National Flood Information Portal for all Canadians.

> "Without a level of knowledge increase, all the things that governments want to do and behaviours that people want to change—none of that will move forward."
>
> — Donald Forgeron, president and CEO, Insurance Bureau of Canada

CWWA executive director Robert Haller participated in both the IBC and the TWGFM meetings. Haller said that CWWA wanted to ensure that Canadian municipal utilities' interests were represented, and that all three types of flooding—fluvial from river overflow, pluvial from extreme rain events, and coastal from sea level and waves—were included. He noted that, in addition to better flood plain maps, Canadians also need maps of municipal stormwater capacity, and we need faster forecasting ability, particularly for extreme rain events.

CWRA president Sean Douglas's organization has also been heavily involved in flood risk management, including hosting a flood workshop in 2016 and undertaking a review of the TWGFM's guidance document last fall. Douglas' main takeaway from the roundtable was that there is an "urgent need for Canada to establish national flood mapping standards supported by […] training and communication to […] help Canadians understand and prepare for […] flood risk."

Douglas recommended that the NDMP continue to be funded to support cross-country, multi-sectoral work around threats, costs, and risks associated with flooding. He said that accurate flood mapping is critical for making risk assessments, particularly since appropriate infrastructure upgrades and development plans can't be made in the absence of such maps. "[The maps] will foster innovative technology solutions and mitigation measures to help protect existing and new developments from potential flood damage," Douglas said.

Public–private partnerships

At an interview with Water Canada at the GLOBE Forum, Donald Forgeron, president and CEO of IBC, said, "Canadians should not face financial ruin as the result of a severe flood." IBC supports a "whole of society" approach to reducing flood risk, which means incorporating all levels of government and stakeholders, the private sector, and the Canadian public.

Historically, Canadian home insurance policies haven't covered loss or damage caused by overland flooding. However, through IBC's leadership, some Canadian

insurers have begun to offer overland flood coverage for policyholders. The challenge now is getting Canadians to access it. Increasing consumer awareness was also a key outcome of the November roundtable and will be part of the ongoing working group effort.

As a nation, we need to move beyond the status quo of government bailouts for climate risks, given that they are becoming more predictable and manageable as new floodplain maps are created.

Forgeron added, "There is a need to 'up the game' of other private sector actors as we try to drive this message deeper into communities […] Without a level of knowledge increase, all the things that governments want to do and behaviours that people want to change—none of that will move forward." Private sector actors, like real estate agents and bank lenders, play an important role in ensuring their clients have the appropriate information regarding their exposure to climate risk, which will enable them to manage or avoid that risk as they see fit. In light of these risks, property owners and investors need to assume greater responsibility for their investment decisions. As a nation, we need to move beyond the status quo of government bailouts for climate risks, given that they are becoming more predictable and manageable, as new floodplain maps are created.

Looking to the future

The expanded FMC held their first meeting on April 5, 2018 and are exploring ways to share up-to-date flood data and interactive flood maps so that existing and future risks can be identified. The idea is to build on existing emergency management initiatives, including the NDMP. The expanded Flood Mapping Committee and the private-sector IBC committees are to report to Public Safety Minister Goodale at a meeting of provincial and territorial public safety ministers on May 25, 2018. Future plans and priorities will be defined based on the recommendations of the working groups and those of an overarching advisory council to review their comments.

"Collectively, we simply need to do a better job to face this risk head on. We can start by working together to educate and empower consumers," said IBC's Forgeron. WC

Sarah Boon is a science communications expert and founding member of Science Borealis.

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Credit: Office of the Auditor General of New Brunswick

Auditor General Kim MacPherson held the New Brunswick government to task for failing to set targets and timelines behind its latest set of climate objectives.

Eastern Promises

New Brunswick is doing everything right and still getting walloped by climate change. BY STEPHANIE MERRILL

OVER THE PAST FOUR YEARS, the Government of New Brunswick has launched a number of major climate change focused initiatives, including a discussion guide on Building a Stronger New Brunswick Response to Climate Change, a Select Committee on Climate Change, and a Climate Change Action Plan, and the *Climate Change Act 2016*. It seems that climate change is being taken seriously and has finally become a major policy discussion in the province.

Each of these initiatives contains good elements and gives nods to climate change adaptation needs. On paper, New Brunswick seems to be doing everything right. But communities keep getting walloped by water—too much, too warm, too frequent, too heavy.

This spring, five Nor'easters hit the province in less than 10 days and buildings in the northern community of Edmundson collapsed under the weight of the snow accumulation. Last summer, the province's most popular summer tourist draw, Parlee Beach, dominated the news cycle with unhealthy levels of e.coli. Add these to countless others: weather bomb cyclones, coastal storm surges, inland winter flooding, and blue-algae outbreaks.

New Brunswickers barely get cleaned up and recovered from one severely damaging event, just to be set back by another. The Province was still cleaning up and paying off the $23 million bill from the post-tropical storm of 2014, just to be outdone by the ice storm of 2016 and another invoice of $30 million—the costliest natural crisis in the province's history, so far.

New Brunswickers barely get cleaned up and recovered from one severely damaging event, just to be set back by another.

The intensity of many events has left communities and residents struggling without power and drinkable water, flooded or washed away homes, impassable roads, and health emergencies that are all adding up and taking a huge toll. A recent survey by the Conservation Council of New Brunswick shows that respondents living in existing and future flood prone areas demonstrate a low level of preparedness for current and future flood risk with less than half indicating that they feel they can cope with the effects of flooding. Clearly, all

the talk is not translating into adaptation action that can keep up with the water woes being felt.

In December, New Brunswick became the latest province to deliver a water strategy, and it's a good start. Most notably, it has a promise to modernize water legislation by 2020 which would establish mandatory watershed protection action plans, with legally-enforceable science-based water quality standards. Over the longer term, it commits to evaluating the causes of algal blooms in order to develop and implement a comprehensive action plan.

The water protection strategy also acknowledges existing complimentary undertakings such as the New Brunswick's Flood Risk Reduction Strategy (2014) and makes a commitment to updating the 2002 Coastal Areas Protection Policy, which would go a long way to protecting towns and villages, important estuary habitats, and recreational beaches along the sensitive Acadian coastline.

It's primarily a freshwater protection strategy. It acknowledges that conservation and management of watersheds have a role to play in addressing some of the impacts of climate change including flooding and droughts. However, it doesn't really take the water and climate nexus bull by the horns and lacks attempt to elevate the actions needed to address water as the main driver of climate impacts and adaptation.

The Auditor General of New Brunswick also identifies an important trend in the province's climate initiatives. In her 2017 report, that formed part of the recent Perspectives on Climate Change Action in Canada, a collaborative report by Auditors General across the country, said, "overall, we found many action items do not have timelines or implementation plans." She pointed out that the province has identified a fairly comprehensive list of adaptation activities, however detail of how each activity will be achieved, timelines, and allocated funding are lacking.

With the harshest of this year's winter wallops hopefully behind us, we enter a new season with no doubt its own attempts at challenging our resilience. We can brace ourselves and build on the momentum generated by these progressive policy discussions; the heightened awareness of increasing personal impact; and the rising costs of inaction, to ask ourselves and the politicians gearing up for a nearing provincial election, how and when are we going to really dig in and do it. WC

Stephanie Merrill is a research associate with the Global Water Futures Program in the Global Institute for Water Security at the University of Saskatchewan. She is from New Brunswick where she spent more than 10 years advocating for modernized water policy and is an active board member of the Nashwaak Watershed Association.

A community wellhead poking up from beneath the snow sits unprotected.

Seasonal flooding in areas like this can contaminate drinking water wells.

This wellhead is protected by a fence—the first line of defence from activities or actions that could either physically damage the wellhead or directly/indirectly contaminate the water source (e.g., animal waste, chemical spill, etc.).

All photos: Robert Patrick

SOLUTION SOURCE

First Nation communities in Saskatchewan are adapting to climate change impacts through source water protection planning. BY ROBERT PATRICK

THE YEAR 2017 was the driest year on record in the southern part of Saskatchewan, and yet, the wettest year on record in the north. The combination of climate extremes, variability, and unpredictability will continue to challenge water operators while putting stress on physical infrastructure. First Nation communities are experiencing flooded roads, landfills, and sewage lagoons contributing to surface and groundwater contamination. More frequent freeze-thaw events are damaging household water cisterns contributing to contaminant infiltration often resulting in a boil water advisory.

In one Saskatchewan community, frequent low water is drying the river water intake, prohibiting surface water withdrawal to fill a reservoir. In another community, ground instability caused an oil pipeline break contaminating a major river lifeline for the community and region. For Indigenous people whose lives are connected to the land and water, climate change is altering food gathering and medicinal plant harvesting in the south, and north, and flooding has isolated some communities and even resulted in loss of life from drowning.

Ongoing climate change-induced infrastructure stress will be most acute in Indigenous communities across Canada, driving the need to consider climate change in source water protection planning activities. Source water protection may not repair all the water woes facing Indigenous communities, but it is already making a difference in many communities in the Prairie region.

Source Water Protection Planning

While the uptake of source water protection planning has been slow across Canada, a number of First Nation communities have completed source water protection plans in the Prairie region. These plans, and their communities, signify a surge of activity aimed at protecting drinking water sources from land-based contamination. A template developed for INAC in 2013 has provided helpful guidance to many communities.

The goal of source protection—the first barrier in the multi-barrier approach—is to prevent contamination from occurring in the first place. The benefits of this planning exercise are many, including identification of real and perceived threats to source water, risk assessment, as well as the development of management actions to mitigate or eliminate risks to source water.

Threats to source water in Indigenous communities will vary greatly across Canada, yet in the Prairie region the threats are reasonably consistent:

- Damaged household water cisterns
- Contamination in water trucks
- Unauthorized landfills and overcapacity operating landfills
- Seasonal flooding and surface water contamination
- Legacy land use contaminants from commercial, industrial activity
- Abandoned and uncapped groundwater wells
- Agricultural activities
- Domestic animals
- Overcapacity sewage lagoons


Excess flood water at a sewage lagoon.

An unforeseen benefit of source water protection planning is the communal benefit that comes from plan-making, along with a sense of human empowerment to take action. The involvement of youth, Elders, and community members on the Working Committee (Stage 1), as well as the formation of partnerships both inside and outside the community, builds collaborations, new relations, and facilitated reconciliation. The process of planning, and plan-making, allows people to talk, share ideas, and to gaze into a different water future. These source protection plans began as a means to protect, if not improve, source water quality and yet offered so much more through relationship building, partnerships, and trust. Completion of these community-based source water protection plans has also opened funding opportunities from provincial and federal agencies for plan implementation.

In a recently-developed source water protection plan, community members noted an increase in flood conditions were preventing access to the main landfill, resulting in unauthorized solid waste dumping by community members. The plan recommended that the community examine opportunities for a transfer station to remove solid waste off reserve to a licensed municipal facility. In another First Nation, the planning process resulted in a water cistern repair and replacement program supported by federal funding. Wellhead protection that included berm construction and fencing was the priority in a community experiencing an increase in annual flood events. In several First Nations the threat of wildfire has resulted in measures to protect water infrastructure, including ground cover modification. In another community the planning process has led to examination of alternative water supply after years of lake level decline. The impacts of climate change on small water systems in the prairie region are many.

Given these and many other water challenges—poor source water, inadequate water treatment facilities, lack of water operator training, unequal pay rates to water operators compared to municipal operators, off-reserve water contamination, and uncoordinated land use planning—it is surprising that there are not more reports of water contamination and human health impacts facing Indigenous communities in Canada. The resourcefulness of community water operators has helped compensate for system design deficiencies and historical institutional neglect. The current challenge in source water protection planning is more related to human and institutional capacity than technical and scientific capacity. Plan implementation requires a community champion to oversee the many actions and activities coming out of the plan. This position needs to be resourced in the community and not 'tagged-on' to an already busy person's workload.

Climate change

While the planning process is driven by the community, the process does require facilitation by a planner or land use coordinator. As a community-engaged researcher, building respectful relations of trust is key to the planning process. The outcome of these planning exercises is greatly appreciated by the communities but also highly rewarding to a planning facilitator. Relationship building between non-Indigenous and Indigenous people is key to reconciliation. Source water protection planning provides this opportunity through community-university relationships, watershed partnerships, collaboration between land users, and inter-agency cooperation. WC

Robert (Bob) Patrick is an associate professor of Source Water Protection and Watershed Planning in the Department of Geography and Planning & School of Environment and Sustainability at the University of Saskatchewan.

From RISK to RESILIENCE

In B.C., there is a rising trend in wildfires that are a result of drought, invasive species, forest management, and intense storms—exacerbated by climate change—that significant consequences for surface water quality.

WWF International is harnessing tools to help tackle water challenges.

BY ALEXIS MORGAN

ASK YOUR AVERAGE CANADIAN about the notion of water risk and they're likely to say, "not here in Canada!" Yet water risk is a multifaceted issue, not restricted to one issue, one place, or one time. Consider the Calgary flood of June 2013, which was the costliest natural disaster in Canadian history at over $6 billion, or the Kelowna double whammy in 2017 when some of its worst floods were followed immediately afterwards by a record-setting drought. Contrary to popular belief, we are a country of numerous water risks—too much, too little, or poor water quality.

Water risk is defined as the combination of likelihood and severity of water-related impacts, and often stems from extreme weather events. But water risk is not only physical, it is also regulatory and reputational. Furthermore, water risk is not only driven by river basin conditions, but by the susceptibility of operations in a given city or industry.

Freshwater is the foundation of life and a core area of focus of WWF. We have worked with cities, Global 500 companies, and financial institutions to tackle water risks facing both people and nature. By helping public sector agencies and private sector companies understand the risks they face, it helps to create a shared understanding of the need to jointly address shared water challenges.

A tool for water risk

In 2012, this logic led us to launch the Water Risk Filter, a tool initially intended to help users assess water risk. Much has evolved over the past seven years, and this August will see the relaunch of the Water Risk Filter with a vast array of new features and data to enable users to explore, assess, value, and respond to water risk. Not only will it incorporate even better data and sport a more user-friendly design, but it will also introduce new valuation and response sections. Along with being the only water risk tool that assesses both basin and operational risk, this upgrade will also make it the only one that can guide tailored responses and translate risks into financial impacts. In short, it will allow users to harness state-of-the-art data to identify risk hotspots and prioritize customized interventions to optimize value.

In advance of the relaunch, we have started to harness the enhanced tool to explore issues of water risk around the world, including cities. Globally, cities are the economic and socio-cultural engines of our nations. In Canada, major cities account for over 70 per cent of the national GDP and population. To understand the different water risks facing Canada's cities, we looked at the local watershed in which each city lies as well as the source basin for its drinking water. We focused on the physical risks for the 37 major metropolitan census areas of Canada.

BREAKING DOWN WATER RISKS FOR CANADIAN CITIES

Source: Results generated from the WWF International Water Risk Tool.

Risk Level Legend: Very Limited | Limited | Moderate | High | Very High

METROPOLITAN AREA	NATURALLY ARID, SEASONAL OR INTER-ANNUAL SCARCITY	RECENT DROUGHT	FLOODING	SURFACE WATER CONTAMINATION	THREATS & DEGRADATION OF FRESHWATER ECOSYSTEMS	SPECIFIC RISKS FLAGGED BY THE WATER RISK FILTER
ABBOTTSFORD / MISSION						Flooding (moderate), threat to freshwater ecosystems (high), degradation of ecosystem services (moderate), recent droughts (very high)
KELOWNA						Arid (moderate), threat to freshwater ecosystems (high), ecosystem service degradation (high)
EDMONTON						Flooding, recent droughts (moderate), surface water contamination (moderate), threat to freshwater ecosystems (very high), projected change on freshwater ecosystems (moderate)
REGINA						Arid (moderate), recent droughts (very high), surface water contamination (high), threat to freshwater ecosystems (very high), projected change on freshwater ecosystems (moderate)
SASKATOON						Aid (moderate), flooding (moderate), recent droughts (moderate), surface water contamination (high), threat to freshwater ecosystems (very high), projected change on freshwater ecosystems (moderate)
WINNIPEG						Recent droughts (high), floods (moderate), surface water contamination (high), threat to freshwater ecosystems (very high), projected change on freshwater ecosystems (moderate)
PETERBOROUGH						Flooding (moderate), recent droughts (moderate), surface water contamination (moderate), threat to freshwater ecosystems (very high)
HAMILTON						Seasonal scarcity (high), recent droughts (moderate), surface water contamination (high), threat to freshwater ecosystems (very high)
TORONTO						Seasonal scarcity (high), recent droughts (moderate), surface water contamination (high), threat to freshwater ecosystems (very high)
WINDSOR						Flooding (moderate), surface water contamination (high), threat to freshwater ecosystems (high)
SHERBROOKE						Flooding (moderate), surface water contamination (moderate), threat to freshwater ecosystems (very high)
MONTREAL						Flooding (moderate), surface water contamination (high), threat to freshwater ecosystems (high)
MONCTON						Threat to freshwater ecosystems (moderate), ecosystem service degradation (high)

Credit: WWF International

On June 20, 2013, thousands of residents in Southern Alberta were forced to leave their homes after torrential rain and widespread flooding occurred in the province. The provincial authorities had the lead in organizing the response efforts and Canadian Armed Forces were tasked to support hard-hit communities such as Canmore, High River, Calgary, and Medicine Hat.

Credit: National Defence and Canadian Armed Forces

An initial scan suggests that the cities in the Prairies and Southern Ontario are at elevated levels of water risk. Surface water quality and ecosystem degradation present the highest risks to many Canadian cities, while several cities facing a degree of flood and drought risk exposure. Recent years have seen massive harmful algal blooms due in part to a loss of wetlands and their purification services. This degradation of green infrastructure is not only relevant for surface water contamination, but also for flood mitigation—an issue affecting a number of the cities, including several of the cities in Western Canada. The assessment also highlighted the fact that several of the assessed cities, such as Abbotsford and Regina, and interestingly Yellowknife, are projected to experience a decrease in discharge of water from their source basins. While Canada may not face the world's greatest water risks, we are certainly far from water-risk free.

Resilient response

To begin to mitigate the risk of drying and downing assets in a world facing a changing, more extreme climate, it is critical that we begin to consider social, economic, and environmental resilience. Resilience, as much as risk, will determine our future as events grow in severity and frequency. However, resilience will require not just investments in our built, grey infrastructure, but a new appreciation and approach to our natural, green infrastructure such as wetlands. It will require new thinking in economic resilience to diversify our economies against water risk and capacity building to ensure social resilience.

Resilience, as much as risk, will determine our future as events grow in severity and frequency.

It is imperative that cities, communities, companies, and governments all have the ability to not only assess water risk, but also ensure suitable resilient responses. Accordingly, the updated Water Risk Filter will also feature a new "Respond" section that will equip users with recommended actions to improve resilience to water risks. For Canadian companies, it also offers an ability to assess exposure to water risk, but also critically, regions of the world that need Canadian innovation and solutions to water challenges. In short it will enable improved decision making by allowing users to explore, assess, value, and respond to water risks and opportunities.

Beyond the tool, WWF is committed to strengthening water resilience around the world. From addressing #DayZero in Capetown, to establishing bankable projects on water in Asia, to working with communities here along the Saint John's River, WWF is working to protect, manage, and restore our river systems. WC

Alexis Morgan is World Wildlife Fund's global lead for water stewardship. He is based in Vancouver, B.C.

The Water Risk Filter is available online at **waterriskfilter.panda.org**

Photo: Nestlé Waters Canada

At the **Hope Mountain Centre for Outdoor Learning**, elementary school students are learning the importance of water to our communities.

Since its inception, the Centre has become a core component of education for elementary schools in southwest B.C. In part, because the Centre built the program to empower students and teachers in learning about water. "Working with teachers around their curriculum," said Michele Drummond, chair and one of the founders of the Centre. "That was really important to us. What grade does the wetland fit into? And how can a teacher then use that knowledge, that experience for the kids, during the year?"

The results speak for themselves: "I am full of gratitude for the educational programs the Centre offers our students," wrote Peter Flynn, Grade Four Teacher and Vice-Principal, Coquihalla Elementary School. "My fervent hope, and the Centre's stated goal, is that while learning about their local marsh and its surroundings, students will learn to love the environment."

How has the centre generated such a sticky experience? Mud, obviously.

"Always with some hands-on activities," said Drummond. "They're there getting their hands in the mud, creating models of river and tributaries with a jug of water, and they're watching it flow."

"Students learn how watersheds capture, store, and release water through the seasons, collecting rain and snowmelt within the air spaces that exist in soil, then slowly releasing that stored water during dry months. They learn these concepts using interactive props and squirt bottles that show how water moves through natural landscapes or is altered by urban areas," added Kelly Pearce, Program Director at the Centre.

The program also has a community water use component, which the students find just as compelling as the ecological one. Hannah, a grade four student at Silver Creek Elementary wrote: "Thanks for all of the great field trips. I liked the last field trip when we went inside of the big water factory. I really liked learning how to save water."

Nestlé Waters Canada has been a sponsor of the Hope Mountain Centre's programs since 2008. "Although, the programs are called Young Stewards of the Wetlands and Young Stewards of the Watersheds, it goes beyond that to the community," said Drummond.

In Goldilocks' world, the three grumpy bears are never far away. What if running away was not an option?

RISK BEARING

Three kinds of risk to water infrastructure and how to prepare for them.

BY KEVIN QUIGLEY

RISK IS A FUNCTION OF probability and consequence. A conventional risk management approach multiplies these two concepts and prioritizes risk management resources according to those risks that are at the top of the list. When it comes to water infrastructure, this approach has important limitations. Identifying risks and developing an appropriate risk management plan is a subtler exercise. This was not always appreciated in different corners of the Canadian water sector, yet it represents an important opportunity to improve risk management in the sector. The International Risk Governance Council Framework (IRGC) underscores the importance of the state of knowledge we have of a particular risk and how this state of knowledge can influence the process and the actors with whom we engage.

A team of researchers at the MacEachen Institute for Public Policy and Governance, Dr. Calvin Burns, Gwendolyn Moncrieff-Gould, and myself, recently conducted a study focused on three important types of risk: complex, uncertain, and ambiguous. The study shows that water utilities experience risks in each of these three categories and that a different approach is required for each of them.

Complex risks

Complex risks usually include sophisticated engineering and the relationship between the multitudes of variables is opaque. The probability and consequences of the failures are hard to predict but water engineers usually have some experience with the risk. Complex risks are examined largely on the basis of expert opinion and formal modelling, therefore, town hall meetings are rarely required. Our study identified a number of complex risks: aging infrastructure, many types of source water contamination, and spring flooding were prominent among them. These risks are relatively common and water utility operators can focus on existing expert practices, however imperfect, to increase efficiency in their response.

Responses to complex risks do have limitations. Computer models that integrate technical data from inside, or even outside, the water treatment plant, and the computer tools used by experts can overlook important external social and political considerations that may be critical in risk management. Notwithstanding these blind spots, our study found that most water engineers

> With uncertain risks, we need to understand our tolerance for failure, our resilience, redundancy, and adaptive capacity.

are reasonably confident when it comes to complex risks. Uncertain and ambiguous risks are more problematic.

Uncertain risks

In the IRGC framework's categorization of risks, uncertain risks exist where there is a lack of reliable data and experience regarding the risk. These limitations diminish the water professional's confidence in traditional objective measures of risk estimation, and therefore risk management becomes more reliant on "fuzzy" or subjective measures of risk estimation. Uncertain risks frequently generate surprises or realizations that risk modelling frameworks fail to anticipate or explain. Our study looked a number of uncertain risks for the water sector, such as rare natural disasters, cyber security, and malevolent actors such as insider threats and terrorist attacks.

While experts can offer a wide range of estimates regarding uncertain risks, they may be unable to anticipate the reach of the risk and to predict with confidence what will be affected by failure. These types of risk create three vulnerabilities: first, our inability to quantify risk credibly gives rise to conflicts among and between experts and stakeholders; second, our imperfect knowledge of the risk can lead to mistakes, such as giving bad advice; and finally, our inability to predict outcomes reliably can result in surprises or shocks to the system. All three of these vulnerabilities can lead to media coverage that emphasizes conflict, guilt, blame, and disaster yet fails to contribute to a better understanding of the risk in question. This dynamic can also lead to public anxiety and over- and under-reaction. With uncertain risks, we need to understand our tolerance for failure, our resilience, redundancy and adaptive capacity. Greater stakeholder engagement is required.

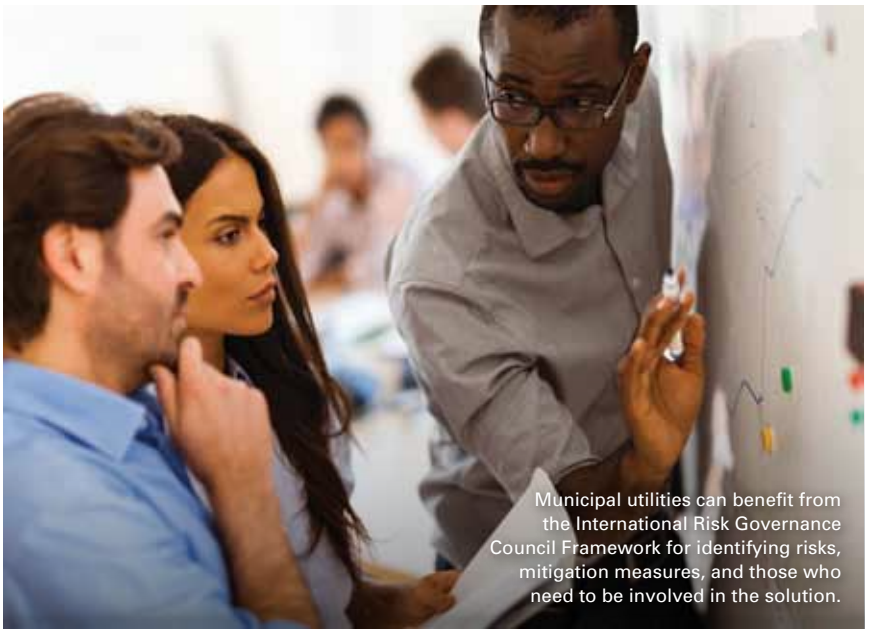
Ambiguous risks

Ambiguous risks result from divergent or contested perspectives on the justification, severity, or wider meanings associated with a given threat. Hydraulic fracturing, for example, represents an ambiguous risk for water infrastructure operators. For ambiguous risks, broad public consultation is important and solutions are usually provisional until more reliable data becomes available. These types of risks can result in protests and conflict. How the risk is framed is important. So too is our ability to access reliable data from a number of legitimate sources. Much greater public engagement is required in these cases. For ambiguous risks, we need to focus on learning and negotiation and we need to develop provisional plans until we have better understanding of the risk.

There are challenges with approaches to ambiguous risks also. To start, they tend to lead to precautionary approaches. Although the precautionary approach has been popular in some circles of society, precautionary approaches are expensive, and often lack clear definitions and transparency concerning who is actually paying the cost (and opportunity cost) of the precautionary approach. The IRGC framework's focus on engagement makes decision-makers more susceptible to lobbying; the framework is unclear however, about how to limit the influence of those with knowledge, funding, organizational capacity, and access.

Right response

The distinction between risk types matters because the range of possible answers associated with uncertain and ambiguous risks is too wide to provide a clear understanding of the risk. Our national survey of 352 individuals representing 139 different water utilities showed that aging infrastructure, a complex risk, rose to the top of the risk register among survey respondents. Solutions to aging infrastructure lie largely with funding and technology. Uncertain and ambiguous risks, such as cyber security and hydraulic fracturing are qualitatively different. In these cases, we need to develop opportunities for the water sector to share information and experience with respect to these risks and in so doing increase the pool of reliable data across the country. This can help to create a more effective learning environment and more appropriate risk response. WC



Municipal utilities can benefit from the International Risk Governance Council Framework for identifying risks, mitigation measures, and those who need to be involved in the solution.

Kevin Quigley is the scholarly director of the MacEachen Institute for Public Policy and Governance at Dalhousie University in Halifax.

The Report on Strengthening the Resilience of the Canadian Water Sector was completed for the CWWA in December 2017 and is available on the MacEachen institute website at **dal.ca/dept/maceachen-institute.html**

Credit: Centre for Affordable Water and Sanitation Technology

Tal Woolsey, director of Public Engagement and Donor Initiatives with CAWST delivers biosand filter competency training in Zambia.

Positioning for Peace

Canada already has high-water marks for managing water. We should leverage this capacity towards global peace.

BY KATHERINE BALPATAKY

CANADA HAS A RICH HISTORY as a peacekeeping nation and a commitment to continue this legacy. However, there is a growing recognition that the nature of peacekeeping has changed, requiring a longer-term view, and some experts have suggested that water security is playing a much bigger role than ever before in achieving political stability and forging peace. Related to these themes, the United Nations Sustainable Development Goals (SDGs) provide a framework to mobilize businesses, nations, and civil society groups to improve the world, and the SDGs have the potential to improve the stability of nations. Now, as nations and private firms get organized around achieving the UN water goals, there is an opportunity for Canada to take a leadership role based on its wealth of water expertise, history of successful governance, and community of water cleantech entrepreneurs who are already building relationships to improve water abroad.

It takes a village

Life has greatly improved in the tiny agricultural village of Jambudiyapura, about 500 kilometres west of Bhopal, India. Although most homes have had running water and outdoor bathing areas for years, until recently, the 300 community members defecated in open public spaces. The health risks of these conditions were many as greywater pools from laundering bred waterborne mosquitos and disease, and public exposure degraded peoples' sense of dignity and safety, especially women's.

In 2013, India's Parliament passed legislation requiring that companies doing business in India spend two per cent of their profits on corporate social responsibility projects, so when Gujarat Road & Infrastructure Company Limited won the contract to build a toll road beside Jambudiyapura, they decided to invest in sanitation projects for the village—employing a distinctly Canadian solution.

Clearford Water Systems is a cost-effective sanitary servicing alternative to big pipe conventional sewers for smaller communities. Kevin Loiselle, president and CEO of Clearford Water Systems, said, "A key focus for Clearford in developing international markets has been finding the right local partners to help build our brand as a Canadian

Credit: Clearford Water Systems

Clearford water and sewage systems have been installed in Colombia and Peru.

CAWST International Technical Advisor, Lena Bunzenmeyer, with biosand filter entrepreneurs in Nepal.

Credit: Centre for Affordable Water and Sanitation Technology

The Clearford One system improved the public health of an entire village by providing a sustainable alternative to open defecation.

Credit: Clearford Water Systems

water solutions provider. In India, the recent corporate social responsibility regulations opened up a new avenue for partnerships with Indian corporations looking to make the most impact with their CSR dollars with water and sanitation projects in communities where they do business."

> "What Canadian companies can offer is the reliability of our homegrown solutions, which may not be the most technically advanced, but are thoughtfully developed to serve their purpose of providing safe drinking water and protecting health and natural water resources from wastewater pollution." — Kevin Loiselle

Clearford partnered with Gujarat Road & Infrastructure to deliver an affordable wastewater sanitation system that included private toilets and bathrooms, wash stations, and sustainable wastewater collection and treatment that provided treated wastewater suitable for agriculture crops. Extensive public consultation was done to identify the specific needs of the community. A low-cost vertical soil biotechnology treatment facility was chosen for final treatment, due to its simplicity in operation and maintenance. In order to accommodate the low water supply of 70 litres per person per day, the Clearford One system was selected for solids-free wastewater conveyance. As well, the government kicked in funds to sustain the operation for 15 years. Now the villagers are the envy of many communities in the region, and on March 7, 2017, over 100 women village leaders—Sarpanches—came to see the Clearford One sanitation system in Jambudiyapura. The community was a proud host.

"What Canadian companies can offer is the reliability of our homegrown solutions, which may not be the most technically advanced, but are thoughtfully developed to serve their purpose of providing safe drinking water and protecting health and natural water resources from wastewater pollution," said Loiselle. "The world knows Canada for its vast, clean environment, high quality of living, and reputation as a reliable and peaceful nation—and these brands will continue to support the position of Canadian companies globally as long as we maintain those ideals at home."

Global business case

The health risks that Jambudiyapura once experienced are not unique to rural India—they are pervasive globally. According to the World Health Organization, it is estimated that 2.3 billion people around the world have no access to safe, clean toilets, and where there are sanitation facilities, the waste is often not safely managed. The cost in lives is enormous—an estimated 280,000 deaths every year. These health risks and challenges related to the accessibility

of clean drinking water, especially in regions with transboundary water challenges, are present and often lead to political instability, and in the worst situation, conflicts.

Jean Chrétien, the former Prime Minister of Canada, is also a past co-chair of the InterAction Council (IAC), a group of 40 prominent former government leaders and heads of state established in 1983 focused on the problems confronting humanity. At a September 2013 meeting of the IAC, Chrétien called on the UN Security Council to recognize water as one of the top security concerns facing the global community. Chrétien said, "The future political impact of water scarcity may be devastating […] Using water the way we have in the past simply will not sustain humanity in future."

Although Chrétien's term as co-chair ended in March, the ideas he put forward have been sustained by other Canadian leaders, such as Francis Scarpaleggia, chair of the Liberal Caucus; Thomas Axworthy, who served as principal secretary and chief speechwriter to Pierre Trudeau; and a new Canadian alliance of research institutions and organizations that collectively support a Canada-based international secretariat for the new Water Decade (*see page 42*). Although technology is only one part of these leaders' bid to encourage federal leadership on global water security, there is a strong business case to be made that aligns with many of the government's existing priorities.

THE WATER-FOOD NEXUS

The world's population is expected to grow to almost 10 billion by 2050. Even under modest scenarios of economic growth, the UN Food and Agriculture Organization (FAO) predicts that agricultural demand will grow by some 50 per cent compared to 2013, with low- and middle-income countries hastening a dietary transition towards higher consumption of protein, fruits, and vegetables. This growth and shift in demand for food will have dramatic impacts on water resources. Nations will have to come together to improve the sustainability of agricultural operations in bread basket regions, while deploying technologies and capacity building to increase domestic food sources in the areas with greatest growth, mainly Asia. Water is essential to that equation.

Stewart Beck is the president and CEO of the Asia Pacific Foundation of Canada. Prior to joining APF Canada, Beck served as the Canadian High Commissioner to the Republic of India with concurrent accreditation to the Kingdom of Bhutan and to Nepal.

Water Canada spoke to Beck at the Asia Business Leaders Advisory Council (ABLAC) meeting in Toronto in March, where promoting "Brand Canada" as part of the government's Asia Strategy was priority number one.

"Canada has this opportunity," said Beck. "We understand water. We have the land. We should be innovating, not only to export commodity products, but also to take those technologies into Asia where they will be rapidly used and seen as being a way of collaborating and building relationships as opposed to just selling." Beck noted that the federal government's innovation clusters and the money that's being invested in innovation all fit into the government's Asia Strategy and that there is an understanding among government leadership that Canada needs to increase our technology deployment domestically and abroad to help feed the world, but that we are missing some of the tools to support that innovation. Beck said that Canada's agri-tech capacity was discussed by the leaders present at the ABLAC meeting. "There was a very passionate discussion around agri-tech around the superclusters and the need for protein and how that whole environment is changing very rapidly," he said.

Beck added, "We need to think about ways to support companies to go out and demonstrate those technologies so that they can get the projects, start building revenues from that, and then scale up into other places in Asia where similar challenges exist, whether its wastewater management, groundwater pollution, the use of different irrigation techniques, or technologies to deal with the issues around agriculture." WC

> "It's not that we're not doing anything about the SDGs. It just hasn't been framed the right way."
> —Raad Seraj

Empowering feminism

Clearford's success in collaborating with female leaders in India highlights an important dimension of the water SDGs that Canada has committed to through its global humanitarian efforts. The federal government has emphasized that enabling women and girls as agents of change will help transform societies; and the federal government's 2018 budget has pledged $2 billion over five years to increase "feminist" international aid, as well as $1.4 billion to support female entrepreneurs. This direction may prove to be crucial, not only because of the merits of a feminist approach, but also because greater coordination will be necessary to achieve global success.

Millie Adam is the director of International Partnerships with the Centre for Affordable Water and Sanitation Technology (CAWST), a Calgary-based charity and engineering firm that has been disseminating knowledge and developing capacity on non-networked water, sanitation, and hygiene (WASH) solutions with government agencies and local partners since 2001. It has successfully helped deliver over 1,300 decentralized water systems in 84 countries, and through

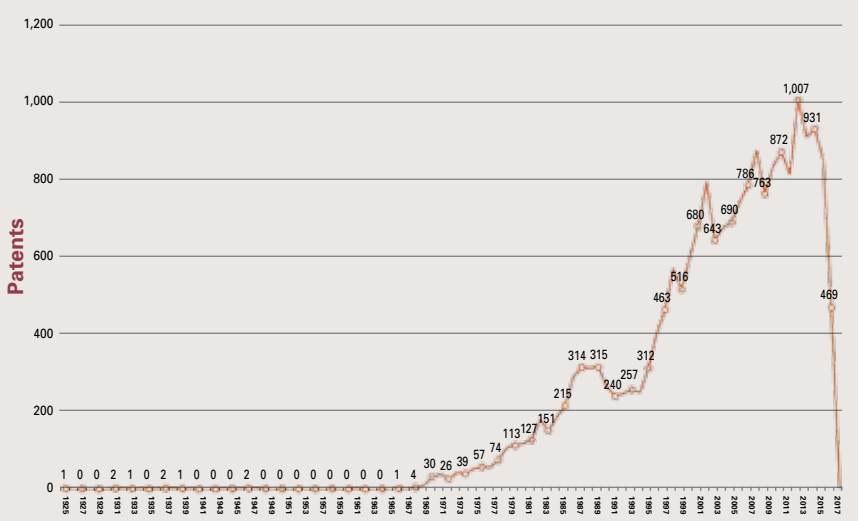
this work, has developed an astute understanding of gender roles related to water, sanitation, and hygiene (WASH). The CAWST website states: "Developing women's capacity to fully participate in the provision, management, and safeguarding of water not only works toward closing gender gaps, but also leads to better results for WASH programs." Adam helped to secure CAWST's first CIDA (now DFATD) funding and managed its successful execution. Adam said, "I think Canada has a responsibility to support the SDGs. Water affects us all and the Sustainable Development Goals are a call to action to ensure a healthy future for our people and our planet. Safe water is not simply a nice-to-have, it's a need-to-have."

Although CAWST provides low-cost water filtration technologies and infrastructure as the backbone of their programs, it is the capacity-building side of the equation where they really help. "Capacity-building is explicitly identified as one of the primary means of implementation, particularly for water and sanitation. [...] The water SDG is only achievable with a balanced investment in infrastructure and capacity-building. Adam noted that Canada is ideally suited to deliver upon the need to build capacity, based on a strong legacy of development relations and knowledge. "Canada has been a world leader in water, sanitation, and hygiene going back to the 1970s."

Demonstrated success

Michael O'Connor, CEO of Rainmaker Worldwide, is another example of a growing number of Canadian entrepreneurs who are successfully leveraging Canada's strong reputation as a partner for business in achieving the greater good. O'Connor's publicly traded company exports two technologies: an air-to-water solution that can produce up to 20,000 litres of clean drinking water per day per unit from the air; and the Water-to-Water technology, designed to produce up to 150,000 litres of drinking water from brackish or contaminated water, powered by decentralised renewable electricity.

FIGURE 1: WATER PATENT APPLICATION TREND



The results of a search for all Canadian patent claims that contain the word "water" using the patent search & IP analytics software, Patsnap. This query was conducted at 2018-04-23, approx. 1:00 p.m. EST. **Caveat:** The number of results found, especially in 2017 and after, will be directly impacted by the fact that many applications filed during this time are not yet published (i.e., not available for 18 months). Although somewhat uncommon, certain applications may have been filed with "non-publication requests" in the U.S. and will therefore not show up in the search.

Source: Research by Water Canada & Brian Chau, associate, Norton Rose Fulbright.

"In my experience travelling globally for three decades, it is very advantageous that Canadians travel with relative ease and are generally recognized for their unwavering commitment to global development," said O'Connor. "Those countries that suffer the most from water scarcity are those that not surprisingly express the greatest interest. Unfortunately, the deployment of technology in these countries is incredibly difficult for a range of widely known barriers."

Brand Canada

Even if Canadian water technologies have a proportionately smaller presence in developing nations than some powerhouse technology nations like Singapore or Israel, that presence is growing. Water Canada called on the help of Brian Chau, associate with Norton Rose Fulbright to conduct a search on patent claims filed by Canadian firms for technologies that relate to water. The

results in Figure 1 show a sharp increase in claims, from just over 500 in 2001 to over 1,000 in 2015.

Raad Seraj, is a senior analyst of client engagement with Ontario's Water Technology Acceleration Program (WaterTAP), an Ontario organization that works with emerging and established technologies to help accelerate their growth. Seraj said, "Ontario is recognized all around the world not only as center for freshwater stewardship, but also research and innovation in this space. So, automatically any country or anybody who's trying to address the SDG goals looks to Ontario for solutions."

Seraj noted that meeting the SDGs both domestically and abroad will require leadership and coordination of experts across multiple disciplines. "Not only technology partners, but regulators, national policy coordinators, even the UN and large corporate water," he said.

"It's not that we're not doing anything about [the SDGs]," said Seraj. "It just hasn't been framed the right way."

In the 2017 book entitled Ingenious: How Canadian Innovators Made the World Smarter, Smaller, Kinder, Safer, Healthier, Wealthier, and Happier (Signal press), authors Governor General David Johnson and University of Waterloo Chancellor Tom Jenkins make the point that Canada has a strong legacy of innovation and invention. At a July 2017 event in Johnson's hometown of Waterloo, Jenkins said, "Canadians are one-half of one per cent of the world's population, but account for five per cent of the world's patents, refereed publications, and white papers." Jenkins and Johnson's theory is that Canada's vast and variable geography, our constant flux and diversity, and global connectivity makes us uniquely positioned to be innovators. "Canada is a social invention, it is a society built on the principle that diversity can work, which is a rare and wonderful thing in the world today," said Jenkins. When it comes to water, Michael O'Connor agrees: "The diversity of Canada's geography and industrial perspectives together with the long history of innovation in water technology certainly provides a unique perspective and experiences that can be shared internationally." WC

Katherine Balpataky is Water Canada's editor.

ON GUARD

Evaluating digital risk in a world of cyber threats. BY TODD WESTCOTT

AS THREATS TO PUBLIC INFRASTRUCTURE from cyber attacks are on the rise from coordinated—sometimes state-backed—actors, public utilities are being forced to seek new risk management frameworks. But there are challenges in doing so.

Matthew Scholl is the deputy division chief of the Computer Security division at the National Institute of Standards and Technology (NIST), a U.S. organization that promotes innovation and industrial competitiveness by advancing measurement science, standards, and technology. At a recent virtual conference, Scholl said, "Cyber security as a risk, generally, is not discussed with those other risks like water quality, customer delivery, supplier, financial. Those are all risks discussed at that business level. You should have cyber security in that discussion, at that level."

The conference came just days after a ransomware attack on the City of Atlanta, Georgia, that didn't target water utilities directly, but nonetheless stopped people paying their water bills. The attack locked up the machinery of civil society for a large metropolitan area in North America.

Scholl described such problems as, in part, how individuals view their relationship to the digital world, equating this with "small, rural, […] not immediately impactful," but this is a misapprehension. "You may think you're not on threat radar, but there are threats that are specifically designed just for, small, non-IT focused, but heavily IT-dependent organizations that are highly transactional."

"Often times, people don't see themselves as targets," said John Kassel, principal consultant, Black & Veatch, another virtual conference presenter. Unfortunately, unlike more conventional forms of risk, anyone with a digital device that connects to a utility network represents a potential risk vector. Even when water utilities accept that they may be the target of cybersecurity threats, they are often uncertain who needs to respond and what to do. In survey results released by the Canadian Water and Wastewater Association, Public Safety Canada, and Dalhousie University, water utility personnel agreed that that cyber-attacks are becoming more common among utilities that have online systems, yet several noted that it was not their area of responsibility or expertise.

Assessing cyber risk

Experts such as Terry Ingoldsby, president of Calgary-based Amenaza, help critical infrastructure providers analyze their digital vulnerabilities and establish measures to help avoid cyber attacks. Unfortunately, many utilities, water and otherwise, face a common flaw: "The bad news is that the systems that were created to manage and control all of this physical infrastructure, the designs were built to a large extent in an era when cyber security was not a consideration," said Ingoldsby. "These systems were designed with the main focus of security being that they were isolated. The theory was that nobody could get to them, because they are standalone."

> You may think you're not on threat radar, but there are threats that are specifically designed for small, non-IT focused, but heavily IT-dependent organizations.

When many of today's operational technology (OT) networks were installed, said Ingoldsby, the replacement cycle was 15 to 20 years. But, the world of information technology (IT), which powers the utilities' corporate networks and is the platform used to launch cyber attacks, has become exponentially more sophisticated in the period since OT systems were installed. As a consequence, "if you do manage to connect to the network, [they] are relatively easy to seize control of, in general terms," said Ingoldsby.

Still, he doesn't see the growth of cyber

threats to infrastructure as apocalyptic. In fact, he's somewhat optimistic: "It's fairly tricky for an outsider, who has nothing but cyber visibility of the plant, to necessarily figure out what all of this stuff that they're controlling does."

That doesn't mean that cyber threats can be ignored. The growth of networked devices through IoT and automation are increasing the connections between IT systems and their formerly isolated OT systems. "That increases our exposure; that is why we have a need to expand our risk management paradigm," said Kevin Morely, manager of federal relations for American Water and Wastewater Association.

Employees on the frontlines

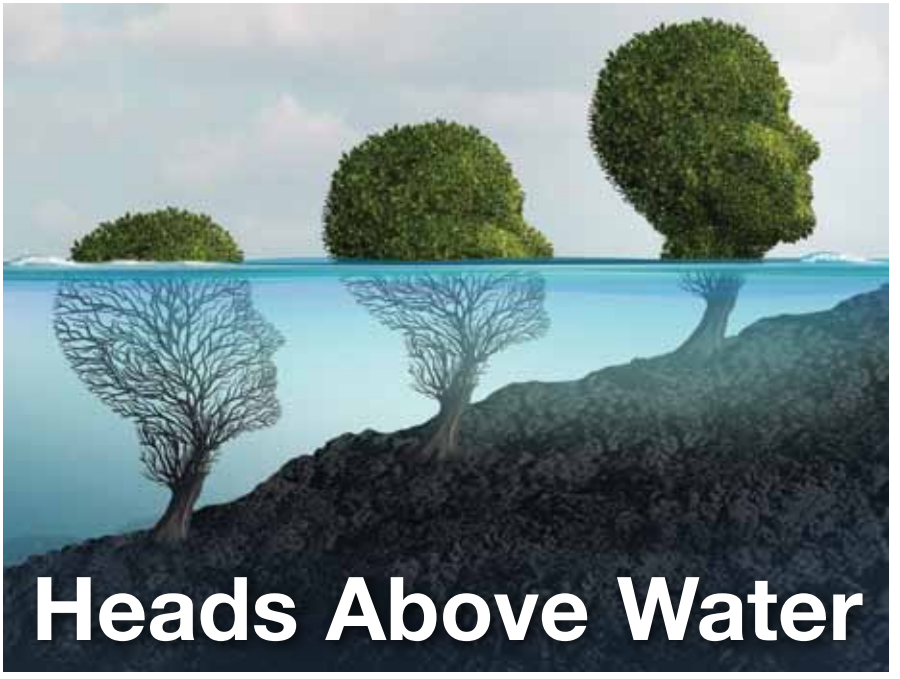
The increasingly interconnected nature of IT and OT means that users on both networks need to be better equipped to understand digital attack vectors and how to decrease utility-wide risk through their own activities. "You need to be able to understand what a credible threat is," said Kassel. "There's threat actors out there that may take advantage of you, regardless of where you think you are within the community or within the country." A new risk management paradigm has to account for all of the individuals on a utility's network, whether they access the OT network directly or not. Consequently, there is a greater burden on utilities and utility managers to provide cyber security skills to their staff.

Usefully, support institutions, such as associations and government, are providing more opportunities for up-skilling and implementing new risk management paradigms. "The Government of Canada in particular has done some excellent service to the community in that Public Safety holds periodic symposiums, workshops, in various parts of the country where they have speakers come in, talk about ways of improving security and doing things," said Ingoldsby.

"In light of the interconnected nature of Canada's critical infrastructure, partnerships are required among government and critical infrastructure stakeholders, including owners and operators, law enforcement, and the research and development community," said representatives from Public Safety Canada in a recent statement to Water Canada. In addition to partnerships, Public Safety Canada emphasizes security measures, business continuity practices, and emergency management.

In the meantime, a quick tip to reduce cyber risk: don't click strange links. Ransomware attacks succeed, because "people like to click on stuff," said Morely. WC

Todd Westcott is Water Canada's content and marketing manager.



Heads Above Water

It will take a big table of experts to address this big challenge.

BY ROBERT HALLER

I'LL SKIP THE EXPLANATION of climate change and its impact on world weather patterns and jump right to the concerns we all share about the impact on our communities and the billions of dollars in damages suffered as a result of our new weather reality. We have all come to the conclusion that we cannot continue our current routine of waiting for disasters to hit and then relying on government assistance programs to deal with the aftermath. We need to be more proactive and prepared, reduce the risk, mitigate the potential damage, and find a sustainable way to recover.

I have been very pleased to see the leadership of the federal government to address this challenge and their approach to coordinate an inclusive roundtable and working group approach. This is a big challenge that will require a big table of experts. Public Safety Minster Ralph Goodale led a National Roundtable on Flood Risk in Regina last fall to bring together many of the major stakeholders. CWWA was proud to represent the municipal sector along with the Federation of Canadian Municipalities (FCM). There were many federal departments and agencies represented, as well as each province and territory and a strong representation from the First Nations. There were academics and research organizations as well as significant participation from the insurance and banking sectors that have a huge role to play.

> One of our main arguments is the need to recognize the growing threat from intense rainstorms (pluvial) and their immediate impact on urban systems.

The roundtable recognized the need for better information and for some analysis of options. Two working groups were quickly established and got straight to work, preparing reports for the federal minister (and provincial ministers) by May of this year. One working group addresses data and flood mapping while

the other looks at the financial aspects; considering options for viable insurance plans and the future of government assistance programs.

Coming from these discussions, my two favourite words are "fluvial" and "pluvial." There has always been a focus on river flooding (fluvial) and flood plains, urban planning, and prediction models like the 50- or 100-year storm. The world is also watching coastal flooding threats from rising oceans. But one of our main arguments, supported by the FCM, is the need to recognize the growing threat from intense rainstorms (pluvial) and their immediate impact on urban systems. This requires a harder look at our stormwater management and protection of all public infrastructure. These comments have been well received and accepted to expand from floodplain mapping to include urban data and modelling.

What I have appreciated about the finance working group is the shared acceptance of a "whole-of-society" approach, meaning, no one player or sector can solve this alone. The insurance sector seems genuinely committed to offering affordable coverage if reasonable steps are take to mitigate risk. This requires steps by both the private property owner and the multiple levels of government. Efforts on municipal drainage systems won't help if the property owner doesn't take action on their own side of the property line. Vice versa, all the homeowners' efforts may be fruitless if the municipal system out front cannot handle a situation.

Flowing (pun intended) from these discussions will be two major projects that will heavily involve our utility sector. One will be to address the public infrastructure design and adaptation required to reasonably mitigate the risk. The other will be to educate the general public on the true threat of flooding and the steps they will be expected to take to accept their role in all of this. While CWWA is pleased to participate in these national discussions, we feel that the entire municipal sector may be a little under-represented at the table so far, considering the degree of responsibility we hold for implementing the solutions. As the work advances, we will be calling on the expertise of all public works, asset managers, planners, and resource experts from our communities. WC

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

We love hearing from you! Tweet us **@CanadianWater**

APPOINTED

ANNE BOLIVA

The Canadian Water Quality Association (CWQA) has announced that **Anne Baliva** will be the new executive director. Baliva served as program manager of the CWQA in 2015/16. For the last nine years, and through various volunteer experiences, Baliva has embraced and immersed herself in the not-for-profit space. Her passion to be a valued contributor to the board of directors and members that she serves led her to achieve the Certified Association Executive (CAE) designation.

SCOTT PRESTON

AGAT Laboratories has appointed **Scott Preston** to the position of vice president. Preston holds Environmental Management and Technical Diplomas, as well as other related technical and professional development training from a variety of organizations. Since joining AGAT in 2013, Preston has been leading the significant growth of AGAT Laboratories operations throughout Canada, including the expansion of laboratory facilities in Dartmouth, N.S., the development of a new laboratory in St. John's, Newfoundland, and overall expansion of AGAT's services throughout Atlantic Canada.

STEVEN LISS

At the start of April, Ryerson University welcomed **Steven Liss** as the new VP, research and innovation. Liss is an internationally-recognized researcher in the area of environmental biotechnology and water and wastewater microbiology and a VP of research at Queen's University. From 1988 to 2007 he was a faculty member in the Department of Chemistry and Biology and associate dean for the Faculty of Engineering, Architecture, and Science (research, development, and science programs). He will be joining the Department of Chemistry and Biology in the Faculty of Science as a tenured, full professor.

Hank Venema, Prairie Climate Centre addresses the room.

Tom Kaszas, Ontario Ministry of Environment and Climate Change.

Photos: Water Canada

National Nutrient Reuse and Recovery Forum Toronto, Ont.

On March 8, 2018, the International Institute for Sustainable Development in partnership with the federal and Ontario Ministries of Environment and Climate Change hosted a one-day workshop to explore the research and best practices in industry to facilitate nutrient reuse and recover. **Hank Venema** of IISD and the Prairie Climate Research Centre moderated the event that included over 20 technical presentations on federal and provincial regulation, North American business collaborations, pilot greenhouse projects, and winners of the Everglades Foundation's George Barley Water Prize. A brief discussion in breakout groups evaluated tangible actions the government could take to encourage greater innovation in this area.

Tara Roumeliotis and Rhoneke Van, both young professionals of AECOM network at the reception.

Guitarist is Gilles Rivard, CWRA Quebec branch president, CWRA president-elect, Stephen Braun and brother Graham Braun on Congas: The Braun Brothers.

Photos: Water Canada

Young professionals mingle at the networking reception.

John Neate of VerifiGlobal presented on the ISO 14034 Environmental Technology Verification system.

TRIECA Brampton, Ont.

With the highest attendance record yet, this year's TRIECA conference offered networking, technical presentations, and tradeshow floor to stormwater and erosion control professionals. Co-hosted by the Canadian Chapter of International Erosion Control Association (IECA), brought together contractors, consultants, suppliers, municipal government staff, students, and research partners. LID specialists, including Canadian Water Resources president-elect, **Stephen Braun**, provided musical entertainment at the popular networking reception. If you missed #TRIECA2018, you can purchase the webcast for $125 at *bit.ly/2HI7967*.

CWRA Ontario Branch World Water Day Panel Discussion

Toronto, Ont.

Each year, in celebration of World Water Day, Canadian Water Resources Association's Ontario Branch hosts a moderated expert panel discussion. The goal is to bring together a broad spectrum of professionals to create a dialogue around issues of effective water management, in the context of the United Nation's annual World Water Day. This year's theme was Green Infrastructure for the Urban Landscape, featuring guest speaker **Lesley Herstein**, WaterTAP, **Sheila Bourdreau**, Toronto Region Conservation Authority, and a representative from Aquafor Beech Ltd.

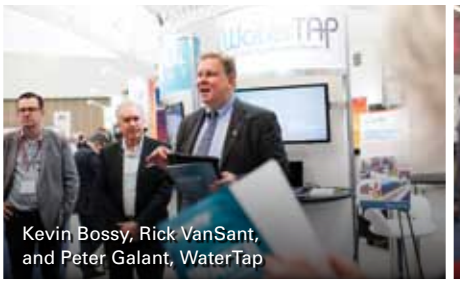
Photos: Water Canada

Left: Todd Latham, Renee White of KBL Environmental, and Joe Chowaniec of ESAA at the Glenbow Museum reception. **Right:** Opening Panel discussion on the future challenges facing the environment industry (L-R): Faramarz Bogzaran, F&M Management; Kevin Nilsen, ECO Canada; Christie Shultz, University of Alberta; Todd Latham, moderator.

EnviroTech Calgary, Alta.

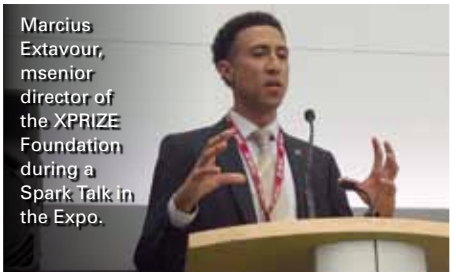
Building on the success of the WaterTech series, the Environmental Services Association of Alberta (ESAA) launched its new spring conference, EnviroTech, this April. The conference program featured water as a key theme, but also other essential components of the environment industry including: air, alternative energy, and climate change. **Ben Poltorak** of Earthmaster Environmental spoke about artificial wetland creation as a cost effective reclamation strategy, and **Yong Li** from Millennium EMS Solutions presented on challenges in characterization of 3D groundwater flow and transport at contaminated sites. Canadian photographer, filmmaker, and marine biologist **Paul Nicklen** provided the keynote address.

Minister McKenna explores Acciona's "EcoPowered," the first electric car to participate in a European points trial race on the World Rally.


Kevin Bossy, Rick VanSant, and Peter Galant, WaterTap


Ministeria Cather McKenna with Country Director and President, Acciona Canada, Darren Sokoloski.

Photos: Water Canada and GLOBE SERIES


Marcius Extavour, msenior director of the XPRIZE Foundation during a Spark Talk in the Expo.

Mike Gerbis, CEO of GLOBE Series, opens the Innovation Expo.

Water Canada publisher, Todd Latham, reconnects with UBC P.h.D candidate, Madison Stevens.

GLOBE FORUM Vancouver, B.C.

This year's theme "Disrupting Business as Usual" delivered on a promise of brave ideas and through provoking content. For 28 years, the GLOBE Forum has delivered a whale-sized program of global industry sustainability leaders who provide insights on and best practices to clean capitalism and a low carbon economy. Under the leadership of **Mike Gerbis**, **Nancy Wright**, and **Christopher Henderson**, the bi-annual event has played an important role in fuelling this transformation.

"Increasingly it's not just corporations that are looking at these issues, but we see institutional investors such a pension funds, such as the largest firms on Wall street and everything in between starting to look at sustainability and water issues," said **Kirsten James**, director of California policy and partnerships at Ceres, speaking at the panel session on Reducing Water Risk in Business.

The GLOBE Innovation Expo included a number of cleantech clusters this year including Smart Grid/Micro-Grid, High Performing Buildings, Sustainable Mobility, Water Innovation, Carbon Capture, Utilization and Storage, and Advanced Manufacturing. The conference format was equally varied with a mix of roundtables, formal and informal sessions, debates, B2B Matchmaking, SPARK talks, and of course, plenty of receptions and parties. The BASF reception was a favourite with an exclusive live performance from Canadian rock musician **David Usher** and his discussion on creativity and innovation with BASF president **Marcelo Lu**.


Joel Garbon, Reagan Davidson.


Joel Garbon and Kent Campbell.


Garnet Shaver.


The new Filterra bioretention system, part of the STEP program.

Photos: Water Canada

Stormwater Quality Seminar Woodbridge, Ont.

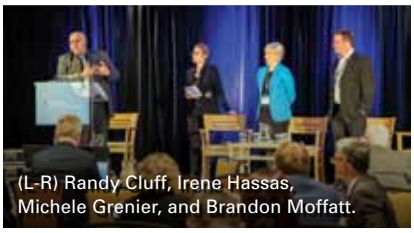
At the office of the Earth Rangers on a rainy April day, a group of over 50 engineers, developers, regulators, and academic researchers came together for the first of two workshops aimed at informing

Reagan Davidson, regional manager and **Joel Garbon**, regulatory manager of Imbrium Systems kicked off the workshop. Garbon delivered a presentation about the kind of rigorous testing that Imbrium has done both in the lab and field to ensure that their Stormceptor EF and Jellyfish filters to meet ISO 14034 Environmental Technology Verification, and performance requirements, and what guidance that should be included in municipal stormwater management to ensure stormwater installations are operating properly. Garbon explained that the ISO process has been fully accepted by Environment Canada and translates the value internationally. "It should provide the stakeholder community the confidence that these devices that they have been properly tested and that they will work if they are applied under the proper guidance," said Garbon.

Joe Costa, senior scientist at Good Harbour Laboratories explained the details of the kinds of tests they run to verify stormwater producs, and **Garnet Shaver**, president, Minotaur Stormwater Services stressed the importance of proper stormwater and low impact development maintenance. **Tim Van Seters**, senior manager, Sustainable Technologies at TRCA gave the last presentation before a site tour of the TRCA stormwater assets.

Photo: Water Canada


Alex Gill, Ellen Greenwood.


(L-R) Randy Cluff, Irene Hassas, Michele Grenier, and Brandon Moffatt.


(L-R) Ellen Greenwood, Irene Hassas.

Ontario Environment and Cleantech Business and Policy Forum

Toronto, Ont.

The annual Ontario Environment and Cleantech Business and Policy Forum held on Tuesday, April 10, was well attended by business and government leaders. This year's program featured three Ontario deputy ministers: **Paul Evans** from MOECC, **Giles Gherson** from Research and Innovation, and **George Zegerac** from the Ministry of Infrastructure; a popular panel discussion featured **Sandra Odendahl** of CMC Research Institutes, Andrew White, CHAR Technologies, and **Todd Moser**, Terrapure Environmental on how environment and cleantech companies are expanding in 2018.

The afternoon sessions included a high-energy innovation pecha kucha, which included **Doug Wilton** from TECTA-PDS talking about what the company is doing to revolutionize microbial detection in water. **Ellen Greenwood** was awarded the Skip Willis Award by event co-chair **Irene Hassas**.

Canada's Lead

Water as a lever for global development and reconciliation.

BY ZAFAR ADEEL

CANADA IS AT THE DOORSTEP of a unique water leadership opportunity that builds on a considerable history of successes in managing its ample water resources. These successes range from long-term management of shared water resources across provincial and international jurisdictions to overcoming threats to its lake systems by phosphate-based detergents. We can also overcome some of the systemic failures such the absence of a shared and ambitious national water vision and exclusion of First Nations' perspectives in water resources management.

Emerging water challenges in Canada can be tied to climate change impacts on water availability, urbanization and population growth, water pollution, and threats to aquatic ecosystems. A 2017 report from the World Wildlife Fund in Canada indicated that most of the watersheds in Canada are showing significant disruptions from human activities such as hydropower dams, discharges from agricultural and industrial activities, rapid urbanization, and incidents involving natural resources extraction.

We can use a new comprehensive framework to address these interconnected water challenges in one fell swoop: the Sustainable Development Goals (SDGs) developed by the United Nations that aim to achieve significant and ambitious improvements to society and the environment by the year 2030. Countries across the globe are re-tooling their national development strategies to meet these global targets. As with any new paradigm, understanding of SDGs and their application is far from perfect, and everyone is looking around for success stories and examples to follow. That is where Canada can shine.

Canada brings unmatched strengths to the table that can lead to overcoming its own water challenges while assisting other countries in learning from our experience. We can offer world-class expertise in water technologies, adaptation to climate change in various settings, water governance across borders, research on emerging arctic challenges, and management of fragile aquatic ecosystems.

Further, as we respond to the recommendations of the Truth and Reconciliation Commission of Canada, addressing the water challenges of Indigenous communities offers an easy win. Using our expertise to address scores of boil-water advisories not only overcomes a long-term well-being issue for these Indigenous communities, it also helps Canada meet its obligations under the 2007 United Nations Declaration on the Rights of Indigenous Peoples (UNDRIP).

A new Water Decade—which started in March 2018 and connects to all water-related SDG targets—is the perfect vehicle for Canada to achieve water security at home while claiming international leadership. A pan-Canadian alliance of universities, civil society organizations, private sector leaders, and environmental groups called the International Water Decade Alliance (IWDA) is moving in that direction. As more and more partners join this alliance, concrete actions to meet the SDGs are emerging.

To regain its mantle as a global leader in environmental and climate change issues, taking on a leadership role in the Water Decade is a first step for Canada. Autumn Peltier, a 13-year-old Anishinaabe girl from Wikwemikong First Nation, summarized it beautifully at the United Nations as it marked the start of the 2018-2028 Water Decade: "It's time to 'warrior up,' stop polluting the planet and give water the same rights and protections as human beings." WC

Zafar Adeel is a professor of resource and environmental management, and the executive director of SFU's Pacific Water Research Centre.

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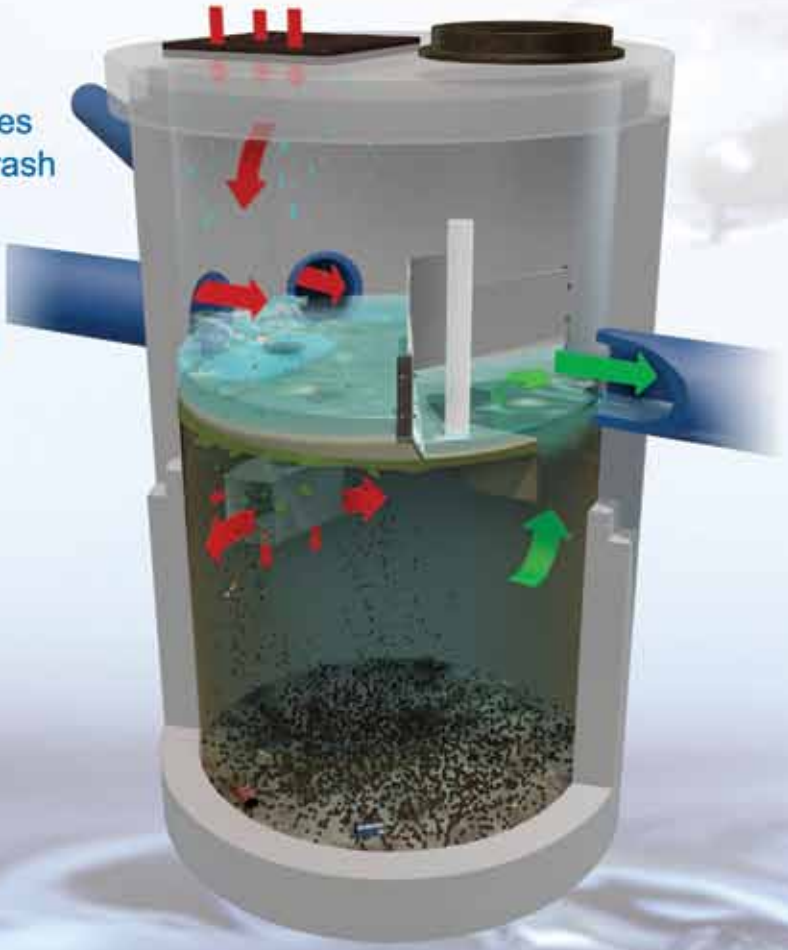

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