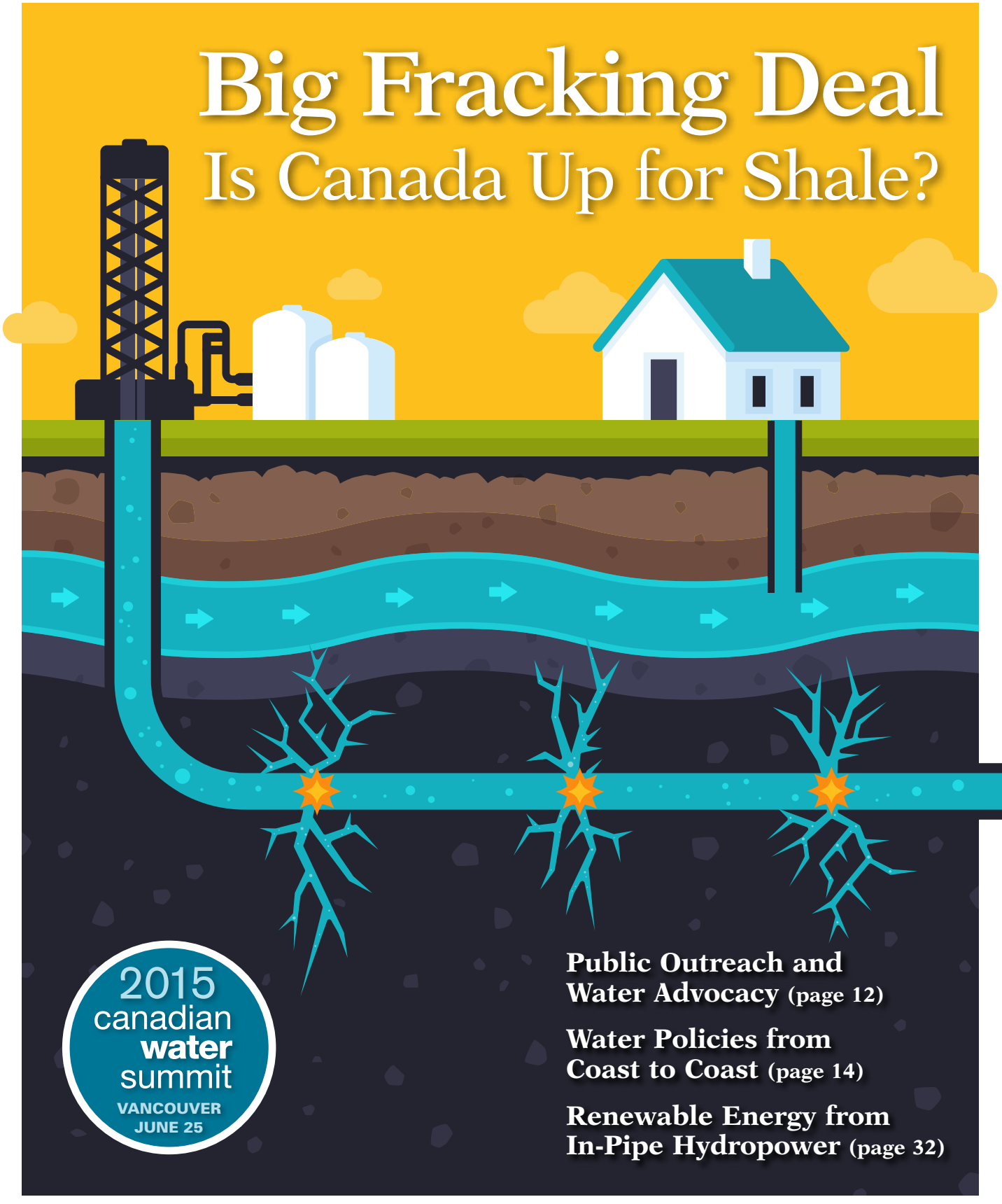
THE COMPLETE WATER MAGAZINE

MAY/JUNE 2015

WATER CANADA



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Rallying the Public

BY RACHEL PHAN

WHEN ROBERT HALLER, executive director of the Canadian Water and Wastewater Association (CWWA), talks to community leaders and decision-makers about putting money toward water and wastewater infrastructure, he often gets the same response: "Robert, we get it. We know we've got huge decisions to make, but we're scared to make these decisions for fear of not getting re-elected. We're going to get crucified—we'll never get back in again."

Haller says many elected officials recognize that arenas, recreation centres, and parks are "fun and sexy" projects to fund. But he added that, "Every time a council defers maintenance, they are gambling with their taxpayers' funds. An emergency repair always costs much more than preventative maintenance."

Water and wastewater infrastructure—often "out of sight and out of mind"—just doesn't excite the public's imagination, especially since, according to the latest RBC Canadian Water Attitudes Study, only one in 10 Canadians think the water treatment, water delivery, and stormwater systems in their community require major investments.

There's a clear gap here: if people don't think their water systems need upgrades, they certainly won't support the funding of these necessary projects. So how do we start changing the public's opinions so they recognize the value of water and the cost of doing nothing? To help change people's water attitudes, the CWWA—in partnership with Water Canada publisher Actual Media Inc.—released the Public Attitudes Project in May 2015. For the first time, the document consolidates the answers to four key questions: What attitudes do we want? Who are our target audiences? What is our messaging? What communications methods do we use? It is our hope that the project will provide an invaluable framework for users to develop a public awareness strategy.

And it's not just infrastructure that benefits from having public support. As you will read in this issue, elected officials have no choice but to be at the mercy of the undeniable and deafening cry of a public rallied around an issue. Whether it's galvanizing communities over fracking (*see page 8*), forcing politicians to talk about water and the environment in their campaigns (*see page 12*), making key changes to water policies (*see page 14*), or keeping the public in the loop on stormwater management projects (*see page 28*), we should never underestimate the power of the public.

In fact, water professionals, decision-makers, and leaders can only do so much without calling on the public to rally behind their causes. Since Haller says fear of re-election drives our politicians' decisions, it's critical to make water and wastewater infrastructure the public's No. 1 priority.

While the various water nexuses are all important—the water-energy nexus, the water-land nexus, and the water-food nexus—the water-social nexus may be the most important one of all. WC

Contact Rachel at 416-444-5842 ext. 116 or email rachel@watercanada.net

For daily news and discussion, visit
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PG 26

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PG 26

ABOUT THE COVER

Canadians continue to grapple with the big fracking question. While recent anti-fracking campaigns on the East Coast have resulted in moratoriums in Nova Scotia and New Brunswick (*see page 8*), professionals in the oil and gas industry continue to emphasize the importance of shale gas to the Canadian economy (*see page 50*). The answer to the "to frack or not to frack" question is still up in the air, but the anti-fracking side does have one ace in the hole: public support.

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- **Water's Next 2015: Spotlight on Winners and Finalists**
- **Canada and the California Drought**
- **An Eye on the Water Brothers**

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Source: NASA

Satellite image of the Great Lakes from space.

Improve Bill 66

Five ways the Ontario government could strengthen the Great Lakes Protection Act.

BY ANASTASIA LINTNER

IN FEBRUARY 2015, Bill 66—the proposed Great Lakes Protection Act—was introduced into the Ontario legislature. Bill 66 is a much stronger version than what had been previously introduced twice before. If passed, this legislation would create new tools and opportunities to work on the most serious threats to water throughout the Great Lakes-St. Lawrence River Basin in an integrated way. It offers opportunities for public engagement and strengthens provincial accountability for ensuring that the Great Lakes are drinkable, fishable, and swimmable for current and future generations.

To fully realise the potential of the proposed legislation, there are five key ways in which the government could further strengthen Bill 66. These recommendations were developed by the Great Lakes Protection Act Alliance.

❶ Eliminate exemption power

Bill 66, unlike the prior versions, includes a broad power for cabinet to exempt anyone from the legislation or the regulations. This power is completely unnecessary in enabling legislation that has no prohibitions or authorizations. The exemption power has got to go.

❷ Align Great Lakes ministers' decision-making

Bill 66 requires that the minister of environment and climate change considers the purposes of the legislation and principles listed in Ontario's Great Lakes Strategy as part of his/her Great Lakes-related decision-making. However, Bill 66 should go one step further to ensure greater inter-ministerial cooperation and coordination. It should clarify that all Great Lakes ministers are accountable for achieving the visions and goals of the Great Lakes Strategy.

❸ Ensure mandatory "action plans" and target(s) for wetlands/purposes

Bill 66 enables the minister of environment and climate change (and the minister of natural resources and forestry when it comes to wetlands) to develop action plans that describe how targets set under the act will be achieved. Such plans should be mandatory. What's the point in setting a target without a plan for achieving it?

Bill 66 also provides discretion to the minister of natural resources and forestry to set a target "in respect of preventing the net loss of wetlands." Simply stopping the loss is not enough to address the urgent need to protect and restore wetlands. The goal should be "reversing wetland loss," and setting a target should be mandatory.

Finally, there should be targets set for each of the purposes under the legislation.

❹ Further enhance purposes

Bill 66 has improved language in the preamble and purposes that clearly outline the urgency of action needed and the importance of the Great Lakes Basin. Bill 66 also contains a new purpose dedicated to protecting and improving the capacity of the basin to respond to climate change impacts. What's missing are specific ways the law is meant to address biodiversity and climate change.

❺ Expand inter-jurisdictional agreements to be considered

Bill 66 mandates that various inter-jurisdictional agreements (such as the Great Lakes Water Quality Protocol of 2012) be considered when the new tools are used. But there are agreements beyond those directly related to water that should also be considered, including the Migratory Birds Convention and the Ramsar Convention.

Anastasia Lintner is the principal at Lintner Law. She is also an advisor to the Great Lakes Protection Act Alliance, which consists of Canadian Environmental Law Association, Ducks Unlimited Canada, Ecojustice, Environmental Defence, Nature Canada, and Sierra Club Ontario.

CANADIAN INNOVATION

In March, the University of Calgary and the City of Calgary unveiled the $38.5-million Advancing Canadian Wastewater Assets (ACWA) facility at the Pine Creek Wastewater Treatment Plant. It's the world's first and only fully integrated, fully contained university research facility located within an operating industrial wastewater treatment plant.

Want to learn more? Read about ACWA in Water Canada's July/August 2015 Innovators and Groundbreakers issue!

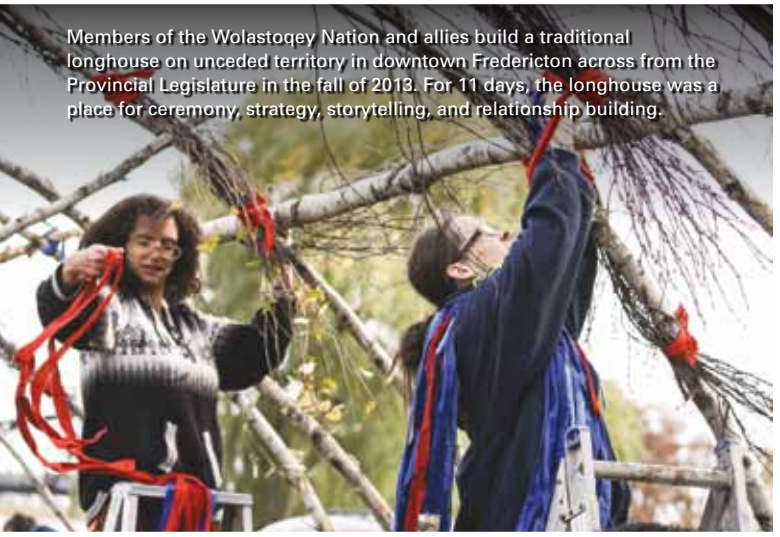
Online at WATERCANADA.NET

INTERVIEW: Ecojustice Canada's Randy Christensen talks to Water Canada about groundwater management in British Columbia and the differences and parallels between the province and California. ***bit.ly/RChristensen***

BLOG: A Toronto shopping centre chooses a combination of underground plastic chambers and an open detention pond for its stormwater management. ***bit.ly/TPOCStorm***

VIDEO: Can't wait for our upcoming feature on ACWA? Check out this introductory video on the facility. ***bit.ly/IntroACWA***

Credits: Lianne Thibodeau, Sea Dog Cove Photography



Members of the Wolastoqey Nation and allies build a traditional longhouse on unceded territory in downtown Fredericton across from the Provincial Legislature in the fall of 2013. For 11 days, the longhouse was a place for ceremony, strategy, storytelling, and relationship building.

New Brunswickers from across the province rally at the Legislative Assembly of New Brunswick in fall 2013.

Off the Frack Track

How anti-fracking campaigns succeeded in New Brunswick and Nova Scotia.

BY DAVID MINKOW

FOUR YEARS AGO, if you had asked Stephanie Merrill of the Conservation Council of New Brunswick (CCNB) and Jennifer West of the Ecology Action Centre (EAC) in Nova Scotia the odds of success in their respective efforts to enact fracking bans in their provinces, they would have likely replied, "Pretty low." After all, they were going up against a powerful industry, lax government oversight, and a largely uninformed public.

Yet in fall 2014, the provinces of Nova Scotia and New Brunswick joined Quebec in halting the practice of hydraulic fracturing for shale gas.

How did this happen? To find out, we asked Merrill and West to share their respective stories.

New Brunswick: Water for the Win

Ultimately, water was the lynchpin that led to one of the largest citizen-engaged movements in the recent history of New Brunswick.

In 2010, the New Brunswick government granted Texas-based SWN Resources Canada the right to explore for shale gas on one million hectares of land in the province. The size of these exploration rights and the fact they literally crossed people's backyards propelled interest in finding out the environmental and health impacts of fracking.

Safety concerns about personal drinking water—65 per cent of New Brunswickers get their drinking water from groundwater wells—are what triggered the initial interest in learning about fracking, Merrill explained.

Piquing interest

At first, Merrill didn't have much of an overall campaign strategy other than informing others about what she

knew. Her research on the health and environmental concerns and risks was well received, and she found herself responding to an increasing number of requests to give presentations.

During her presentations, she felt it was important at the beginning not to steer people in a particular direction. "The key was to build trusting and credible relationships and provide information in a way that made people interested, and to leave them with enough questions to want to explore the issue on their own."

> "Every step the government took, we matched with science, professionalism, and politeness."
>
> —Jennifer West

The response was great, as community groups popped up throughout the province. By 2011, about 40 local anti-fracking groups had formed to focus on the issue.

By 2012, Merrill's work had evolved from educating communities and groups to helping the new groups connect with each other and "build up social capital on the issue." This contributed to community-based actions becoming more sophisticated, from door-to-door canvassing to anti-fracking groups jointly organizing rallies and strategic communications.

From network to alliance

In September 2011, the informal network of groups came together to form the New Brunswick Anti-Shale Gas Alliance.

"The idea was that being an entity with one voice would be more effective," Merrill said. "For example, it helped in organizing press conferences and media packages and responding to media requests." It was also practical, in that groups had developed a large fundraising effort for a legal action and being an incorporated group with a board of directors was a necessary step to make the legal action possible.

Having many of the groups housed under the umbrella of the alliance allowed Merrill and CCNB to evolve from network coordination to a more behind-the-scenes role of adviser—helping the alliance with media messaging, public communications and actions, and strategic planning.

United front

A key to the success of the anti-fracking movement in New Brunswick, according to Merrill, has been its ability to unite Anglophone, Francophone, and First Nations populations in a way that hasn't been seen in the province's recent history. Typically, despite New Brunswick being on unceded territory of the Maliseet and Mi'kimaq Nations, there is often a lack of meaningful conversations with First Nations communities and people concerning resource development in the province. Merrill explained that "consultation" has been a controversial topic, and often, including in the shale gas fracking discussions, First Nations have felt left out and "only a mere check mark on the consultation boxes of review processes."

Boiling point

Early in the morning of October 17, 2013, the RCMP decided to break up a 17-day-old blockade of seismic testing equipment along a stretch of highway near the town of Rexton. Things quickly got out of hand: pepper spray, Molotov cocktails, camouflaged police snipers, five burned RCMP vehicles, and 40 people arrested, including the chief and council of the Elsipogtog First Nation.

It turned the anti-shale gas fracking protests into a national story. But despite the clash finally "bursting through the provincial media bubble" and leading to Idle No More solidarity actions across the country, Merrill said she still wishes it hadn't happened. "It was a very emotional day and a lot of people are still feeling very traumatized by the events."

Campaign issue

By 2014, while the anti-shale gas movement was increasingly winning the public debate, they didn't seem to be making much political progress. Merrill said the discourse had gotten so polarized between anti-fracking activists and the Conservative government that

Jennifer West speaking to media outside the independent review panel public consultation in Halifax in July 2014.

Inside the independent review panel public consultation at King's College in Halifax on July 23, 2014.

the conversation "essentially got shut down." As a result, the alliance turned its attention to making the issue part of the 2014 election campaign, advocating that New Brunswick voters say no to shale gas.

Politicians on all sides seemed quite willing to have shale gas be the centerpiece of the campaign. The Conservatives made fracking a core part of their election platform, advocating that New Brunswickers say yes to shale gas. This forced the Liberal party into a position to call for a moratorium. For the first time in a long time, an environmental issue was a core election issue in New Brunswick.

When the Liberals won a majority government and a Green Party MLA was elected for the first time, it was clear a halt to the practice of shale gas fracking was soon to follow. And it did, on December 18, when the new government announced a moratorium.

Nova Scotia: Persistence Pays Off

When West got the word on September 3, 2014 that the Nova Scotia government was set to announce its decision on shale gas fracking, she didn't know what to expect. "We were equally prepared to celebrate or to storm the streets," she said.

Bill 6, an amendment to the Petroleum Resources Act, which officially went into effect on November 20, 2014, turned out to be cause for celebration, as it prohibits the fracking of shale gas in the province. Four years of hard work, creativity, and alliance-building by West and her cohorts had finally paid off.

Sketchy information

West, along with EAC energy coordinator Catherine Abreu, formed the Nova Scotia Fracking Resource and Action Coalition (NOFRAC) to educate the public and put pressure on politicians. NOFRAC's first task was to get a handle on the fracking that was already happening in the province. So they put in freedom-of-information requests and pulled more than 20 binders of information from the Department of Energy and the Department of Environment on the geology, drilling records, water withdrawal applications, communications, proprietary chemicals, and much more.

Among their findings:

- With very little community consultation, five exploration wells were drilled and fracking was used in three of them.
- The government had approved a wastewater disposal method that involved freezing a pond of formation water and fracking fluid in the winter and then letting the water drain into the woods and groundwater when the pond thawed.
- Wastewater had been taken to several places for disposal, including a municipal facility that did not know the contents of the waste.
- Proprietary chemicals were being used that had serious health and environmental risks and impacts associated with them.
- Despite two government directives to clean up the wastewater ponds, neither was adhered to by the company Triangle Petroleum.

The research, which took two years, revealed that fracking in the province was "largely unregulated and unenforceable," West said.

Ground zero

In fall 2011, NOFRAC organized a conference to provide Nova Scotians with independent information on the science of fracking. By this time, the coalition had expanded to more than 50 members. NOFRAC organized online petitions, public rallies, letter-writing campaigns, and efforts to lobby MLAs at local constituency offices. West developed a steering committee in January 2012 to guide the organization through strategic planning, which led to the creation of various working groups.

As a result of this work to mobilize concerned citizens, the NDP government in 2011 launched a one-year internal review of fracking, later extended to 2013. Prior to the October 2013 election, the NDP announced a change to the structure of the review from a closed-door review to an independent review led by an external chairperson.

West said the government's review, which was continued by the Liberals after they came to power, was "short, underfunded, and not collaborative between panel members." Even though members of the anti-fracking movement submitted peer-reviewed resources to the review panel, these didn't make it into early chapters of the report.

League of ladies

As part of the review, the panel organized a series of 11 public information sessions in the summer of 2014. West met with a group of Halifax-based organizers, including PowerShift Canada, LeadNow, and the Sierra Club to talk about how to mobilize the public to attend these public meetings. Dubbed the "League of Ladies," the resulting organizing team used clever and humourous radio spots, ads, posters, banners, a toolkit, t-shirts, and social media blasts to publicize the meetings.

"Many of our strategic discussions were around how to use the most consistent concern—water—in our communications strategies," West said.

Water safety concerns drove high turnout as more than 1,500 Nova Scotians attended the public information sessions. West said that David Wheeler, chair of the government's review panel, was shocked by how informed the public was about fracking and how passionate and entrenched their opposition had become. Residents who came to the sessions undecided about the issue were often swayed by the overwhelming support of their neighbours for a fracking ban.

West said that NOFRAC made sure to try to keep various First Nations in the loop. "First Nations groups are concerned about access to clean water for the next seven generations—something that cannot be assured in the context of fracking."

People power

West and her colleagues deployed a number of tactics to build a popular movement in the province.

Door-to-door canvassing by EAC staff and volunteers helped boost the organization's membership from 1,500 to 4,000 over a three-year period. When David Suzuki came to Nova Scotia in 2013 for the release of the film "Climate Change in Atlantic Canada" and spoke about the perils of fracking during a panel discussion on environmental issues, it caused a doubling of NOFRAC members and a big boost to EAC's membership.

West said NOFRAC had no way of knowing whether this public support was having any impact on the government's decision-making process. Although the coalition had been in contact with Andrew Younger before he became provincial energy minister in 2013, they were unable to connect with him or anyone else in government.

West said the coalition took the high road—"every step the government took, we matched with science, professionalism, and politeness"—and this helped build credibility with the government and with the public. Ultimately, it contributed to the success of the campaign, as the final report issued by the review panel cautioned against fracking in Nova Scotia. WC

David Minkow is the communications specialist for the Canadian Freshwater Alliance. An original version of this article appeared on the Freshwater Alliance website.

Ecology Ottawa volunteers pose in front of garbage collected from Sawmill Creek. This neighbourhood clean-up team hopes to improve the important stream's health and water quality.

Credit: Karen Hawley

Emotional Connections

We all know water is important. Now it's time to get people to care. BY STU CAMPANA

THE UNNAMED CANDIDATE had a problem.

Though not against the idea of clean water—who would be?—he didn't want to make it a priority in his election campaign.

But on the day before the 2014 Ottawa municipal election, he was frantically calling the Ecology Ottawa offices, trying to convince the organization to post his environmental positions on its website.

In the lead up to the election, Ecology Ottawa developed a candidate survey on the organization's key project areas, including water. The questions weren't exactly challenging (one was known internally as the "Would you rather have clean water or a punch in the face?" question), but they didn't have to be. The point was not to determine whether a candidate likes clean water, but whether they would prioritize clean water.

Nobody is really against water. That's why water is so difficult to force into the conversation. Like a calm lake, there are no ripples in that statement which would create an opportunity for discussion.

As Canadians, we all agree water is great. This agreement is also, paradoxically, the source of difficulty for anyone trying to improve water quality in a local river, or reduce the flood risk in a nearby neighbourhood. Water advocacy has to find a way to move beyond the blanket statement "clean water is important" to an advocacy model that makes water emotive. Some environmental NGOs are reimagining their water leadership role as one that enables the public to use their own connection with water to enact change.

Making connections

For environmental organizations, being right isn't a top priority. Being right doesn't win elections and it doesn't mobilize supporters. Many environmental organizations agonize over policy papers, before finally releasing them to a rousing chorus of crickets. The right answer isn't what sways opinions on environmental issues.

With this in mind, Ecology Ottawa approached the election with the goal of being seen, heard, and counted. It wanted the candidates to go into office knowing there was a large group of committed Ottawans who cared about the environment—and to reach out to that group.

The way to do that is to figure out what connects people with water instead of focusing on what is technically correct, but uninspiring. Why do people care about water? For example, most of Ecology Ottawa's water supporters live near a river or creek. It seems self-evident, but people who have actually taken the time to step back and think about what water means to them are more likely to support enhanced water protection.

The organization's surveys forced candidates into a place where they had to be clear about their prioritization of water, both in relation to their other platform pieces and in relation to where the other candidates ranked water on the hierarchy of priorities. This exposure presented a foothold for water advocates to think about their own feelings on nearby rivers, creeks, and canals.

Diving deeper

The Lake Ontario Waterkeeper spends a lot of time looking for what connects people with water. Founded in 2000, the group seeks to create a swimmable, fishable, drinkable future through the empowerment of those who care about Lake Ontario. Part of that empowerment is about diving deeper into the depths of how people relate to water.

The Waterkeeper Swim Guide—a website and app that provides up-to-date information on beach swimmability—is designed with this connection in mind. "Other swim guides are very technical," said Krystyn Tully, executive director of Lake Ontario Waterkeeper. "Scientists would come to us and say, 'you can't just say it's green or red, there's more nuance.' But if you're taking a two-year-old to the beach, yellow is red. You're not putting them in."

Clean water is important, but water quality facts can't be expected to resonate on their own. The Waterkeeper isn't content to be right about water quality. They want to be heard—and in order to be heard, you need more voices.

Distributed leadership

Distributed leadership is a model that empowers community members. The system is collaborative rather than top-down. It allows volunteers to see themselves as leaders. It combines all the advantages of leadership—flexibility and enthusiasm, for example—from within a system to maximize their individual impact. It is a group activity that works through relationships.

Ecology Ottawa created community groups that also mobilized around the election. The groups used the survey results to inform themselves on each candidate. Survey responses started to come up at election debates across the city. The number of candidates who had submitted responses rose rapidly as they realized that they could not afford to ignore the environmental conversation.

The Waterkeeper used distributed leadership as well. "Years ago, we realized that it's actually going to take a lot more water leaders to protect the watershed," Tully said. "So we started to create them."

The distributed leadership model is a new approach for water advocacy groups that is both more personal and more wide reaching. "We're taking them to something that drives them personally," she said. "An artist might want to contribute art. If you're building a movement, you need to allow people to engage in different ways."

In Ottawa, the unnamed candidate didn't win, having been defeated by an opponent with excellent answers to all of the environmental survey questions. In total, 17 of 23 elected councillors had provided in-depth survey answers. Voter turnout in that neighbourhood rose significantly compared to past years.

Clean water is a self-evident good, but one without a clearly defined area of ingress for problem solving. Distributed leadership may help push water into the conversation. WC

Stu Campana is an environmental consultant specializing in community-led solutions to urban and rural water problems.

Canada, In Brief

Your 2015 guide to the latest in provincial and territorial water policy.

National Exemptions

The Government of Canada continued with regulatory changes to the *Fisheries Act*. Most notably, a regulatory exemption was introduced that would preclude certain activities, primarily aquaculture, from the general provisions of Section 36 of the act. This section of the act prohibits the deposit of deleterious substances into waters frequented by fish. Additionally, changes to the newly named *Navigation Protection Act* came into effect on April 1, 2014. The changes exempted approximately 98 per cent of waterways across Canada and regulate only those deemed significant to navigation. That means only 62 rivers, 97 lakes, and the three oceans—or approximately two per cent of the waterways in the country—are protected. —Lindsay Telfer, Living Water Policy Project, Canadian Freshwater Alliance

Alberta

Land-use planning and flood readiness

Alberta is continuing implementation of the Provincial Land-use Framework with the completion of the South Saskatchewan Regional Plan, which came into force September 1, 2014. Despite the inclusion of new protected areas, the plan failed to protect the region's headwaters, leaving it open to criticisms. Public consultations are underway for the North Saskatchewan Regional Plan. Attention to flood readiness saw dollars directed to many flood management projects throughout southern Alberta in attempts to avoid future damages like those caused in the 2013 floods. In fall 2014, Alberta renewed their water research and innovation strategy. The corresponding water conservation action plan outlines 25 short- and long-term actions to safeguard drinking water supplies, improve lake management, and enhance groundwater protection. Finally, in an attempt to curb invasive species in Alberta waterways, the province introduced new legislation that would make boat and watercraft inspections mandatory on major highways coming into the province in spring 2015. —LT

British Columbia

A new water act for a new century

In May 2014, British Columbia's new *Water Sustainability Act* (WSA) became law and will come into force in early 2016. This represented the culmination of six years of consultation and engagement to modernize the more-than-100-year-old *Water Act*. The full impact of this potentially cutting-edge legislation will hinge on passing a suite of important regulations. The first phase of regulations will focus on British Columbia's new groundwater licensing regime. The important next phase will protect environmental and critical flow needs, enable regional water sustainability plans and shared watershed-level decision-making, and promote conservation through a focus on monitoring of use, emphasis on the land-water interface, and clear requirements for "beneficial use." The province also announced a new fee and rental schedule for water users that will help recover the costs of implementing the WSA.

— Laura Brandes and Oliver Brandes, POLIS Water Sustainability Project

Saskatchewan

Proactive flood preparations

In 2012, the Government of Saskatchewan released its 25-year Saskatchewan Water Security Plan, which included 89 specific actions and provides government with wide direction on water management. The Water Security Agency reports annually on progress in implementing the plan. Development of new water legislation, a key component of the plan, is underway. The Water Security Agency completed an innovative online forum on agricultural drainage in 2014, and based on the findings from that forum, the government committed to further consultations and development of new regulations governing drainage. The province has responded to significant flooding since 2011 with the Emergency Flood Damage Reduction Program. Now in its fifth year, the program covers 100 per cent of the cost of engineering work and shares other costs, such as building berms to prevent imminent flooding. A review in 2011 showed the program saved $20 to $30 of property damage for each dollar invested. Saskatchewan is currently developing bilateral agreements with Northwest Territories and Alberta under the Mackenzie River Basin Transboundary Waters Master Agreement. —Elizabeth Hendriks, Living Water Policy Project, WWF-Canada

Manitoba

Legislation toward healthy waters

Several key pieces of legislation have been passed in Manitoba over the past two decades that have potential to improve water protection—most notably, the *Water Protection Act* (2006), a broad act that allows the minister to ensure water quality, protect against invasive species, and protect against water shortage. Other legislation includes the *Manitoba Environment Act* (1996), *Drinking Water Safety Act* (2008), and the *Ground Water and Well Act* (2008). New regulations were proposed in June 2014 for a Surface Water Management Strategy and Drainage Regulations. These regulations will work toward a no-net-loss model whereby drainage is either prohibited or significant mitigation is required. According to Ducks Unlimited, it is estimated the protection of Manitoba's 275,000 acres of seasonal wetlands would prevent more than 200 tonnes of phosphorus from entering waterways annually. The comment period is now closed and a decision to pass these new regulations is expected by mid-2016. —Kirsten Earl McCorrister, Lake Winnipeg Foundation

Ontario

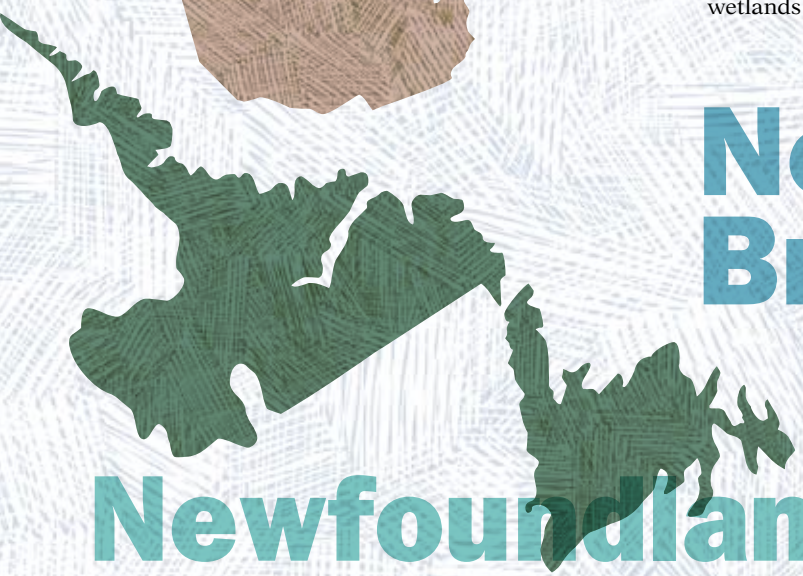
Tackling a changing climate

With its new majority government, the Liberal Party has put a focus on the environment. The party has added climate change to the agenda, putting Glen Murray at the helm of the renamed Ministry of the Environment and Climate Change and introducing a climate change discussion paper to serve as the foundation for a province-wide public consultation. A strategy is due in 2015, and the province is set to host the Climate Summit of the Americas in July, ahead of the Pan Am Games. The majority has also allowed the Liberals to reintroduce the proposed Great Lakes Protection Act, which died on the order table before the 2014 election. Proposed phosphorous targets for the Great Lakes are expected in summer 2015 by the Great Lakes Water Quality Agreement (a bilateral agreement between Canada and the United States) to address growing blue-green algae concerns in the lakes with a specific focus on Lake Erie. —Kerry Freek, Living Water Policy Project, WaterTAP

Quebec

Limits to water withdrawals

In July 2014, the newly elected Quebec government announced updated regulations for water withdrawals. The regulations increase the minimum distance for drilling activities near drinking water sources from 300 to 500 metres with options to increase to two kilometres should hydrological assessments demonstrate a need. Jean-Paul Raîche, senior VP of ROBVQ (a coalition of watershed organizations in Quebec), reacted to the proposal with tepid support, saying the "decision is a compromise that will reduce stresses and guarantee the protection of drinking water sources." In February 2015, the Government of Quebec announced a delay on its anticipated wetlands policy. A new policy is now not expected until 2017. —LT



Newfoundland and Labrador

Protecting wild waters

In line with regional counterparts, the Newfoundland government announced an independent panel for review of hydraulic fracturing in October 2014. The review will be conducted before any changes to government policy on the industry are made. A final report from the review is expected by fall 2015. In November 2014, the Government of Newfoundland and Labrador released a Sustainable Forest Management Strategy for the province. The strategy defines the goal that forestry practices and infrastructure will not damage aquatic ecosystems in the province. It further identifies the removal of some areas like the Upper Humber Wetlands Complex from forest management. Arguably the most notable feature of the strategy is the protection of vast amounts of land from forestry fragmentation. According to the Canadian Parks and Wilderness Society, "Policies contained in the forest strategy create a substantial zone for the protection of large intact landscapes, roughly 4-million hectares in size (approximately 35 per cent of the island), which is essentially off-limits to industrial scale forestry activities." Protection from major forestry activities will significantly protect the watershed. *The complete strategy can be found online at bit.ly/NFLDStrategy* —LT

New Brunswick

Moratorium on fracking

The risks of hydraulic fracturing to water became a big issue for voters in New Brunswick's 2014 general election. The new Liberal government was elected on a commitment to enact a moratorium on hydraulic fracturing. This moratorium was put into effect by the legislature in March 2015. The government has initiated a task force to review the environmental impact and the social licence of shale gas development. Meanwhile, the water classification regulation, which was fundamental in setting baseline water quality standards for rivers and streams, was the focus of a rare public report by the provincial ombudsman in August 2014. The report stated that the regulation "exists primarily as a mirage, misleading observers." The critique stemmed from an apparent failure to implement the regulation in the 13 years of its existence. The ombudsman's report urged the new government to "be proactive and make yourself the champion of that change." —Stephanie Merrill, Conservation Council of New Brunswick

The Living Water Policy Project is an evolving non-partisan library of Canadian water policy information. It is available online at **waterpolicy.ca**

Nova Scotia

A pause on hydraulic fracturing

In 2011, the Nova Scotia government initiated an internal review of hydraulic fracturing, with a pause on exploration and development activities using fracking. In 2013, the government reorganized the review of fracking from an internal government-based review, to a broader review led by an independent chair (David Wheeler). This review included reports by experts and public consultations across the province. In August 2014, the panel concluded it was not the time to proceed with fracking due to technical uncertainties and lack of social licence. Shortly after, the Government of Nova Scotia developed an act to prohibit high-volume hydraulic fracturing in shale in the province. —Jennifer West, Ecology Action Centre

Prince Edward Island

New water policy on horizon

The Government of Prince Edward Island announced in summer 2014 a new legislative and policy framework to ensure the sustainable management of the province's water resources. This new policy framework is meant to create a comprehensive set of policies to address groundwater allocation, discharges into fresh and marine water environments, and water quality targets. The process will include extensive public consultation, and most importantly, the lifting of the moratorium on high-capacity wells for agriculture irrigation will not be considered until the water act is approved and regulations are in place. Timelines for the public consultation and the policy have not been announced. A provincial election was called on the eve of April 6, 2015, and it is unclear how this commitment will be affected. —EH

Yukon

Regulating groundwater

In April 2015, the Government of Yukon released its position on shale gas development in the region. The position states support for "responsible shale gas development" only in the Liard Basin and only when the activity has the support of affected First Nations. The position reiterated that previously announced restrictions in the Whitehorse Trough will remain in place. The Yukon Water Strategy and Action Plan was released in June 2014. One of the six priority areas outlined in the plan is to better understand and manage Yukon's groundwater, with an emphasis on enhancing and formalizing the existing groundwater program in the Yukon and developing a regulatory framework to manage groundwater. —LT

Northwest Territories

Uncertainty around devolution

Planned consolidation of the Northwest Territories' (NWT) five regionally-based land and water boards has been temporarily delayed due to a recent injunction granted to the Tłı̨chǫ government. The injunction grants temporary protection to the Wek'èezhìi, Gwich'in, and Sahtu boards for the remainder of the Tłı̨chǫ Government's lawsuit against the *Mackenzie Valley Resource Management Act*. On March 19, 2015, the federal government submitted an appeal against the court decision (*see* "Uncertain Future" *on page 36*). The historic Northwest Territory-Alberta Water Management Agreement was signed on March 18, 2015, ensuring better protection of the territory's downstream needs. Discussions with British Columbia began in early 2014 and discussions with Saskatchewan and Yukon are set to begin later in 2015. Finally, after releasing the landmark provincial water strategy in 2012, the community of Sambaa K'e (Trout Lake) was the first community in the NWT to develop a community source water protection plan. The plan is set to begin implementation in 2015. —Blair Carter, Ecology North

Nunavut

Growing capacity in the territory

Nunavut's territorial government is not responsible for inland water use, management, or regulation. That's up to the Nunavut Water Board (NWB), an arm's-length institute of public government. In March 2015, the NWB received a 55-per-cent boost to its funding as part of a series of increases for the territory's institutions of public government under the renewal of the Implementation Contract of the Nunavut Land Claims Agreement. Maintaining a strong regulatory regime in Nunavut opens the doors for more vigilant environmental protection. It also provides Nunavummiut with the increased capacity to invest in, benefit from, and manage the territory's development potential, according to Leona Aglukkaq, Minister of the Environment, Minister of the Canadian Northern Economic Development Agency, and Minister for the Arctic Council. —KF

Only **62 rivers**, **97 lakes**, and the **three oceans**, or approximately **two per cent** of the waterways in the country, are protected.

Top Energy Efficiency Opportunities For Wastewater Treatment Plants

Wastewater treatment is a highly energy-intensive operation. With this in mind, municipally-owned wastewater treatment plants are looking for ways to reduce their operating costs. One proven method for facilities to reduce operating expenses, making funds available to reinvest in plant operations, is to reduce one of the biggest expenses in any wastewater treatment plant: energy consumption.

Energy use can account for a major portion of a municipality's annual operating budget, and 20% to 30% of this municipal energy use is linked to wastewater treatment. With pumps, motors and other equipment operating 24 hours a day and seven days a week, wastewater facilities can be among the largest consumers of energy in a community.

Operating costs can be significantly reduced by improving the energy efficiency of wastewater facilities' equipment and processes, freeing up resources for future investments in energy efficiency and other projects. In a typical plant, there are several opportunities that energy managers can explore.

> "Taking part in the **save**ON**energy** program has allowed us to use operational savings to help pay for other energy efficiency projects."
>
> **GEORGE DE GROOT**
> Manager of Engineering, Infrastructure and Development Services, City of Stratford

1. AERATION DIFFUSERS

Aeration is one of the most fundamental and costly processes in wastewater treatment and can represent as much as 60% of total plant energy use. There are effective strategies to reduce the energy demand of these systems.

Many wastewater treatment plants have achieved positive results by installing fine bubble diffusers for their aeration systems. Fine bubble diffusers are easily retrofitted into existing aeration basins, and this can be done during normal annual maintenance. Transitioning to fine bubble diffusers has been demonstrated to lower electricity consumption associated with the aeration process by nearly 30% through increased oxygen transfer efficiency and can also improve the quality of the treated water.

2. AERATION BLOWER UPGRADES

Many wastewater treatment facilities operate blower systems at a fixed rate with no effective means of adjusting oxygen feed to the aeration basins to match demand. Wastewater treatment plants are now upgrading to optimally-sized, high-efficiency blowers that can automatically adjust the air flow rate using a variable frequency drive (VFD) to maintain an ideal dissolved-oxygen level in the aeration basin. During periods of lower flow rate, such as at night, the airflow rate can be reduced to match the actual oxygen demand and reduce energy consumption. Integrating variable frequency control of the aeration system based on dissolved oxygen has been demonstrated to reduce blower electricity demand by more than 30% and provide payback in less than three years.

The City of Stratford's Wastewater Treatment Plant was able to achieve energy savings of 31% with the installation of a VFD controlled turbo blower. "The aeration process accounts for 60%

PUMP FITTED WITH VFD

of the plant's total energy usage, making it an ideal starting point to improve the site's overall energy efficiency and reliability," says George De Groot, Manager of Engineering, Infrastructure and Development Services for the City of Stratford.

By utilizing incentives offered through **save**ON**energy** programs, the plant was able to reduce its wastewater treatment and collection costs by more than 20% through just one project and achieved higher-than-expected energy savings. "The blower upgrade project has saved roughly $68,000 in energy costs over the first nine months of operation," says De Groot. "This will reduce the $215,000 in electricity costs for aeration by at least 30% annually. "Projecting this cost saving over the 20-year life of the project means this blower upgrade will essentially pay the city $1.2 million." The estimated return on investment over the life of the equipment is nearly 700%.

3. HIGH EFFICIENCY MOTORS AND VFDS ON PUMPING SYSTEMS

Electric motor-driven pumps are the second-largest consumer of energy in a wastewater treatment facility and can account for up to 30% of energy consumption. Significant energy-efficiency gains can be realized by making pumping systems more efficient. Many utilities operate pumping systems that have aged beyond their effective lifetimes, and more efficient solutions are now available.

VFDs vary the speed of pump operation to match the flow conditions. They control the speed of a motor by matching energy requirements with pumping requirements. VFDs can be installed at remote collection pumping stations and lift stations, or on blowers, screw pumps, sludge pumps, return activated sludge pumps and deep well lift pumps. By installing VFDs, facilities can achieve significant savings, with typical payback periods of less than two years, making them an attractive option for wastewater treatment plants looking to improve energy efficiency.

Hamilton's Woodward Avenue Wastewater Treatment Plant took advantage of incentives offered through **save**ON**energy** programs to replace aging equipment in its high-lift pumping Station. More than 10,000 horsepower was required daily to move 340 million litres of treated water to serve 500,000 Hamilton residents on a daily basis, with pumps of various sizes fed from two separate electrical feeds. The varied pump sizes resulted in more expensive maintenance and higher energy costs for the facility. To meet its energy efficiency and water safety targets, the City replaced the pumps with six identical pumps. Four of the pumps were connected to VFDs, and two operate as single-speed pumps. The pumps were constructed in a single-voltage, split electrical bus that allows half the station to be shut down for maintenance while the other half continued to operate.

Since the new pumps were designed to operate at higher efficiencies across a wider range of flow rates using VFDs, the new design considerably reduced power consumption. The change in operational approach allows the high-lift pumps to run at a lower capacity during higher-cost, on-peak periods and at a higher capacity during lower-cost, off-peak periods. With the installation of the new equipment, the plant was able to reduce its peak load by 2,559 kW and cut its electricity costs by 20% or $400,000 annually. The City of Hamilton received more than $2 million in incentive funding for installing energy-efficient pumps and VFDs to reduce the pumping station's energy costs through **save**ON**energy** programs.

Regardless of the age of the wastewater treatment facility, continuous improvement initiatives that reduce energy consumption with attractive returns on investment are available. Furthermore, funding to support these initiatives is available through government-funded programs such as **save**ON**energy** programs.

De Groot highly recommends other wastewater treatment facilities consider leveraging incentives offered through **save**ON**energy** programs delivered through local electric utilities. "The City of Stratford would highly recommend the program to other municipalities. It allows for infrastructure improvements as well as cost savings on energy, both of which help reduce the payback period for the capital project, and also allow the savings to become part of operational savings to help pay for future projects."

ABOUT saveONenergy

Businesses across Ontario are benefitting from incentives to support energy efficiency projects that conserve electricity, use innovative technology and deliver savings. You can learn more here:

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As Canada's oceans strategy drifts off course, conditions continue to worsen. Threats to the world's oceans include acidification, rising sea levels, and swirling masses of floating plastic debris.

Lost at Sea

Are Canada's oceans policies adrift?

BY SAUL CHERNOS

CANADA'S STATE OF THE OCEANS REPORT acknowledged many of the concerns scientists and conservationists have raised for decades: increasing acidity, a significant thinning of sea ice in the Far North, depletion of life-supporting oxygen in waterways, and wholesale shifts in coastal wildlife populations. Issued in 2012, the Fisheries and Oceans Canada document pointed to causes ranging from natural cycles to industrial development and warned of trouble ahead as entire ecosystems continue to undergo unprecedented change. Oceans in other jurisdictions are comparably troubled, yet Canada has more coastline than any other country—more than 240,000 kilometres, including countless inlets and islands and a vast Arctic. The government's own data tells a compelling story of a complex, self-sustaining web of life that also nurtures Canada's economy, contributing nearly $38 billion to the country's gross domestic product through maritime-related commercial activities like oil and gas, tourism, and fishing. However, these same oceans, at home and abroad, are under critical stress. Veteran ocean watchers say the scientific research and early initiatives seem impressive, but governments have much to do in order to truly protect the seas.

In 2002, under a previous Liberal government, Fisheries and Oceans Canada drafted a national oceans strategy, and Sabine Jessen of the Canadian Parks and Wilderness Society (CPAWS) had high hopes. "It was all part of the implementation of the Canada *Oceans Act* (in 1996), which at the time was world-leading," she recalled. "We were at the forefront. It was the first piece of national legislation in the world specifically focused on oceans management." The act, which followed on the high profile international dispute between Canada and Spain over fishing on the Grand Banks just outside Canadian waters, was viewed as an opportunity to correct a piecemeal approach to ocean management. It called for integrated management planning to address economic, environmental, and social issues. The subsequent oceans strategy promised marine protection in five areas: the Pacific north coast, Beaufort Sea, Eastern Scotian Shelf, Gulf of St. Lawrence, and Placentia Bay/Grand Banks.

More than a decade later, however, there's a sense that Canada's oceans strategy is drifting off course. Jessen said while some integrated ocean planning did occur in these five areas, the assortment of federal and provincial government departments that participated didn't all provide the needed follow-through, and there's been a notable shortcoming in actual, measurable protection. Furthermore, conditions continue to worsen. Fisheries and Oceans Canada's

> "We're still a long way away from moving toward more comprehensive integrated planning around our waters." —David VanderZwaag

2012 report acknowledged, for instance, that Canadian surface waters were 30 per cent more acidic than when the industrial revolution began and could be 150 per cent more acidic by the end of this century. Acidification dissolves calcium, and Jessen said commercial shellfish industries have already reported reduced harvests of species like oysters. While the report listed carbon dioxide emissions as a major cause, Canada withdrew from the Kyoto Protocol a year earlier and has yet to agree to international emissions-reduction targets.

Acidification isn't the only threat. Other concerns raised in the 2012 report continue to escalate. Rising sea levels threaten low-lying coastal communities, wetlands, and salt marshes while warming waters have sent species packing for cooler, more protected venues. "The result is basically a reassembly, the creation of whole new kinds of ecosystems and ecological linkages," Jessen said, citing dwindling Pacific salmon stocks as most noticeable. Hypoxia, where depleted oxygen levels have produced dead zones in the Baltic Sea and the Gulf of Mexico, is worsening in pockets around Vancouver Island and in the Gulf of St. Lawrence. Cod stocks decimated decades ago by over-fishing have been replaced by crab and shrimp as predominant species, and swirling masses of floating plastic debris are proving deadly to marine creatures mistaking it for food.

David VanderZwaag, a marine environmental law professor at Dalhousie University, sees direct economic tie-ins, with acidity reducing shellfish catches, rising sea levels visibly affecting the South Pacific and other low-lying areas, and devastating flooding in North America from superstorms like hurricanes Katrina and Sandy costing billions of dollars. Proposals for marine-protected areas and integrated management planning marked Canada as a potential leader in ocean law and governance, yet VanderZwaag said he's not seeing enough actual planning and protection. He explained, for instance, that strict pollution standards for ships in the Arctic have failed to lead to any substantial vessel routing. Furthermore, he warned that a lack of ports and other infrastructure in the Far North leaves Arctic waters vulnerable in the event of an oil spill on the scale of 2010's BP Horizon disaster in the Gulf of Mexico, even as warming waters stand to enable year-round shipping through the Arctic. Describing current ocean management in Canada as largely sectoral, with pieces often delegated to other federal departments and to provincial government ministries, VanderZwaag called for comprehensive marine spatial planning at the national level. "It's almost like (municipal) zoning or land-use planning, deciding where we might allow aquaculture or wind farms, or where we wouldn't allow certain kinds of shipping," he explained.

David Walters, a media spokesperson with Fisheries and Oceans Canada, said

Global Standouts in Ocean Protection

MORE THAN A QUARTER CENTURY AGO, Canada's *Ocean Act* and subsequent national oceans strategy positioned our country among world leaders in ocean protection. Nowadays, VanderZwaag looks instead to Belgium, the Netherlands, and the United Kingdom, which have begun to implement comprehensive marine spatial planning at the national level. "It's a big challenge," VanderZwaag said, adding that the European Union has followed up with a similar directive of its own.

Jessen said the United States has put a priority on ocean issues, including marine spatial planning and increasing the number and size of national marine sanctuaries. She pointed also to New Zealand, where recent measures include a marine spatial plan for the Hauraki Gulf off the city of Auckland.

Jeremy Jackson, professor emeritus at the Scripps Institution of Oceanography in La Jolla, California, believes individual efforts will lead the way to improving ocean protection. Norway's conservation policies are steeped in science and carried through with strong enforcement, he said. "They monitor the changing climate in the Norwegian Sea incredibly carefully and with great rigour. They're aware that a lot of things are changing and they're not putting their head in the sand." Jackson also pointed to Australia, where a previous government enacted strict zoning to protect the Great Barrier Reef. "They had this incredible interactive process for 10 years involving all the stakeholders and went from 10 per cent to more than 30 per cent of the entire area being protected. They looked at every species and ecosystem and decided one-third has to be protected. Nobody can even go to about 10 per cent of the Great Barrier Reef except scientists with special permission." The State of California, also on Jackson's list, recently protected 15 per cent of its coastal fisheries, with fish populations recovering noticeably. The standout might be the Pacific island of Palau, which declared total protection of its fisheries and coral reefs. "Tourism on coral reefs is huge part of Palau's income," Jackson said. "Its coral reefs are incredibly popular in the diving community, and Palau's leadership is very aware of that."

Measures such as these offer hope, he said. "When you get three or four of the major countries getting together and agreeing to do something, they'll pull others along with them. The oceans are genuinely in peril, especially the coastal oceans, for the obvious reasons of explosive human population growth, consumption, activity, and pollution. But that's the bad news. The good news is that it's all pretty fixable. The frustration is just how slowly it all moves." —Saul Chernos

the government has in fact stepped up to the plate with funding and legislative support. "Canada's National Conservation Plan, announced in 2014 by the prime minister, includes funding of $252 million over five years for a variety of conservation initiatives, including $37 million to strengthen marine and coastal conservation," Walters said. He added that Fisheries and Oceans Canada is establishing marine protected areas (MPAs) and is working to identify additional conservation measures. "Our strategic approach to network development will ensure that future MPAs will be optimally located to respond to ecological needs and socio-economic realities in Canada's oceans," he said.

While the government has faced criticism over inaction on climate change, Walters said climate change has been a Fisheries and Oceans Canada research priority dating back to work by the Department's Climate Change Science Initiative and continuing through the Aquatic Climate Change Adaptation Services Program (ACCASP). He added that the federal government has backed this up with funding. When the government announced $148.8 million in climate change adaptation funding in 2011 to be spread out over five years, $16.5 million of that went to ACCASP. Fisheries and Oceans Canada scientists have also contributed to the Intergovernmental Panel on Climate Change and engage with the international scientific community through the International Union for Conservation of Nature, the Convention on Biological Diversity, the Arctic Council, the United Nations, and other agencies.

VanderZwaag said the research is impressive and initial steps to create marine-protected areas are a positive step. However, he sees announced protections as largely aspirational. "We have to start relating the growing science to what we have to be doing to deal with greenhouse gas emissions, particularly carbon dioxide," he said. "We're still a long way away from moving toward more comprehensive integrated planning around our waters."

At CPAWS, Jessen said Canada's performance on MPAs doesn't add up to much. "Australia put in a national network around the whole country that covers 36 per cent of their ocean territory at the same time that Canada has barely protected three per cent.

"It's good to see some new money from the government to put MPAs in place, but if we continue to do this at the pace we have—taking about 10 years to put each MPA in place—it will take decades to complete the work." WC

Saul Chernos is a Toronto-based writer and frequent Water Canada contributor.

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L-R: Derek Jewell, Jeremy Manning, Colin Newell, Peter Torbet, Joseph Kennedy, Numair Uppal, Saad Ulhaq, and Julie Preslie.

Credit: David Martin

WCI Environmental Solutions Inc.

Spring thaw brings renewed concerns for lagoon operators about treatment odours and related complaints as temperatures rise and biological processes accelerate. But a community in Ontario's recreational heartland is optimistic that a chemical-free, solar-powered oxygenation system can eliminate lagoon odours and promote enhanced digestion of accumulated sludge to increase treatment capacity.

Earlier this month, WCI Environmental Solutions, in cooperation with the Water Research and Innovation Network (WRAIN) and the Ontario Clean Water Agency (OCWA), installed an EOS 2000 System at the Coboconk Waste Stabilization Pond in the City of Kawartha Lakes. The EOS 2000 system is a solar-powered resonance frequency generator. The intent of the project is to demonstrate the effectiveness and ease of use of this compact system in boosting oxygen levels throughout the treatment lagoon, including the bottom sediment where most microbiological activity occurs. Most treatment lagoons struggle to achieve sufficient oxygen levels with conventional, energy-intensive mechanical aerators in operation. Low levels of oxygen promote anaerobic conditions and activities, which result in malodours caused by methane and hydrogen sulfide gas.

"The pilot/demonstration by WCI with the EOS 2000 system showcases how small and medium-sized enterprises (SMEs) are being progressive and innovative in their business outlook and commercialization strategy," said Numair Uppal, WRAIN's Economic Development Officer. "Working collaboratively with OCWA, the City of Kawartha Lakes, and WRAIN allows companies the opportunity to engage various stakeholders and build strong relationships which can yield great benefits."

The EOS 2000 System has been proven to increase and maintain oxygen levels in treatment lagoons from an anoxic state of 0-3 mg/L to a highly aerobic state of 7-12 mg/L, at the bottom, to create an ideal environment for aerobic micro-organisms to thrive. Within only a few days of start-up, the Coboconk treatment lagoon experienced aerobic conditions sufficient to eliminate odours, while increased aerobic microbial digestion in the bottom sediment

Business inquiries:
info@wrain.ca

wrain.ca


The EOS is small with a big impact.


EOS 2000 control box compared to air blower pump house.


EOS transmitter tethered to the berms.

began to decrease the volume of bottom sludge. Reduced sludge volume helps to restore treatment capacity in the lagoon and extend intervals between lagoon cleaning cycles by two or three times.

The EOS 2000 System installs in as little as 30 minutes and requires no pumps, blowers, or electrical infrastructure to operate.

New Environmental Technology Evaluation (NETE) Program certification and a mobile Certificate of Approval from the Ministry of Environment and Climate Change (MOECC) mean that operators can simply notify the local MOECC office of the project and install an EOS System in as little as two weeks to tackle lagoon odour issues.

With installations all over the world, WCI Environmental always seeks local partners that can make a big difference to our success. WRAIN plays an important role in solving water problems faced by communities in its region. Municipal and community leaders in the City of Kawartha Lakes have shown a keen interest in building a more attractive environment for business and visitors, and with WRAIN, they have a trustworthy partner who has the ability to reach beyond the traditional boundaries to drive activity and growth. Joseph Kennedy, President of WCI Environmental, said "For their effort and professionalism, we are very grateful to WRAIN; the partners and sites chosen are perfectly aligned with the company goals."

In addition to the EOS-2000 installation, WRAIN is also helping WCI potentially develop a ThermAer ATAD project at the Lindsay Waste Pollution Control Plant to create revenue opportunities from septage and sewage sludge. WRAIN will also be planning an installation of the EOS-2000 system at a local beach to improve water quality for public swimming.

WRAIN understands the needs of companies and how to effectively pilot and commercialize innovative water and wastewater technologies into the Ontario market. WRAIN can help you achieve your business goals. As your single source for business development, marketing, and technical advice, WRAIN works with you to continuously improve product performance and provide your company with a responsive demonstration site to effectively perfect your water and wastewater technology.

Best Practices

A look at the prevailing gaps and challenges in Canadian stormwater policy.

BY DALIA AL-ALI

STORMWATER MANAGEMENT in urban regions is an ongoing challenge for Canadian municipalities. Often, what little policy exists is disjointed from an intragovernmental standpoint, with gaps among federal, provincial, and municipal legislation. In addition, municipalities are often left with the daunting task of developing and implementing stormwater management plans—a task requiring expertise and resources not readily available to some municipalities.

Typically, stormwater runoff in Canadian municipalities is regulated by implementing stormwater management objectives in the form of Best Management Practices (BMP) like green roofs or permeable pavements.

In Canada, stormwater management is typically the responsibility of municipalities, and they learn about management strategies mainly through guidelines and handbooks. These typically outline three methods of managing stormwater based on the location of stormwater within the runoff cycle.

Three methods

Lot-level controls are implemented at the source, aiming to reduce the flow and control the quality of stormwater runoff on site prior to its reaching the storm sewer system. Conveyance controls are implemented throughout the stages of a stormwater conveyance system (such as storm sewers and open channel systems) with the aim of flow reduction and quality control prior to discharge into receiving waters like lakes and oceans. Both these methods use infiltration or storage techniques to stagger the inflow of runoff into receiving waters, thus limiting flooding potential and aiming not to overwhelm the assimilative capacity of receiving waters. The final method, end-of-pipe controls, involves the installation of treatment facilities just before discharge into receiving waters. Their size relies upon the effectiveness of the aforementioned lot-level and conveyance controls.

Ultimately, a combination of at least two methods is often required to achieve municipal stormwater management objectives. Municipalities typically use the Stormwater Management Planning and Design Manual as a baseline guidance document then work to tailor their stormwater management strategies to their specific watershed and local hydrologic-cycle processes.

Currently, more municipalities and developers are shifting their focus to runoff management at the source rather than end-of-pipe techniques. The key concept is that it is more effective and cost efficient to prevent pollution than it is to restore harmed ecosystem components. However, some municipalities and developers are hesitant to adopt site-level management strategies due to the lack of comprehensive evidence on the performance of these measures. Permeable pavement and vegetated swales are emerging lot-level management techniques, but documentation on actual-versus-modeled performance, as well as maintenance requirements and costs, is sparse.

In Ontario, the Credit Valley Conservation Authority and the Toronto and Region Conservation Authority have undertaken efforts to monitor and quantify the performance of these low impact development strategies. Ultimately, there is a lot of work to be done in this area before these changes are adopted by stormwater policy frameworks. Additional hurdles in the adoption of site-level management strategies in policy include the lack of municipal control over private property, as well as homeowner perception of management strategies as a nuisance. Public perception plays a critical role in acceptance of stormwater management practices.

> Balancing municipal objectives and public involvement is a continuing challenge for stormwater management projects.

Public outreach

The management of stormwater in urban areas is rarely a straightforward task. Management method selection often requires input from multiple stakeholders, each with competing priorities. Public outreach and education initiatives are critical in the implementation of robust stormwater management and pollution prevention projects. If projects and their associated costs are poorly understood, public opposition or apathy to project implementation may dominate. Keeping the public updated and maintaining open communication channels is crucial, as demonstrated by the recent opposition in Halifax to rural and suburban water fees, which had not been properly communicated to municipal homeowners. The purpose of the fee is to fund stormwater management efforts in areas outside the city centre and was imposed onto residents' water utility bills without preceding clarification from the municipality.

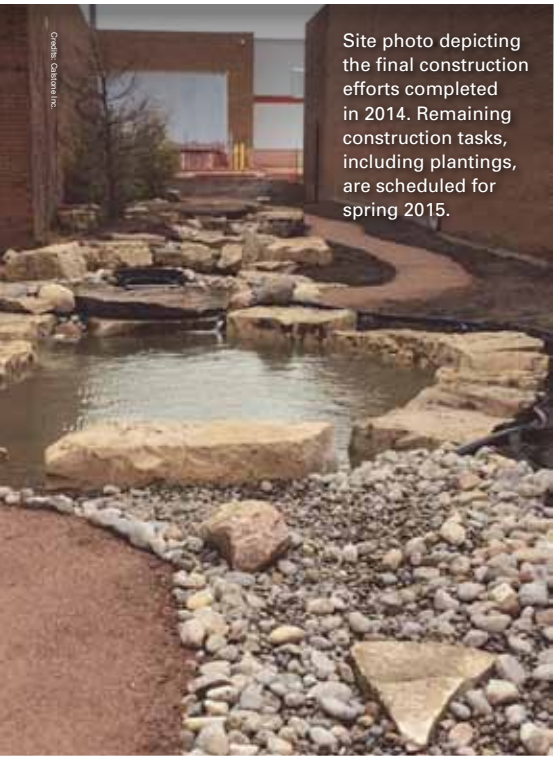
The breach of public trust is a difficult act to undo. As such, an informed public is paramount to project implementation. Of course, an informed public does not necessarily equate to a fully supportive public. Balancing municipal objectives and public involvement is a continuing challenge for stormwater management projects.

Moving forward

Ultimately, pressing questions remain in the field of urban stormwater management and policy. In the design of stormwater management systems, historical weather data is typically used to predict the performance of a given BMP control. However, little or no accommodation is made in considering the impact of climate change on design considerations. It is likely that the capacity requirements of BMP controls will either be over- or under-estimated due to changes in climate. Currently, much of these potential impacts are not fully understood.

Regulatory agencies must begin moving toward integrated planning initiatives. Integrated planning aims to address economic, social, and environmental requirements by merging land use and environmental planning. Typically, land use plans operate at the municipality level. However, environmental plans may be drafted for watershed, sub-watershed, and local/neighbourhood scales. As a result, the implementation of integrated planning critically requires the creation of communication channels between multiple levels of government and across various disciplines. WC

Dalia Al-Ali is a civil engineering M.A.Sc. candidate at Queen's University.



Credits: Calstone Inc.

Site photo depicting the final construction efforts completed in 2014. Remaining construction tasks, including plantings, are scheduled for spring 2015.

Site photo depicting the fully developed location after project implementation was completed in November 2014.

Site photo depicting the undeveloped location before project implementation was started.

From Industrial to Oasis

A look at lot-level stormwater management for businesses in the Greater Toronto Area.

BY ERIC MELITON AND ALYSSA CERBU

THE GREATER TORONTO AREA (GTA), home to more than nine million people and nine watersheds, has felt a strain in the past few years on its once robust stormwater management systems, making it more pertinent to look at different approaches to managing stormwater in the GTA.

One approach being explored by Partners in Project Green (PPG)—a group run within the Toronto and Region Conservation Authority (TRCA)—is to engage private companies to adopt lot-level stormwater management techniques and facilitate the implementation of low impact development technologies for the industrial, commercial, and institutional sector.

Stormwater management in GTA

Although the City of Toronto was once considered to have sophisticated storm sewer infrastructure and flood management systems, the growing threats of population increases, urban sprawl, and climate change bring to question the robust design of these current systems. The city's infrastructure is aging and traditional modes of stormwater management alone (such as detention ponds, retention basins, and piped drainage systems) may not hold up against the potential threat of more frequent and intense storm events, such as the 100-year storm experienced on July 8, 2013.

In conjunction with the aging infrastructure issue, the City of Toronto faces growing water quality concerns related to both stormwater management and surface water quality, measured through indicators like total phosphorous, *E.coli*, and benthic macroinvertebrates levels. Though Toronto's nine watersheds have improved in both of these areas on their watershed report cards, they are still met with water quality challenges. One way to look at tackling both of these problems is to take a closer look at lot-level stormwater management practices, such as green roofs, rainwater harvesting, and low impact development technologies, including permeable pavement, rain gardens, and bioswales.

Numerous partners, greater results

Calstone Inc., a furniture manufacturer in Scarborough, wanted to tackle some of these stormwater issues as well as beautify their property for their 30th anniversary in September 2015. After receiving the Earth Day Hometown Heroes award from the City of Toronto for a small rainwater harvesting project, Calstone approached PPG for further assistance. Using available capital project grant funding provided by its water stewardship team and from the Ontario Ministry of the Environment and Climate Change's Showcasing Water Innovation program, PPG was able to help scale-up the project to include a 9,300-litre rainwater harvesting tank, three infiltration ponds, and a recycled materials walkway.

The project's construction and maintenance plans were developed and reviewed by Grounds Covered Landscaping, XCG Consultants Ltd., and the Sustainable Technologies Evaluation Program (STEP) run through the TRCA.

After completion of Phase I, four of Calstone's six roof downspouts are disconnected to feed into the retention tank. This tank overflows and feeds into the two ponds that provide temporary water storage and infiltration functions while the third pond functions as an eye-catching permanent water feature. The official planting of drought resistant and native plants, shrubs, and trees will be completed in spring/summer 2015 in addition to the testing and monitoring of the unique stormwater management system design.

Dean Young, project manager at STEP, said, "The understanding gained from evaluating the treatment and cost-effectiveness of this system will be used to inform decisions about future private-property retrofits across Southern Ontario." With the completion of Phase 1 and the help of all the project partners, Calstone Inc. will be able to divert 1.8 million litres of rainwater from aging City of Toronto sewer infrastructure to ultimately benefit and restore the local watershed, the Highland Creek."

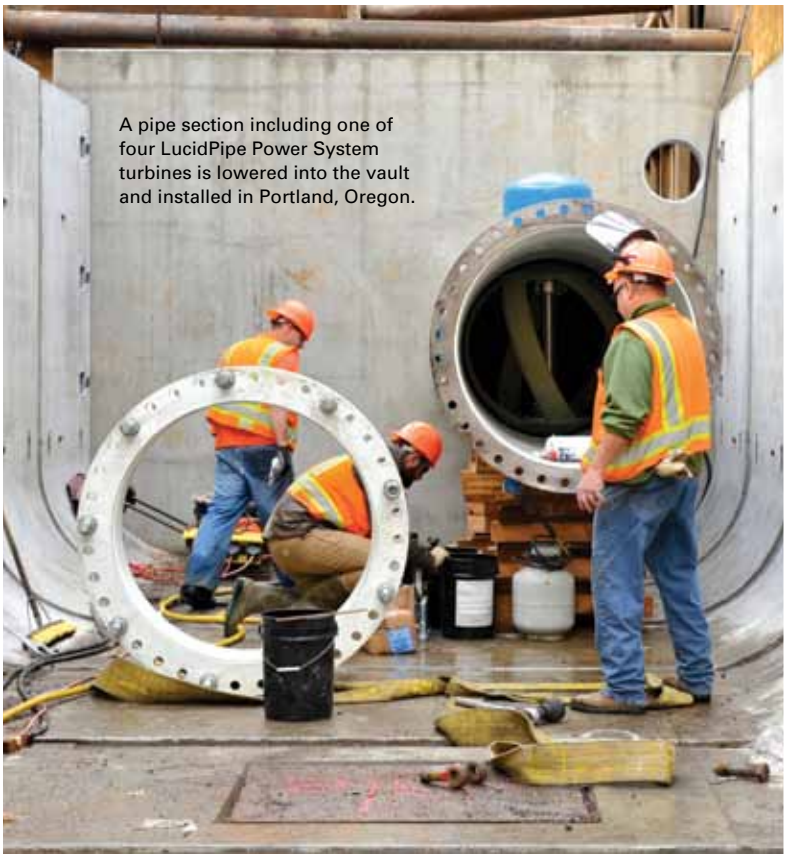
In 2016, Phase 2 of the project will begin, which involves disconnecting the remaining two downspouts, installing an additional rainwater harvesting tank, and constructing a permeable pavement parking lot. Not only will Calstone showcase a variety of different stormwater management and low impact development technologies, but they will also meet their goal of capturing 100 per cent of their roof rainwater and remove themselves from the municipal water supply through water re-use projects within their facility.

Stormwater project replication

By showcasing the successes of this project, it is the hope that other industrial, commercial, and institutional properties across the GTA and Southern Ontario see the value in mitigating the risks of on-site flooding, while simultaneously reducing the burden on aging stormwater infrastructure and becoming stewards for a local watershed.

As of April 2015, PPG had more than 80 companies in its official membership and more than 20 technology vendors, landscape architects, and engineering consultants within their stormwater infrastructure vendor network. The network is positioned to speed up the implementation and replication of lot-level stormwater management systems. With a greater number of on-site stormwater projects, a larger volume of water can be treated and captured, building resiliency within local water management infrastructure and implementing solutions necessary to combat urbanization and the growing risks of flooding. WC

Eric Meliton is the project manager of the water stewardship team at Partners in Project Green. Alyssa Cerbu is the project coordinator of the water stewardship team at Partners in Project Green.



A pipe section including one of four LucidPipe Power System turbines is lowered into the vault and installed in Portland, Oregon.

Credits: Sherri Koven

In-Pipe Hydropower

The water-energy nexus provides ample opportunity for innovation.

BY GREGG SEMLER

NOT A DAY GOES BY that we don't read or hear something about energy, be it political, controversial, or aspirational. Everyone is thinking about where our energy comes from today and how we'll be meeting our energy needs in the future. There's a lot of talk—and investment—in energy innovation.

It's time we started thinking about water the way we think about energy. We can go 60 days without energy, but it is unimaginable to go 60 days without water. It takes a lot of water to produce energy and, as every water manager knows, it takes a lot of energy to deliver clean, safe drinking water. It is at that intersection—often referred to as the water-energy nexus—where there is tremendous opportunity for innovation.

Lucid Energy has developed a new source of clean, low-cost renewable energy from in-pipe hydropower that is now being used in cities like Riverside, California and Portland, Oregon. The idea is pretty straightforward: we put spherical turbines inside of gravity-fed water pipelines to generate renewable energy. These systems, which are usually placed upstream of pressure reducing valves, convert a small amount of excess head pressure into electricity (about 5 psi per turbine) without impacting water delivery and with no environmental impact.

> What most water agencies don't realize is that they have the opportunity to use their own gravity-fed water infrastructure to generate renewable energy.

As part of my work, I have the opportunity to meet with municipal governments, water agencies, energy investors, and engineering companies in the water and energy sectors around the world, and what I hear most often are concerns relating to two things: infrastructure (accommodating rising populations and repairing aging pipelines) and energy. At the same time water agencies need to invest in the building and repair of their infrastructure—a costly proposition—they also face shrinking revenues and rising energy costs. Other than manpower, energy is the number one cost centre for most municipal water utilities.

All of this puts water agencies across North America in an awkward position. Costs are ever rising, yet water customers will not tolerate large raises in their water bills. This has prompted many water agencies to consider efficiency

measures that will reduce their energy consumption and to begin looking at smart water grid solutions that monitor the status of pipelines for water quality, flow, and leak detection. This is a huge step in the right direction.

What most water agencies don't realize is that they have the opportunity to use their own gravity-fed water infrastructure to generate renewable energy. In-pipe hydropower provides the opportunity to capture the energy of flowing water in a controlled environment—the electricity produced is predictable and not subject to weather conditions. The larger turbine systems provide a source of baseload electricity that can be used in off-the-grid areas (or as emergency back-up power), used to power the water agency's own systems, or sold to energy utilities through power purchase agreements (PPA). This provides a new revenue stream that water agencies can use to upgrade their infrastructure and reduce the cost of delivering water. Smaller turbines can be deployed throughout smaller-diameter distribution pipelines to power wireless smart water monitoring technologies and other devices.

Tapping into the energy industry's robust pool of investors, the capital for construction of in-pipe hydropower projects is available through private institutions that are willing to fund renewable energy projects. Because the systems are fully funded by the investors, they can be installed at no cost to the water agency. The investors share in the revenues from the energy generation, with a portion going back to the agencies.

Lucid Energy recently completed installation of one of these in-pipe hydropower systems, our LucidPipe Power System, in a Portland Water Bureau (PWB) pipeline in Portland, Oregon. This project had the distinction of being the first project in the United States to secure a 20-year PPA for renewable energy produced by in-pipe hydropower in a municipal water pipeline. The investor funded the installation of the four-turbine, 200-kilowatt system and it was completed at no cost to the city. PWB will share in the revenues generated from the sale of electricity, which will be enough to power up to 150 homes in the city.

We are currently talking with a large water agency in Quebec as well as a number of other cities and water bureaus across Canada, the United States, and around the world. I see an enormous window of opportunity at the water-energy nexus for public-private partnerships that bring together expertise and capital from the private sector to support and build out smart, secure, and integrated water and energy infrastructure. WC

Gregg Semler is the president and CEO of Lucid Energy.

Credit: Six Nations Elected Council via Flickr

Six Nations Chief Ava Hill tours a facility during a Haldimand Tract bus tour.

Systemic Water Woes

What impact will the Safe Drinking Water for First Nations Act have on communities?

BY MATT MOIR

IN NOVEMBER 2013, Ava Hill became one of the most powerful aboriginal politicians in the country: she was elected chief of the Six Nations of the Grand River, the largest First Nation in Canada. But even she, a veteran political leader with deep pools of influence and savvy, struggles to bring each member of her community the most basic of life's necessities: clean water.

Last year, Hill said, "We have a new water treatment plant, and that's made a difference, but there are times that we've had water boil advisories. People need to take extra measures to make sure they're safe."

After it's chlorinated at the Six Nations water treatment plant, the reserve's water is entirely drinkable. But the pipes connecting the treatment centre to the reserve's homes are not clean, so water is infected with bacteria immediately upon flowing from the treatment facility (and even if the pipes were clean, not all of the homes on the reserve are connected to the grid).

Some residents pay water service delivery companies to transport water to their homes, but often the large vats the companies' trucks are equipped with are themselves contaminated, much like the wells from which other Six Nations members get their water. The end result is a Six Nations reserve—the largest in Canada and barely 20 kilometres from Brantford, Ontario– with precarious access to clean water.

And it's a result that affects everyone in the community. "I never drink the water," Hill said.

Systemic water troubles

On any given day, more than 100 First Nations communities—the majority of them in Ontario and British Columbia—are under boil water advisories. Some advisories have lasted for almost two decades. The Eabametoong First Nation in northwestern Ontario, for example, has been under a water advisory since 1995.

According to Aboriginal and Treaty Rights and the Charter of Rights and Freedoms, it is the responsibility of the

federal government to ensure the health and safety of First Nations. Throughout the 2000s, various government reports and studies found that as many as three-quarters of all water systems on reserves were at medium or high risk of failure.

> "I never drink the water."
> —Chief Ava Hill

The Harper government said it has spent approximately $3 billion on aboriginal water systems, but critics say it's not enough. Both sides would agree, though, that in 2015, the situation on the ground seems as bleak as ever.

Myriad problems

Robert Patrick, a professor at the University of Saskatchewan and one of Canada's foremost experts on First Nations access to safe water, said there are several reasons why so many First Nations communities do not have access to clean drinking water.

"The reserve system made it really difficult [with] the division of First Nations into small enclaves and placing First Nations into forced settlement on reserves. The land they were put on didn't have good access to water. That wasn't one of the considerations," he said. "There was often not a water distribution system put in place, so the infrastructure wasn't right from the beginning."

Patrick also said the federal government spends enormous sums of money on building multi-million dollar water treatment centres, even though those facilities may not be the most cost-effective way to address the issue.

"The big problem is that you invest millions of dollars in a water treatment plant, but then you don't have a distribution system. So the minute the water gets moved from the plant to the water delivery truck, it's often contaminated. Or certainly by the time it gets to that truck to the cistern outside of the home, because the cisterns are cracked or not well maintained, that water is contaminated. So you produce this technically excellent water only to have it contaminated. It's just ludicrous."

Safe Drinking Water for First Nations Act

In 2013, the federal Conservatives passed the *Safe Drinking Water for First Nations Act*, a bill designed to address health and safety issues on reserves by providing regulations to govern drinking water and wastewater treatment in First Nations communities.

Aboriginal Affairs Minister Bernard Valcourt has said that the act is important because it brings water and wastewater standards on First Nations into line with the standards in non-native communities across the country.

The act, thus far, has not resulted in a significant number of First Nations gaining access to clean water. However, there are signs that things are moving in the right direction.

The legislation, among other things, requires First Nations to develop source water protection plans. To assist with this, Aboriginal Affairs and Northern Development Canada (AANDC) and Patrick developed a source water protection planning toolkit and piloted it with an Alberta First Nation. Following the pilot project, two other First Nations—another in Alberta and one in Saskatchewan—have completed source water protection plans.

"Identifying risks and mitigating those risks is an important first step to safe drinking water. Plan making is very empowering for any community," said Patrick, who was involved in all of the plans and reports their success.

He questions, however, the efficacy of the government's outreach to First Nations, noting that the toolkit's planning template is merely a link on the AANDC website, and wonders if First Nations have the time and capacity to develop these plans on their own.

No end in sight

Hill said she isn't confident that the federal government will offer much financial assistance to her community, but other economic development ventures, like a partnership with Korean electronics giant Samsung, could generate the funds required to build a permanent solution to Six Nations' water problem.

When asked if her efforts to bring her community clean water will be enough, the chief said, "I'm always optimistic." WC

Matt Moir is a freelance writer who has worked as a journalist for the CBC, CTV, and QMI Agency.

Uncertain Future

Natural resource governance in the Mackenzie River Valley remains a source of contention. BY QAJAQ ROBINSON AND BEN HIEMSTRA

THE GOVERNANCE OF the Mackenzie Valley remains a source of contention, even four decades after Justice Thomas Berger was tasked with heading the Inquiry to investigate the impact of the proposed Mackenzie Valley Pipeline. The inquiry took place before the Aboriginal land claims in the valley were settled, and one of Berger's central recommendations in his renowned report, Northern Frontier, Northern Homeland, was to address these claims before constructing a pipeline.

Many of the First Nations of the valley now have comprehensive land claim agreements with the Crown. These agreements, along with the *Mackenzie River Resource Management Act*, established four land and water boards, with each board exercising jurisdiction over portions of the Mackenzie River Valley. These land and water boards include the Gwich'in Land and Water Board, the Sahtu Land and Water Board, the Wek'èezhìi Land and Water Board, and the Mackenzie Valley Land and Water Board. All of them govern and regulate the use of land and water in their respective jurisdictions through the consideration and issuance of Land Use Permits and Water Licences.

The Government of Canada recently passed legislation to amend the *Mackenzie Valley Resource Management Act* (MVRMA). This was done through the Northwest Territories *Devolution Act*, which received Royal Assent on March 25, 2014. These amendments to the MVRMA, once in force, will amalgamate the four boards into a single management board for the Mackenzie Valley. This legislation has faced fierce criticism from the Tłı̨chǫ Government, who has in turn launched legal proceedings against the Government of Canada questioning the constitutionality of the *Devolution Act*.

On February 27, 2015, in the decision *Tłı̨chǫ Government v Canada (Attorney General)*, 2015 NWTSC 9, Justice Shaner of the Northwest Territories Supreme Court granted the Tłı̨chǫ interlocutory injunctive relief, thus delaying the Government of Canada from enacting these major structural changes to the resource management system in the Mackenzie River Valley.

> The recent court decision raises the spectre of regulatory uncertainty in an area that is evolving quickly.

At issue in this action is the Tłı̨chǫ's Wek'èezhìi Land and Water Board This board has jurisdiction over the

Wek'èezhìi Management Area, and was established to fulfill the Land Claims and Self-Government Agreement Among the Tłı̨chǫ and the Government of the Northwest Territories and the Government of Canada (the "Tłı̨chǫ Agreement"). This is a modern treaty protected through Section 35 of the *Constitution Act*, 1982.

The WLWB consists of four members and a chairperson, and two of the four members are appointed by the Tłı̨chǫ. However, if the amending provisions are permitted, the WLWB will cease to exist, and the Tłı̨chǫ will only have the authority to appoint a single member out of the new 10-member board that will manage the entire Mackenzie Valley.

The court found that the Tłı̨chǫ were entitled to injunctive relief because they had successfully established that:

1. there was a serious issue to be tried;
2. it would suffer irreparable harm should it not obtain the interlocutory relief; and
3. the balance of convenience and public interest favoured the relief.

Further, the court held that in order for the protection of constitutional rights to be meaningful, the courts must have the ability to ensure the enforcement of those rights. As such, it would be harmful if injunctive relief was not available to courts as against the Crown.

In reaching its decision the court found that although the federal government underwent a consultation process in advance of the amendments, irreparable harm would be done if the consultation was not conducted according to the Tłı̨chǫ Agreement and if the Tłı̨chǫ were subsequently restricted to the more limited role under the new management structure.

As a result of the decision, until a final determination is made in this action, the status quo will remain in the management and governance of the Mackenzie River Valley under all four existing boards, not just the WLWB. The federal government has appealed this decision.

This decision raises the spectre of regulatory uncertainty in an area that is evolving quickly. Eventually the court will determine whether an amalgamation of the boards is constitutionally sound with respect to Aboriginal Treaty rights protected under Section 35 of the *Constitution Act*, 1982 and the Crown's "Duty to Consult." However, it remains to be seen how the court will resolve the uncertainty with respect to regulation by the water board(s), which currently casts a shadow over Canada's most impressive river valley. WC

Qajaq Robinson is an associate at Borden Ladner Gervais LLP. Ben Hiemstra is an articling student at Borden Ladner Gervais LLP.

Credit: Chris Huggins via Flickr

Areas like the Peace-Athabasca Delta, the Lower Mackenzie River, and the watersheds of Northern Ontario are often under-protected and under-regulated.

Under-Protected

Conservation efforts struggle to keep up with development in Canada's remote watersheds.

BY JOSHUA RAPP LEARN

CANADA'S SIZE has sometimes been a blessing when it comes to maintaining the quality of watersheds brimming with biodiversity. But as mining, energy, and forestry interests continue to push into new frontiers, the very remoteness of some areas could lead to inadequate conservation and protection measures for aquatic ecosystems.

"There are networks across Canada, but the concentration and focus of monitoring efforts has usually been where people are: high-density human population areas," said Cindy Chu, an ecology researcher at the University of Toronto. After comparing data from 1996 with data compiled between 2006 and 2008, she found that some of the major stresses on aquatic ecosystems were warming climate and mining and forestry industries expanding northwards. She and her team of researchers overlaid these patterns on top of freshwater biodiversity data across the country and found that many of the country's most biologically diverse watersheds are in the warmer and most heavily populated areas like Southern Ontario.

Yet whole areas like the Peace-Athabasca Delta, the Lower Mackenzie River, and the watersheds of Northern Ontario have diverse ecosystems that often go under-protected and under-regulated.

Diversity hotspots

One of the problems, Chu said, is that existing regulation only sets out to tackle problems on a site-by-site basis without looking at bigger ecosystems.

"If you are really concerned about conserving freshwater fish biodiversity, you have to think more watershed scale because that can include the downstream effects of whatever local activity you found," she said.

Robert Stewart, an associate professor in the Faculty of Science and Environment Studies at Lakehead University, has similar concerns with the regions in which he specializes: Lake Superior and Northern Ontario watersheds.

"Certainly we don't have both the government agencies and the research capacity to understand water quality at the level of the watershed that we would like to," he said. "We're still stuck looking at aquatic systems within rivers alone or direct variables that affect them."

> "We don't know if our ecosystem is healthy and getting better or degrading and getting worse. We're a bit in the dark with the level of impacts and the level of protection."
>
> —Robert Stewart

An example of this is the federal/provincial Remedial Action Plan created by the Great Lakes Water Quality Agreement to try to address industrial pollution hotspots. Stewart said the aging program likely won't be updated until its mandate to fix pollution hotspots is complete. "We're stuck in the middle of an older program that in the government's eyes needs to get wrapped up before moving into the modern context of lake-wide ecosystem-scale management."

A clearer future?

Chu said there are signs federal and provincial governments are catching up by "expanding monitoring on climate, hydrology, and biodiversity to more remote watersheds." Examples she listed in Ontario include the biodiversity baseline inventories in the province's monitoring of the far north and Environment Canada's upgrading of weather and climate monitoring networks, among other things.

In Alberta, where Chu said watersheds like the Peace-Athabasca are being affected by expanding development, a spokesperson from the province's Environmental and Sustainable Resource Department pointed out new commitments like the Lower Athabasca Regional Plan and a biodiversity framework for the area currently being drafted.

Melanie Quesnel, a media relations advisor with Environment Canada,

said "the expansion of natural resource development in northern and relatively uninhabited areas, such as in the Peace-Athabasca region of northern Alberta, has led to the need for a more comprehensive understanding of the potential cumulative environmental impacts."

She added that the government establishment advanced monitoring systems for the oil sands region around the Peace-Athabasca, which "openly and transparently provides the public with detailed monitoring results."

But this is not to say that all old regulation was bad. Stewart said that, in some ways, the government is actually moving in the opposite direction in terms of monitoring and environmental protection. He referenced the *Navigation Protection Act* (NPA) of 1882, which protected many waterways in Northern Ontario from things that would impede the ability to navigate on them. But the federal government eliminated much of this protection by amending the act in 2012, saying that the environmental assessment (EA) process should take care of any concerns.

Stewart isn't so sure this will be the case.

"In my opinion, there is a dramatic and concerning difference between an absence of impacts due to restricting development under the NPA, and using a highly criticized and biased EA process to ensure that social, ecological, and economic impacts are minimized in hydro development," he said.

The amount of small hydroelectric project proposals that have popped up since 2012 has proliferated, for example, "which poses tremendous impoundments and impairments to rivers and streams," Stewart added.

"We are moving toward different types of development that don't correspond with the appropriate type of protection or cautionary management."

He also said assessing "emerging problems in the Lake Superior basin is hindered by a general lack of government scientist positions," citing Fisheries and Oceans Canada's closure of their Thunder Bay office as well as the fact that the Ontario Ministry of the Environment and Climate Change only has a handful of staff members for the entire northern shore.

While some of this may sound gloomy, there isn't necessarily a crisis on our hands, Stewart said. But if there is one, we may not even know it due to a lack of mechanisms for monitoring and protecting watersheds.

"We don't know if our ecosystem is healthy and getting better or degrading and getting worse," he said. "We're a bit in the dark with the level of impacts and the level of protection." WC

Joshua Rapp Learn is a Canadian journalist based in Washington DC.

Community Effort

We must come together to support climate change champions.

BY PIERRE-ANDRÉ CÔTÉ AND HIRAN SANDANAYAKE

TODAY, we all have to rethink our ways of doing things because of fiscal constraints with respect to infrastructure and the need for climate change adaptation.

One of the main goals of the 2015 United Nations Climate Change Conference from November 30 to December 11 in Paris, France is to move faster toward climate change adaptation. This is urgent because inaction could become much more costly and greatly impact our economy. Moreover, potential impacts on public health are projected and the environment could suffer irreversible damage.

In the water and wastewater sectors alone, many domains (such as water quality, flooding, emergency management, asset management, and more) have a definite link with climate change. Climate change and extreme weather events are increasingly showing us that specialists from various domains—both within and outside of the water and wastewater sectors—have to come together, create a dialogue, and leverage each other's expertise to identify the best sustainable solutions for our communities and to move efficiently in that direction.

In recent years, Canadian Water and Wastewater Association (CWWA) initiatives have focused on bringing the message of action and interdisciplinary collaboration to real, concrete solutions—not only for water and wastewater utilities, but also for the communities they serve. Community education and participation are critical when dealing with an issue whose impacts refuse to be constrained by our notions of sectors or disciplines.

The importance of communities was highlighted by Paris Mayor Anne Hidalgo, when she stated that communities have an important role to play with respect to climate change since cities will host two-thirds of the world's population and generate 70 per cent of its greenhouse gases by 2050.

Supporting climate change champions is one approach to helping communities. These champions have already acted in their various roles to promote climate change adaptation, they have positive experiences and messages about adaptation successes, and they can guide other communities toward increasing resilience. These champions are catalysts who can stimulate action in our communities. They could be community members or elected officials who will help to communicate the need for adaptation in their own ways.

The CWWA climate change committee has been developing initiatives to do our part to promote adaptation and stimulate action. Some of our recent and ongoing initiatives include:

- Developing a resource databank our members can consult when looking for tools, research, data, guidance, and case studies related to:
  - Climate change adaptation in the water and wastewater sectors, and
  - Community education and participation;
- Reaching out to the climate change champions in our communities to develop ways to support their efforts; and
- Including a sustainability and climate change stream in this year's National Water and Wastewater Conference in Whistler, British Columbia from October 25 to 28, which will also include an extreme events and emergency management session.

There is no time to lose. Municipal water and wastewater utilities must work with their communities to adapt to climate change. Climate change will impact water throughout its entire cycle from its source, to the community, and back to the environment. WC

Pierre-André Côté, D.Sc., is a chemist, Sherbrooke University professor, and member of CWWA's climate change and drinking water quality committees. Hiran Sandanayake, P.Eng., is a senior water resources engineer with the City of Ottawa and chair of CWWA's National Committee on Climate Change.

AWARDED

Paul Smeltzer

Paul Smeltzer, P.Eng., director of water and wastewater services for the Niagara Region in Thorold, Ontario, was named a Top Ten Public Works Leaders 2015 in North America, one of just two Canadian Public Works Association members to receive the honour this year.

Smeltzer has 30 years of public works experience, and will receive his award at the American Public Works Association 2015 International Public Works Congress and Exposition in Arizona this summer.

IN MEMORIAM

On April 9, 2015, **Gord Anderson** of the Canadian Water Quality Association (CWQA) passed away in Calgary. Gord had a long career in the water sector, beginning his plumbing career with Anderson Plumbing, and eventually co-owning Aqua Soft Water Service and Alberta Sheet Metal. He was a lifetime member of the CWQA. We offer our condolences to his friends and family.

APPOINTED

Jim Lauria

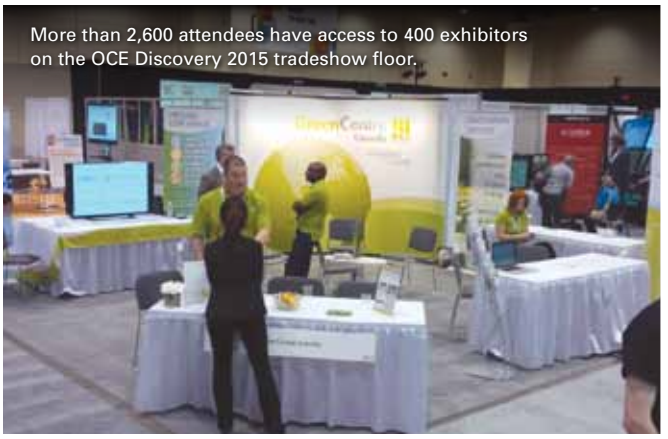
Fluid processing solution manufacturer Mazzei Injector Company, LLC, of Bakersfield, California, has named **Jim Lauria** as VP of sales and marketing. Lauria has been active in the water and wastewater industry for more than 15 years, and has published articles in numerous water industry publications.

"Mazzei is solving complex water and wastewater issues, and my goal is to have Mazzei's fluid technology utilized by water and wastewater experts throughout the world," Lauria said.

Vicky J. Sharpe

Quality Urban Energy Systems of Tomorrow (QUEST) announced in late March the appointment of **Vicky J. Sharpe** to its Board of Directors. Sharpe is the founding president and CEO of Sustainable Development Technology Canada (SDTC), which she built into an internationally recognized global cleantech fund. She is also a senior fellow at the International Institute for Sustainable Development (IISD), and has served as president of GRI Canada and Astral Group, and VP of Ontario Hydro International.

Credit: Actual Media



More than 2,600 attendees have access to 400 exhibitors on the OCE Discovery 2015 tradeshow floor.

Credit: Melanie Lang

Ontario Premier Kathleen Wynne addresses OCE Discovery 2015 attendees during the conference's opening remarks.

OCE Discovery Toronto, ON

Ontario Centres of Excellence (OCE) held its 10th annual Discovery conference at the Metro Toronto Convention Centre on April 27 to 28. The conference aims to showcase leading-edge technologies, best practices, and research in the Province of Ontario.

On April 28, the Clean Water For All: Not a Drop Too Soon panel was moderated by **Brent Wootton**, interim CEO at WaterTAP. Panelists included **Yu-Ling Cheng** of the Centre for Global Engineering and the University of Toronto; **John Coburn**, managing director of XPV Capital; **Adam Doran**, VP of marketing and sales with Aclarus Inc.; **Irene Hassas**, director of strategic partnerships and government relations at Newterra; and **Will Stefan**, CTO and VP of engineering at Clearford Systems Inc. The panel touched on Ontario's role as a growing global hub for water innovation, and discussed the difficulty of confronting issues, like drought and water scarcity, while maintaining an emphasis on economic viability and environmental sustainability.

Credit: ESAA

WaterTech 2015 delegates enjoy the mountain air at the AGAT Labs/ESAA reception at Nakiska.

WaterTech 2015
Kananaskis, AB

Three hundred delegates made their way to the scenic Delta Lodge in Kananaskis Country, Alberta for the Environmental Services Association of Alberta's (ESAA) 8th annual Water Technologies Symposium from April 20 to 22.

Touted as having its "strongest technical program to date," this year's symposium included 15 industry-leading exhibitors, student poster sessions, and three keynote speakers: **Bob Sandford**, the EPCOR Chair of the Canadian Partnership Initiative in support of United Nations "Water for Life" Decade, **Bob McDonald**, host of CBC Radio's Quirks and Quarks, and **Philippe Cousteau, Jr.**, prominent environmental leader.

The symposium kicked off with special sessions on oil sands and an opening wine and cheese reception. The remaining two days of the conference consisted of technical sessions focused on a variety of topics including groundwater, modelling, wastewater treatment, pipelines, and wetlands.

In his opening keynote on hydroclimatic change, Sandford roused the crowd when he said, "The real urgency resides in recognizing that our nature's hydrology is changing. Sustainable development is not enough. What we need is restorative development."

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

Credit: Partners in Project Green, TRCA

Jon Dwyer, energy innovator and expert, Karen Clarke-Whistler from TD Bank Group, and Michael "Pinball" Clemons from the Toronto Argonauts Football Club discuss "Succeeding Against All Odds" at PPG's spring networking reception.

Credit: Partners in Project Green, TRCA

More than 240 people gather to celebrate PPG's results from 2014 and hear from engaging speakers at their spring networking reception.

Credit: Toronto and Region Conservation Authority

L-R: Cher Mereweather, Provision Coalition; Mike Bechard, Region of Peel; Muaz Nasir, City of Toronto; and Anne Medcof, WaterMark Solutions.

Credit: Toronto and Region Conservation Authority

Jay Mullin from Bloom Sustainability Centre overviews lessons learned in water re-use applications for wine manufacturers.

Partners in Project Green Water Re-Use Workshop and Annual Spring Networking Reception Toronto, ON

On March 18, Partners in Project Green (PPG) held their Water Sustainability Skills Lab focussed on Water Re-Use in the industrial manufacturing sector. More than 65 participants heard case studies from BLOOM Sustainability Centre and Coca-Cola Canada, and from industry experts, Watermark Solutions, Toronto Water, Region of Peel and Provision Coalition, on how to approach implementing large water conservation and re-use initiatives in their facilities.

PPG hosted their annual spring networking reception on April 9 where they unveiled their annual report (*bit.ly/PPG2014*) highlighting the achievements of their members in 2014. For the PPG Water Stewardship team, this included working directly with members to achieve 58.2 million litres in annual water footprint offsets and having members report an additional 125.5 million litres in offsets for a total of 183.7 million litres in 2014. The theme of the event—Succeeding Against all Odds—featured **Karen Clarke-Whistler** from TD Bank Group, **Jon Dwyer** from Harvest Specialty Mills, and **Michael "Pinball" Clemons** from the Toronto Argonauts Football Club.

OOWA Annual Conference and Trade Show Niagara Falls, ON

The Ontario Onsite Wastewater Association held its 16th Annual Conference and Trade Show. The focus of this year's conference was on highlighting industry-wide best practices. Presentations and moderated panel discussions addressed technical issues pertaining to servicing, installing, regulating, and inspecting private onsite systems. The sustainability and affordability of decentralized wastewater treatment systems for rural communities was also explored in a number of sessions and in a featured panel discussion. Special guest MPP **Glenn Thibeault** presented OOWA's industry awards to a number of innovative OOWA members.

Credit: OOWA

Parliamentary assistant to the Minister of the Environment and Climate Change Glenn Thibeault (left) presents Don Krauss of Infiltrator Systems with the Corporate Industry Steward Award with OOWA president Rick Esslement (right).

Connecting Water Resources 2015

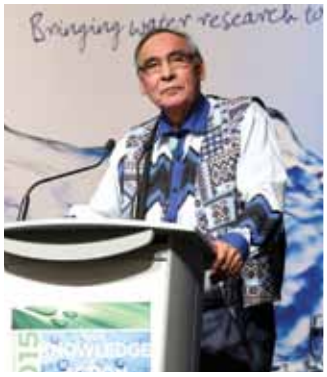
Ottawa, ON

The Canadian Water Network's Connecting Water Resources (CWR) 2015 conference took place in Ottawa from March 10 to 12, 2015. The biennial conference attracted water professionals from across Canada, and featured speakers from several countries, including South Africa, the Netherlands, and Singapore.

Each morning of the conference began with a lively plenary panel session, featuring perspectives from Canada and abroad. After opening panels on days one and two, participants chose between concurrent breakout sessions following the three conference tracks: Blue Cities: Moving to the Systems We Need; Resource Development & Agriculture: Securing Our Future; and Small and Aboriginal Communities: Solutions that Fit.

Keynote addresses were delivered by former NDP and Liberal politician **Bob Rae** and Ontario Lieutenant Governor **Elizabeth Dowdeswell**, and CBC Radio host **Terry O'Reilly** spoke at the banquet dinner.

The conference's theme, From Knowledge to Action, was emphasized throughout the three-day event, with presenters offering ideas and experiences relevant to Canada's many water challenges.



Elder Gordon Williams from Peguis First Nation in Manitoba sets the stage for the conference.

Credit: Neil Wards Photography

L-R: Carl Yates, Halifax Water; Margaret Catley-Carlson, Global Water Partnership; Cecelia Brooks, Assembly of First Nations Chiefs and Canadian Rivers Institute; Beverly Yee, Alberta Municipal Affairs.

L-R: Charles Vörösmarty, CUNY Environmental CrossRoads Initiative; Harry Seah, Public Utilities Board, Singapore; Patricia Mulroy, Desert Research Institute; Jean-François Barsoum, IBM Canada.

L-R: Brent Paterson, Paterson Earth and Water Consulting; Carl Weatherell, Canada Mining Innovation Council; Christa Seaman, Shell Canada.

Bob Rae, former politician and senior partner at Olthuis Kleer Townshend LLP delivering the opening keynote address.

Margaret Catley-Carlson with a group of students and young professionals.

The Honourable Elizabeth Dowdeswell, Lieutenant Governor of Ontario, closed the conference with a call to action.

Delegates ask questions after a TRIECA presentation.

Credits: Yuvetta David

Speakers held the attention of nearly 600 attendees.

Rachel Phan, editor of Water Canada, and Yena Ahadzie of Dillon Consulting.

TRIECA 2015 Brampton, ON

Toronto and Region Conservation Authority (TRCA) and the International Erosion Control Association (IECA) celebrated the fourth year of the TRIECA conference. TRIECA is Ontario's premier stormwater and erosion and sediment control conference, bringing together some of North America's leading experts, influential leaders and distinguished research partners in one event. From March 25 to 26, nearly 600 attendees gathered together to hear the latest technological innovations, case study findings, innovative solutions, and academic research surrounding stormwater and erosion and sediment control, presented by renowned speakers from throughout North America and the Netherlands. In conjunction with the presentation sessions, the conference also included an industry trade show of more than 50 exhibitors providing delegates the opportunity to speak directly with representatives from a variety of leading industry organizations. Alongside the exhibitors, select university students from across Canada were given the opportunity to present their research to the captive audience. Preparations are already underway for TRIECA 2016. *For more information, including exhibitor and sponsorship opportunities, please visit trieca.com.*

Credit: Meg Olson

L-R: Kerry Freek, WaterTAP Ontario; Mark Mattson, Lake Ontario Waterkeeper; Dan Pujdak, Chiefs of Ontario; Derek Gray, Greater Toronto Airports Authority; Ryan Ness, Toronto and Region Conservation Authority; and Lisa Prime, Waterfront Ontario.

CWRA Panel Toronto, ON

The Ontario Branch of the Canadian Water Resources Association (CWRA) celebrated World Water Day 2015 by hosting a panel discussion on water and sustainable development. The event was held in Toronto at the Textile Museum of Canada. **Kerry Freek** of WaterTAP Ontario moderated a spirited and engaging conversation with panelists **Mark Mattson** of Lake Ontario Waterkeeper, **Dan Pujdak** of Chiefs of Ontario, **Derek Gray** of the Greater Toronto Airports Authority, **Ryan Ness** of the Toronto and Region Conservation Authority, and **Lisa Prime** of Waterfront Toronto. The panel provided a diverse range of perspectives regarding the meaning of water and sustainability. Panelists agreed on the need for improved decision-making processes to better guide sustainability policy and infrastructure decisions affecting water. This included discussion of new models for public consultation that provide meaningful opportunity for social engagement. With so many engaging discussion points, audience questions ran over into the evening reception, but plenty of time remained for fruitful networking and door prize raffles. The reception was sponsored in part by Mill Street Brewery. CWRA Ontario Branch is looking forward to hosting their fifth annual panel event to coincide with World Water Day next year.

—Meg Olson

Credit: Mare Perri of MAP Productions

L-R: Jamie Slingerland, director of viticulture at Pillitteri Estates, and Richard Linley, president of the Wine Council of Ontario.

BLOOM's Water & Wine Platform Launch Beamsville, ON

On March 24, Ontario's wine industry gathered at Peninsula Ridge Estates to talk about one thing: making sustainable winemaking a reality in Ontario. Wineries, government, technology providers, and industry associations all committed to a common cause.

The occasion marked the launch of Water & Wine, BLOOM's practical, online platform for winery's water needs. Based on a two-year study of Ontario's wine region, Water & Wine is a platform built to show wineries the path to water efficiency.

"I wish this material was available sooner. If I had this information I could have saved a lot of time and money when we started monitoring water use," said **J-L Groux**, a winemaker from Stratus Vineyards.

For more information, go to waterandwine.ca

For Shale

The natural gas industry is an important driver of Canada's economic growth.

BY GEOFF MORRISON

The debate over fracking rages on in Canada.

NORTHEASTERN BRITISH COLUMBIA'S population and economy are projected to grow over the next decades, with the natural gas industry as an important driver of economic growth.

Water use by all sectors—municipal, commercial, and industrial—is expected to increase as a result, making the management and responsible use of this important resource all the more important.

The Northeast Water Strategy, a framework for water use and management released by the British Columbia government, is an important step in this direction, because it seeks to ensure the continued sustainable use of this important resource by all sectors in the region.

It is also incumbent on our industry, one of the major water users in northeastern British Columbia, to continue using water responsibly and to be transparent about how we use water in hydraulic fracturing operations.

Natural gas wells drilled in northeastern British Columbia are typically fractured in several stages. Depending on the geology and reservoir characteristics, this can require 5,000 to 100,000 cubic metres of water per well. A well is typically only fractured once and will produce for up to 30 years.

While 100,000 cubic metres of water is a large volume, it's important to put our industry's total water use into perspective. British Columbia government data shows water use by all industries and communities is small compared to the total amount of surface water in the region and represents 0.05 per cent of mean annual flow of all rivers in the region.

British Columbia's oil and natural gas sector was approved for about 20 million cubic metres of surface water per year through water licence allocations in 2014. Actual use was much less. An additional 11.3 million cubic metres was approved for short-term water use, of which less than half, or 5.3 million cubic metres, was actually used for hydraulic fracturing.

Our industry believes in water protection and using water responsibly is a priority.

Examples of how we do this include recycling flowback water from hydraulic fracturing operations, use of saline groundwater or low quality non-saline water not fit for human consumption, and use of recycled municipal wastewater. About 30 per cent of the water used for hydraulic fracturing in British Columbia comes from non-freshwater sources, including flowback reuse, recycled municipal waste water, and saline groundwater. Wastewater that cannot be reused is stored in deep disposal wells that are subject to strict government regulations and have been safely used in Canada for many decades.

Our commitment to responsible water use is detailed in the industry's hydraulic fracturing operating practices. For example, one practice outlines the steps, which are also a regulated requirement, natural gas producers take to ensure drinking water sources are protected through sound wellbore construction: several layers of steel and cement must be in place to prevent anything travelling through the wellbore from coming into contact with drinking water aquifers.

Below ground, natural barriers also help prevent fracturing fluids from coming into contact with geological zones containing drinking water.

Drinking water aquifers tend to be within 300 metres of the surface, while shale formations containing natural gas typically sit two to three kilometres below ground. Fissures created by hydraulic fracturing extend 50 to 100 metres from the horizontal leg of the wellbore where hydraulic fracturing takes place. In other words, the fissures are separated from formations containing freshwater aquifers by thousands of metres of impermeable rock, the weight of which is so great it limits the vertical length of the fractures.

Robust regulations and the application of best operating practices have led to an exemplary safety record: over the past 60 years, more than 215,000 wells have been hydraulically fractured in British Columbia, Alberta, and Saskatchewan without a demonstrated impact on drinking water, according to regulators.

Nonetheless, our industry can and should seek to improve from a sound baseline of experience. Where areas for improvement are identified, we expect industry to listen to local concerns and to change operating practices according to scientific evidence. In these cases, we also expect regulators to strengthen regulations. This has always been the case.

British Columbia's and Canada's economic strength and prosperity, and maintaining our valued public services, rest on our ability to develop and market our natural resources. We should be proud of our natural gas and oil potential, and we should be proud of the safe and responsible manner in which these resources are developed. WC

Geoff Morrison is the manager of British Columbia operations at the Canadian Association of Petroleum Producers.

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