2019 Municipal Consortium Update MAY 2020

A nationwide collaboration to advance municipal water management

Canadian Water Network's
Canadian Municipal Water Consortium

For more information about becoming a member of the Canadian Municipal Water Consortium or details on any of the resources described in this update, contact Sandra Cooke, Director, Municipal Consortium at scooke@cwn-rce.ca or (519) 888-4567 x39357.

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Message from Canadian Water Network

This summary of the work of the Canadian Municipal Water Consortium in 2019 is receiving final edits in April 2020, in the midst of exceptional changes in the world resulting from the novel coronavirus pandemic. There is no doubt what is happening now will alter how we all function in the world going forward. The current crisis highlights essential community services; those who ensure we have safe and effective water, wastewater and stormwater services are prominent among Canada's frontline heroes.

As I look back on the work done by the Municipal Consortium in 2019, it strikes me that much of that work has been well placed to support a sector that is looking to build on its connections to communities, offer greater coordination and support evidence-informed decisions. The municipal water management sector in Canada is increasingly moving the industry to where it needs to be to support the challenges of becoming more resilient as a society to major impacts going forward. It is not only about climate change impacts, but about being resilient to the many other unknowns that will challenge us going forward. This current crisis brings challenges to water management, but will likely also accelerate a new way of functioning.

The water leaders who comprise the Consortium's Leadership Group continue to articulate national priorities that better define the sector's knowledge and decision needs. This group has grown steadily over the past few years, and we are looking at ways to expand on the value generated for the overall sector by bringing in perspectives from mid-size municipalities, academia and industry to accelerate, advance and improve municipal water management across Canada.

CWN will continue to be agile in 2020 in response to sector trends and will move the Consortium ahead in areas of strategic focus that strongly support CWN's core goals:

- Enabling resilient, adaptable and strong communities by leveraging the co-benefits of water-management
- Establishing water as Canada's gateway issue to addressing broader challenges like climate change, resilience and sustainable resource management
- Moving Canada to an evidence-informed, effects-based approach to prioritizing risks, investments and actions

These high-level goals continue to frame the Consortium's work plan, even as we help support the sector to address the challenges during and after a pandemic. The goal is to enable the water management community to be vigilant in the areas critical to success going forward: adapting to new industry realities, managing uncertainty, building resilience, working across silos, addressing inequality and public engagement. I am pleased to share the following update on some of the initiatives CWN has completed or commenced in 2019, as well as our plans for 2020 and beyond as we work to accelerate, advance and improve water management decisions. We continue to adapt to the needs of our greater community and look forward to serving during 2020.

Bernadette Conant

CEO
Canadian Water Network

About the Consortium

The Canadian Municipal Water Consortium connects utilities, municipalities, researchers, industry, government and other organizations to address Canada's municipal water management challenges.

Each year, the Consortium undertakes national initiatives that accelerate, advance and improve municipal water management decisions. Consortium members contribute to, or collaborate on, these national initiatives and also exchange knowledge with peers, expand their network of contacts, and access leading knowledge.

As a trusted broker of insights for the water sector, Canadian Water Network facilitates the Consortium's activities and extracts valuable knowledge that can accelerate policy and practice improvements in water, wastewater and stormwater management.

Consortium Leadership

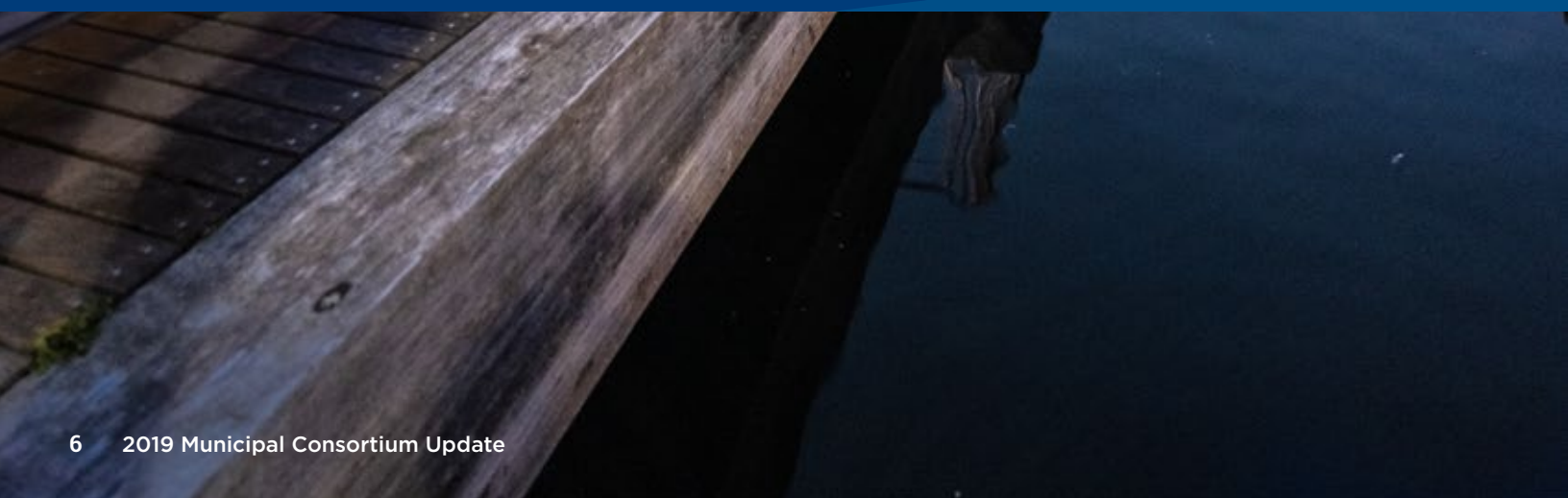
Setting goals and charting a clear course is critical to advancing progress in the complex, multi-stakeholder world of water management. The Consortium is advised by a group of leading senior decision-makers from progressive municipalities and utilities across the country. Together, they identify key challenges and priorities to help direct the Consortium's initiatives. Their willingness to invest in the Consortium ultimately results in better outcomes for the water sector as a whole.

Members of the Consortium's Leadership Group (CLG) provide water, wastewater and stormwater service to more than 56% of Canadians. These member utilities have varying populations, settings and practices; are both publicly- and privately-operated; implement a range of governance models; and bring a wealth of diversity and insights to how water is managed in Canada. The members all share a common goal: to accelerate, advance and improve water management in Canada.

Alberta Capital Region Wastewater Commission
Calgary
CRD Making a difference...together
Durham Region
Providing More EPCOR
City of Guelph
Halifax Water
Halton Region
Hamilton Water Water is Life
metrovancouver Services and Solutions for a Livable Region
Montréal
OCWA Ontario Clean Water Agency Agence ontarienne des eaux
Ottawa
Region of Peel Working for you
Ville de Québec
City of Regina | Regina Infinite Horizons
Toronto
Union Water Supply System
Utilities Kingston
City of Vancouver
Region of Waterloo
York Region

Delivering Decision-Ready Knowledge

In 2019, the Consortium delivered five significant projects that accelerate, advance and improve water management on a national scale.



CASE STUDIES:

Using Data to Identify Infrastructure Vulnerabilities to Climate Change

PROJECT PARTNERS: PSD Inc., Federation of Canadian Municipalities, Canadian Water & Wastewater Association

Download the report at: **cwn-rce.ca/infrastructure-vulnerabilities-to-climate-change**

CWN partnered with PSD Inc., the Federation of Canadian Municipalities (FCM) and the Canadian Water and Wastewater Association (CWWA) to prepare case studies of five Canadian municipalities that are collecting and using data to determine the vulnerability of their water infrastructure to extreme weather events. Each case study provides an overview of the potential impacts of climate change and discusses the types of data being collected, how it's analyzed and used to inform decisions, as well as actions that have been taken to increase system resiliency. Some case studies creatively used unconventional data to complement traditional asset information to build a more complete picture. The municipal roadmap at the end of each case study was designed to highlight relevant points for other municipalities that are considering how they might implement similar strategies in their own context.

- Kenora, Ontario: Asset Risk Assessment
- EPCOR/Edmonton, Alberta: Flood Mitigation and Mapping
- Moncton, New Brunswick: Flood Mitigation and Neighbourhood Vulnerability Assessment
- Saskatoon, Saskatchewan: Grey and Green Infrastructure Adaptation
- Union Water Supply System, Ontario: Drinking Water System Vulnerability Assessment

This project built on previous work by CWN, PSD and CWWA. The 2018 report, *Leveraging Asset Management Data for Improved Water Infrastructure Planning*, was based on information collected from asset and water system managers from 58 municipalities across Canada. We learned what asset data they collect, how the data is being used to support maintenance, repair and replacement decisions, as well how these data inform investment and long-term strategic planning.

To view the 2018 report, visit: **cwn-rce.ca/leveraging-asset-management-data**

SECTOR OUTREACH

These case studies were designed to support local governments in adapting to climate change and to inspire the further sharing of knowledge and best practices. A webinar was organized, which sold out quickly and was re-broadcast on two other dates to allow broader participation. The speaker slides and webinar recording can be accessed at **cwn-rce.ca/infrastructure-vulnerabilities-webinar**.

More than 500 copies of the report have been downloaded from CWN's website. An expert panel presented the case studies at the November 2019 National Water and Wastewater Conference:

- Susan Ancel, Director of Stormwater Strategies, EPCOR Water Services Inc.
- Rodney Bouchard, General Manager, Union Water Supply System
- Anissia Nasr, Capacity Development Officer, Federation of Canadian Municipalities
- Kim Jusek, Municipal Program Manager, Canadian Water Network
- Tyler Sutton, General Manager of Research and Marketing, PSD

WHAT TO WATCH FOR IN 2020

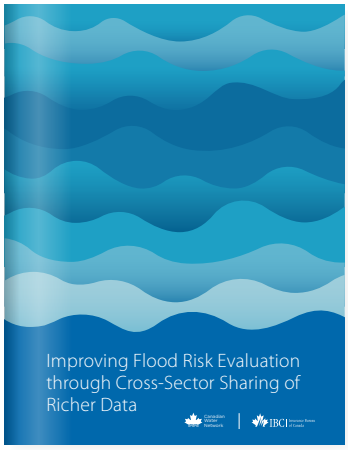
Climate change considerations for infrastructure planning and investment decisions by Canadian municipal water systems will continue to increase in importance. The case study series highlights how data can be used to create a clearer picture of infrastructure vulnerabilities, planning and investment decisions in the face of uncertainty about future conditions related to climate change impacts. CWN sees an opportune pathway to further manage uncertainty by incorporating an active consideration of multi-benefit solutions as a decision-making approach — i.e., considering options that can deliver benefits across multiple elements of society and a broad range of future conditions. CWN will continue to advance this important theme of leveraging multi-benefit solutions to support resilient and adaptable communities.

CROSS-SECTOR STUDY:

Improving Flood Risk Evaluation

PROJECT PARTNER: Insurance Bureau of Canada

Download a summary of the report at: **cwn-rce.ca/flood-risk-evaluation**

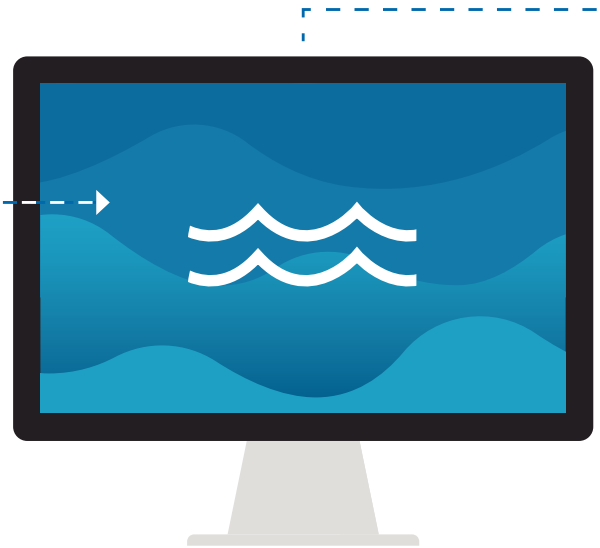


Flooding is a nationwide issue that poses significant challenges to multiple sectors, including municipalities, the insurance industry and the federal government, and requires truly collaborative solutions. In 2018, CWN and the Insurance Bureau of Canada (IBC) convened an introductory meeting to better understand what actions each sector was undertaking to address the risks posed by flooding. During this meeting, it was recognized that the standard for modelling flood risk across Canada could be strengthened to improve decision-making for all groups. Large-scale flood risk models currently rely largely on low-resolution topographical data of mixed quality, and particularly for the modelling of pluvial (urban, rainfall-based) flooding, give limited consideration to flood reduction controls such as storm sewers, dikes and dry ponds. To evaluate whether this was impacting risk predictions and management decisions, CWN and IBC initiated a comparative study in August 2018 to examine how results for pluvial hazard maps derived from large-scale risk models are different — and to what degree — when richer datasets are used.

The study wrapped up in 2019, yielding several insights and pointing to avenues for further productive work. When comparing the two types of data inputs (i.e. topographic and flood defense measures), the greatest improvement in flood risk characterization resulted from incorporating higher resolution topographic data from reliable origins, such as LiDAR-based technologies. A comparison of different topographic data resolutions used in the models found a "goldilocks" level of 5-metre grid spacing, providing the optimal resolution to evaluate municipal flooding from intense rainfall events. These results were shared at a subsequent cross-sector meeting in May 2019 and six opportunities to advance data sharing and usage were generated. A capture of this work, *Improving Flood Risk Evaluation through Cross-Sector Sharing of Richer Data*, can be accessed on CWN's website.

NEW OR IMPROVED INPUTS

- High-resolution topographic data
- Culvert, bridge and flood defense locations and dimensions
- Building footprints
- Virtual pipelines (e.g. drainage systems)



IMPROVED RISK PREDICTION OUTPUTS

- Water depth
- Water level
- Water velocity
- Hazard index values and grids

SECTOR OUTREACH

This work by CWN and IBC is providing much-needed cross-sector sharing to improve mutual understanding and clarity on how flood risks are assessed by the insurance sector and modellers. The discussions that have been held to date highlight a mutual desire to improve coordination between the insurance sector, governments and utilities.

Because flooding is an issue that spans sectors, the focus of the May 2019 meeting convened by CWN was to collectively discuss the pilot project results and determine the next steps to better enable and accelerate knowledge sharing. Seventy-four participants attended from the municipal sector, insurance sector, government organizations, research groups, flood risk modelling firms and other organizations. The objective of the meeting was to identify action items that can be started over the next year to improve the uptake of a broader set of relevant flood risk data and support better flood risk evaluations nation-wide. Discussion focused on potential mechanisms that would improve future access to and sharing of relevant data across sectors. There was strong agreement among the participants that richer data is critical to improving flood risk evaluation in Canada and that new sharing mechanisms will allow decision makers to more effectively leverage the existing and evolving knowledge base. The meeting played a key role in advancing cross-sector discussions and led to insights that have since helped shape a new project by CWN and IBC.

A capture of the study's findings was shared with the media to broaden outreach to other stakeholders. Ultimately, improving access to richer information is a significant opportunity for Canadian municipalities, insurers and homeowners to better understand flood risk and take action. Municipalities can then better identify high risk areas, prioritize investments to reduce risk, undertake mitigation and ensure better recognition and support for the value of that mitigation from the public and governments. The insurance sector can proceed with more confidence that they have appropriately and accurately-priced flood risks. Homeowners, armed with knowledge of their flood risk, can take steps to protect their property or purchase appropriate insurance.

Sample media coverage on October 1, 2019

Insurance Business Canada

'Richer' cross-sector data needed to better understand flood risks

www.insurancebusinessmag.com/ca/news/flood/ibc-richer-crosssector-data-needed-to-better-understand-flood-risks-179564.aspx

Canadian Underwriter

How this city made basement flooding risk predictions more precise

www.canadianunderwriter.ca/risk/how-this-city-made-basement-flooding-risk-predictions-more-precise-1004169793/

WHAT TO WATCH FOR IN 2020

In November 2019, CWN and IBC embarked on a new initiative to generate recommendations on the successful structuring of a Canadian Centre for Climate Information and Analytics (C3IA) as an authoritative source of climate information and decision analysis. The project will focus on the development of a made-in-Canada solution for improved knowledge sharing to advance our ability to achieve flood risk evaluation, identification and mitigation in Canadian communities.

Municipalities, federal and provincial levels of government and the insurance sector all conduct activities that involve identifying and mitigating risks posed by major storms and flooding to communities. As a result, they all hold key elements of the knowledge base needed to effectively identify and prioritize areas for action. This project will generate an approach to maximize the collective value of knowledge sources by more effectively leveraging and curating existing data — as well as the new data being generated by each sector — to better inform risk evaluation.

WEBINAR SERIES:
Changing Trends in Water Use

Download the recordings, backgrounder and summary of insights at: **cwn-rce.ca/changing-trends-in-water-use**

WINTER WEBINARS

November 21, 2018

Changing trends in water use: Managing impacts on water and wastewater operations

With guest experts:

- Simon Horsley, Water Quality Lead, Stantec
- Abhishek Bhargava, Senior Manager of Operations, Gold Bar Wastewater Treatment Plant, EPCOR
- Fernando Sacluti, General Supervisor, Infrastructure Planning Group, EPCOR
- Luke Kurach, Manager of System Condition Assessment, Drainage Department, EPCOR

Listen to the recording at: **cwn-rce.ca/changing-trends-in-water-use-operations-webinar**

February 27, 2019

Changing trends in water use: Planning and design of water and wastewater infrastructure

With guest experts:

- Nicole Sapeta, Project Engineer, Engineering and Planning Group, Region of Waterloo
- Kaoru Yajima, Civil Engineer, Water Services Division, Region of Waterloo
- Heather Zarski, Specialist, Planning, Water Distribution and Transmission, EPCOR
- Jack C. Kiefer, Senior Associate, Hazen and Sawyer
- Linda Sawyer, Senior Process Engineer, Brown and Caldwell

Listen to the recording at: **cwn-rce.ca/changing-trends-in-water-use-planning-webinar**

Municipal per capita water use is decreasing across the country, in part due to new water-efficient fixtures, updated plumbing and building codes, increased metering and changing consumer behaviour. Other contributing factors are urban densification and the closure of large water-using industries. These changes are impacting the operations of drinking water and wastewater systems, including demand forecasting, water age, corrosion, odour and utility revenue. The complexity of this issue led CWN to develop a webinar series to help utilities and municipalities make informed decisions regarding impact mitigation and planning.

The first webinar in the series focused on managing the impacts of declining water use on water and wastewater system operations, while the second webinar looked at planning and designing water and wastewater infrastructure appropriately. Some of the strategies discussed included using water quality models to assess mitigation scenarios, considering potential synergies between corrosion and odour control measures, incorporating scenario planning in demand forecasting, and ensuring the regular revision of design standards. The audio and presentation materials for both webinars were captured and archived on the website so that decision makers could revisit the insights offered. CWN created a webinar summary document that pulls together these insights and opportunities for broader sharing with utility staff and council members.

SECTOR OUTREACH

CWN webinars present leading knowledge on priority challenges in water management. Although these expert webinars fill up quickly, Consortium members are guaranteed registration. After the live event, all background documents, webinar recordings and presentation materials are posted online as a free resource for everyone in the water sector.

One hundred water professionals were able to attend each live webinar and a link to the webinar recordings was shared with an additional 250 individuals. There was widespread interest from attendees working for municipal utilities, industry and consulting, academia and government.

WEBINAR SERIES:

Managing the Impacts of Algal Blooms in Drinking Water

Download the recordings and related documents at:
cwn-rce.ca/algal-blooms-in-drinking-water

Harmful and nuisance algal blooms (HNABs) are a recurring issue for municipalities across Canada. The severity, frequency and incidence of algal blooms have increased over the past several years, even in water bodies that had not previously experienced such events. Factors like agricultural and urban stormwater runoff, rising temperatures, changing precipitation patterns, and changes to the freeze-thaw cycle are contributing to these increases.

HNABs may cause negative ecological impacts in watersheds, such as low-oxygen zones. Toxin-producing strains of algae can impact human health, causing illness or death. HNABs may also impact drinking water treatment plant operations, clogging intake screens, impeding settling processes, increasing the use of coagulant and chlorine and causing taste and odour issues. There may be the need for drinking water advisories which can impact public trust and the local economy.

CWN hosted a two-part webinar series on the strategic management of algal bloom impacts on local water sources. The first webinar focused on reducing and minimizing algal blooms in drinking water sources using holistic watershed management approaches. The second webinar considered how the impacts of algal blooms can be managed in drinking water treatment plants through the implementation of advanced treatment technologies or optimization of treatment plant processes. The audio and presentation materials for both webinars were captured and archived and can be downloaded from CWN's website.

WHAT TO WATCH FOR IN 2020

Each year CWN shapes and delivers webinars on priority water management topics. In February 2020, CWN hosted a webinar on financing water systems, green bonds and the Canada Infrastructure Bank. The costs of infrastructure repair, climate change and development are continuing to increase, while revenues decrease as a result of better water efficiency and conservation. New financing tools are needed to bridge the gap, and this webinar was an excellent opportunity to explore possible ways forward.

A recording is available on CWN's website at:
cwn-rce.ca/financing-water-systems-webinar

FALL WEBINARS

September 18, 2019

Managing algal blooms in drinking water using watershed-scale approaches

With guest experts:

- Monica Emelko, Professor, University of Waterloo; Scientific Director, *for*Water Network
- Nandita Basu, Associate Professor, University of Waterloo; Principal Investigator, Lake Futures
- Wendy Krkosek, Water Quality Manager, Halifax Water

Listen to the recording at: cwn-rce.ca/algal-blooms-watershed-management-webinar

October 16, 2019

Managing the impacts of algal blooms in drinking water treatment plants

With guest experts:

- Arash Zamyadi, Research Project Manager, Water Research Australia; Adjunct Academic Fellow, University of New South Wales
- Ron Hofmann, Professor, University of Toronto; NSERC Associate Industrial Research Chair in Technologies for Drinking Water Treatment
- Scott Bindner, Vertical Market Manager, Trojan Technologies

Listen to the recording at: cwn-rce.ca/algal-blooms-drinking-water-webinar

RESEARCH UPDATE:

Assessing the Impacts of Wastewater Effluent on Aquatic Systems

PRIMARY INVESTIGATORS: Karen Kidd, McMaster University (Project Manager); Mark Servos, University of Waterloo; Markus Hecker, University of Saskatchewan; François Gagné, Environment and Climate Change Canada

Download the report at: **cwn-rce.ca/screening-to-assess-municipal-wastewater-impacts**

Municipal wastewaters may contain hormones, pharmaceuticals and other contaminants that are not fully removed during treatment. Prioritizing actions to identify and address the most significant concerns requires the ability to efficiently screen wastewater effluents and receiving environments to determine where clear impacts are occurring. In 2013, Canadian Water Network and the Water Environment Research Foundation convened a workshop with a group of international experts to compile and prioritize a suite of elements (i.e. a toolbox) that would be effective in assessing endocrine system impacts on fish as a direct result of exposure to contaminants in municipal wastewaters.

CWN subsequently funded three studies conducted from 2013 to 2015 that were led by teams at the University of Waterloo, University of Saskatchewan and l'Institut national de la recherche scientifique. Each research team selected study locations within local watersheds, with a reference site upstream of municipal wastewater discharges and one or more corresponding downstream sites of lower or higher concern. The influents and effluents of the wastewater treatment plants (WWTPs) were tested for the presence of endocrine-active compounds. Testing of wild fish occurred at each study location. Effluents from the WWTPs were also tested in controlled lab studies with fish species, and the effects on different hormonal pathways were examined using in vitro cell bioassays. Whole fish bioassays with effluents were used to determine the potential for changes in egg production, histological alterations of the gonads, hormone production and gene expression.

The results from this project indicate that wild fish sampling, cell line bioassays and fish reproductive tests in the lab can be effective at characterizing wastewater effluent and detecting endocrine-related effects of its contaminants. Whole organism elements integrate responses to a variety of stressors and are therefore much more difficult to link to specific contaminant exposures. However, they are more ecologically relevant, reflect important changes that are more closely tied to ecosystem responses than molecular-level responses such as gene expression, and are more common endpoints in biological monitoring programs. Fish and cell laboratory-based bioassays can provide complementary information that is useful in identifying WWTPs for further study.

Media coverage

Reduction of Intersex in a Wild Fish Population in Response to Major Municipal Wastewater Treatment Plant Upgrades

pubs.acs.org/doi/10.1021/acs.est.6b05370

How Sewage Plants Hurt Fish, And How They Can Help

www.forbes.com/sites/samlemonick/2016/12/30/how-sewage-plants-hurt-fish-and-how-they-can-help/#2311ca7f752c

Sewage plant upgrade reverses 'feminized' male fish

www.cbc.ca/news/canada/kitchener-waterloo/male-fish-intersex-eggs-wastewater-study-grand-river-1.3933033

Cleaner water helps male fish again look and act like guys

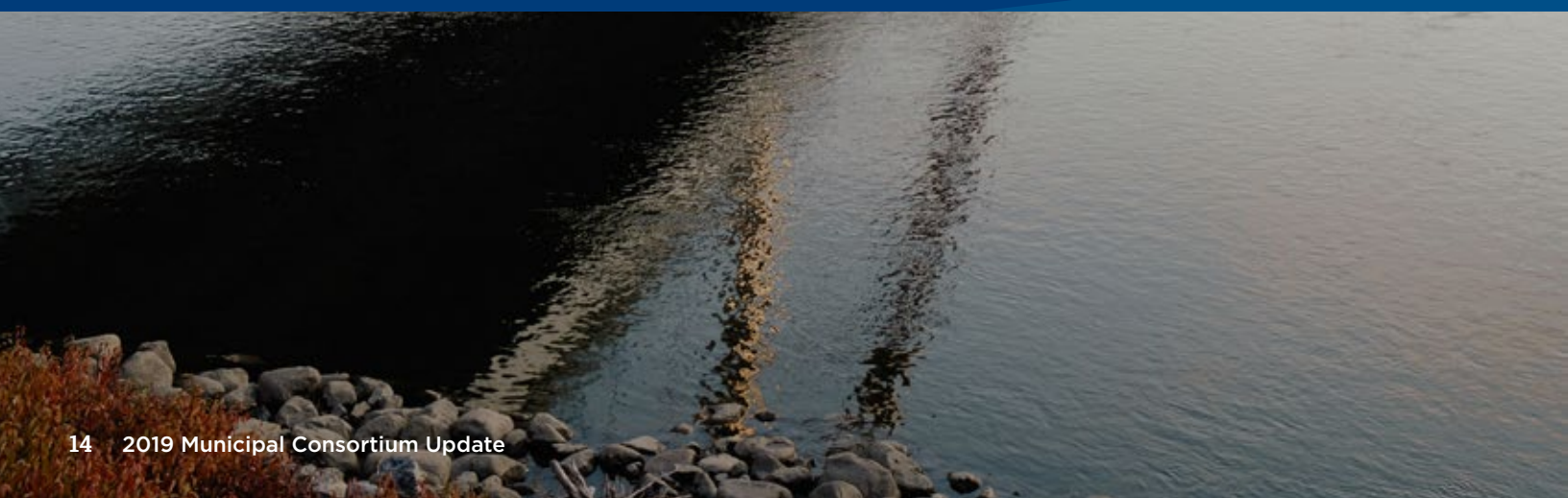
www.sciencenewsforstudents.org/article/cleaner-water-helps-male-fish-again-look-and-act-guys

SECTOR OUTREACH

In October 2019, Karen Kidd and Mark Servos were invited to present their findings to the Consortium's Strategic Sharing Group on Contaminants of Emerging Concern (see page 17). This research contributes to the conversation on the need for the water sector to move toward effects-based monitoring approaches that address the reality of complex mixtures in wastewater discharge to more effectively inform investments and actions. The insights reflected in their work were timely contributions for the municipalities participating in this Strategic Sharing Group, who are grappling with questions like: What does effects-based monitoring or biomonitoring for CECs entail? How could it be implemented to complement existing monitoring programs? How can information from effects-based monitoring inform municipal decision-making on investments and approaches to wastewater management?

Connecting People and Perspectives

Accelerating, advancing and improving water management in Canada requires collaboration. Connecting the many stakeholders involved is central to the Consortium's mandate.



Blue Cities 2019: Embracing Change in Water Management

Canadian Water Network
BLUE CITIES

Blue Cities, the Consortium's annual flagship networking event, continued to bring Canada's decision makers, knowledge providers and industry executives together to advance important conversations in municipal water management. Blue Cities 2019 focused on *Embracing Change in Water Management* and featured more than fifty expert speakers from across Canada and around the globe. Session topics included resiliency, low carbon systems, asset management, crossing the public-private divide, resource recovery, governance, innovation and new technology, emerging contaminants, affordability and financing mechanisms.

An innovative new fishbowl session format was introduced for 2019. This format allowed everyone in the room to shape the conversation and share their experiences and expertise. To begin the conversation, a round of questions was posed to a panel of guest experts. At any point, members of the audience could move into an empty chair on the panel to contribute. A skilled moderator facilitated the session and provided a final summary. This format was well received and will be used again during future Blue Cities events.

CWN was also pleased to introduce the inaugural Water Leaders of Tomorrow program, which engages the next generation of decision makers in strategic conversations on complex water challenges. Participants interacted with senior water leaders from across Canada and around the world in big picture conversations on sector priorities, innovation and opportunities to advance sustainable municipal water systems. Thanks to the support of the Consortium and Blue Cities sponsors, nine outstanding graduate students and young professionals received complimentary registration and travel support. Each participant was paired with a mentor during the event, who provided introductions and shared networking and career insights.

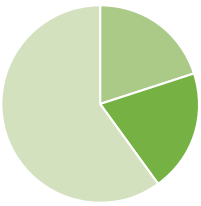
WHAT TO WATCH FOR IN 2020

Blue Cities 2020 was originally to be held on May 7-8 at the Hilton Toronto, but the event was reformatted due to the COVID-19 pandemic to Blue Cities Discussions, to be held online from June 1-4, 2020.

To view the 2020 program and speakers, visit: **bluecities.ca**

SECTOR OUTREACH

Attendees



- President/CEO/ Director 60%
- Management 20%
- Academic/ Government/ Dignitary/Young Professional 20%

Social Media Outreach

Twitter impressions
May 7-8, 2019

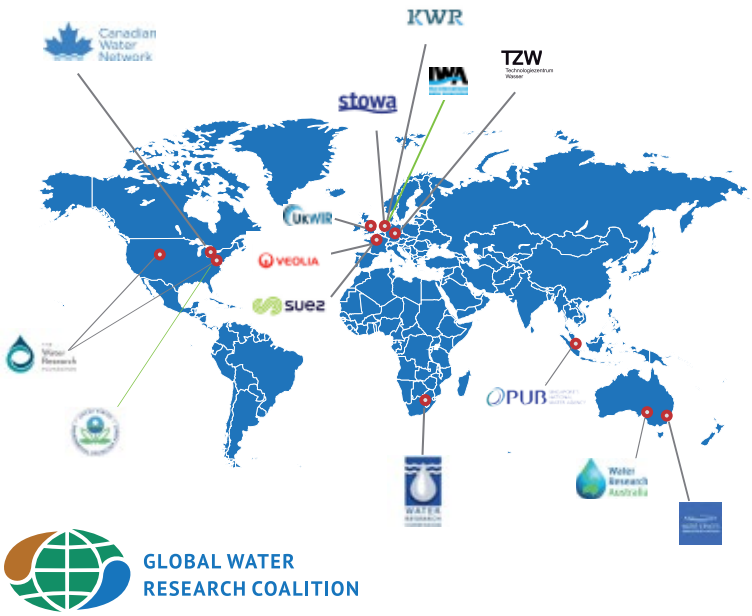
Media Coverage

nrupublishing
TORONTO • GREATER TORONTO & HAMILTON AREA

PSD RESEARCH CONSULTING SOFTWARE

WATER CANADA
THE COMPLETE WATER MAGAZINE

Global Water Research Coalition



CWN is one of 15 international organizations participating in the Global Water Research Coalition (GWRC). Member representatives shape the development of a global research agenda and disseminate leading knowledge on the urban water cycle, including water supply and wastewater issues, and renewable water resources. CWN brings Canadian knowledge and perspective to this international table and benefits from the insights of emerging international research findings. Some of the initiatives currently underway include a microplastics round robin study, antibiotic resistance knowledge hub, PFAS state-of-the-knowledge report, and projects on phosphorus recovery, effects-based monitoring and digitization. In April 2020, the GWRC launched an international platform to guide the global knowledge sharing of water research and practice around the COVID-19 pandemic.

In May 2019, CWN hosted an international meeting of the GWRC's board of directors. Following the meeting, we were pleased to provide a waterfront tour for GWRC delegates (hosted by the City of Toronto) highlighting a naturalization project at the mouth of the Don River, drinking water treatment operations and flood impacts on Toronto Island. Later that fall, prior to the GWRC board meeting in Nanjing, China, CWN attended the International Top-level Forum on Engineering Science and Technology 2019 and the 4th Singapore-Nanjing Eco Hi-Tech Island International Water Environment Management Summit, an event organized by the Chinese Academy of Engineering and supported by the International Water Association.

WHAT TO WATCH FOR IN 2020

Today's water management sector is facing increasing uncertainty about future conditions, heightened expectations about the role of water utilities in achieving community goals, and the need to develop financially sustainable solutions that support evolving challenges and expectations. In response to these challenges, water utilities have an increasing incentive to leverage research and innovation to effectively identify priorities for action and develop resilient and adaptive solutions. The drivers for investment that can inform development of these solutions varies considerably, both within and among countries. However, the need to effectively access value from research and innovation, through shared investment whenever possible, and identify the best local solutions is universal.

GWRC members have identified a need to better understand how the primary users and funders of water research and innovation activities (i.e., water utilities and governments) perceive and recognize value from research and innovation, and access appropriate metrics to measure and demonstrate this value in a way that is meaningful. In response to this need, CWN is leading a qualitative research project with GWRC members to identify how and where investments in water research and innovation provide value to water utilities and governments, and develop metrics to guide the evaluation of return on investment in water research and innovation. There will be three phases to the project:

International Trends in Water Research and Innovation Valuation

Phase 1 (2019 – 2020)
Develop a clearer picture of how water utilities in each of the respective GWRC member countries are interacting with water research and innovation. A Phase 1 report will summarize and synthesize the findings of the individual GWRC member country reports, yielding a high-level comparison of different approaches to investing in water research and innovation internationally.

Phase 2 (2020 – 2021)
Examine how water utilities and other research users in each of the respective GWRC member countries perceive, recognize and measure value from the research and innovation programs accessed by water utilities.

Phase 3 (2021 – 2022)
Examine and propose metrics for measuring value and evaluating return on investment in water research and innovation for water utilities and relevant governments.

Strategic Sharing Group: CEC Risk Management in Wastewater Discharge

Consortium strategic sharing groups provide meaningful peer-to-peer sharing opportunities on emerging issues. CWN facilitates an environment for dialogue among participating members from the Consortium Leadership Group, and where appropriate, invites leading experts to share their knowledge.

In 2018, a pilot strategic sharing group was created to focus on managing risks from contaminants of emerging concern (CECs) in wastewater discharge. The objectives of this group are to learn what work is currently underway across Canada, identify shared challenges, explore strategies for risk management and discuss best practices. Ultimately, the goal is to promote a better understanding across Canadian municipalities on how to anticipate challenges and manage uncertainty around CECs in wastewater to improve decision-making on wastewater management and investments. The participants in this strategic sharing group bring a broad range of expertise, experience and maturity in CEC management to the discussion. A range of topics has been covered, directed by the participants' interests and needs. These include discussion on risk management approaches and policies, monitoring approaches, and strategies for internal and external communications. Leading experts from Canadian universities and Environment and Climate Change Canada have contributed to the discussions.

Eleven municipalities and utilities from the Consortium Leadership Group participate on this strategic sharing group. There have been five meetings in 2018-2019, with three more meetings planned for 2020, at which time we will re-evaluate the needs for the group and the frequency of meetings. The feedback from the group has been positive, with members indicating that their participation allows a better understanding of activities taking place in other municipalities, provides a safe space to discuss and explore challenge issues, serves as an impetus to advance the conversation within their own municipality, and initiates peer connections in other cities. There is a broad recognition of the benefits to this group of staying on the leading edge of advancements in this area, particularly as regulatory oversight and practice evolves and new resources become available.

WHAT TO WATCH FOR IN 2020

As mentioned above, the CEC Strategic Sharing Group will continue into 2020. The work of this group is contributing to a baseline understanding of one of the key themes of the Municipal Consortium moving forward, prioritizing and addressing "forever/everywhere" chemicals.

Following further discussion with the Consortium members, CWN has identified a need to improve the national dialogue around "levels of service" and has identified this as a priority topic around which a strategic sharing group will be structured. Levels of service have been used historically in the context of asset management and engineering design decisions. However, service targets for water, wastewater and stormwater systems today need to be re-evaluated based on impacts (vs engineering standards), a consideration of response to aging infrastructure, changing customer expectations, concerns about equity, new technology, the impacts of climate change and the reality of resource constraints. A realignment of the concept and role of levels of service targets in water infrastructure management is clearly required to better serve the needs of utilities and their customers. Some of the key issues the group will explore include:

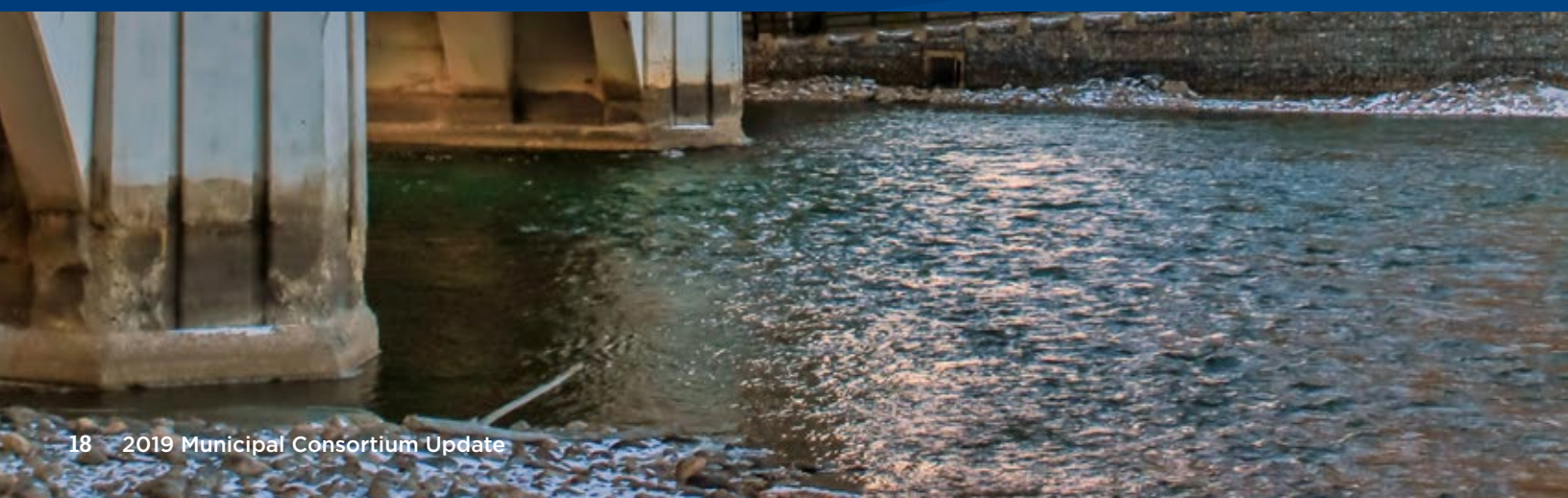
- How service levels intersect with risk management frameworks and design standards
- Bridging the disconnect between levels of service and financial sustainability and affordability
- Customer engagement and feedback on levels of service
- When to surpass regulatory requirements
- Data needs

Discussion at the 2020 levels of service strategic sharing group will begin with identifying shared challenges or roadblocks.

In March 2020, CWN quickly mobilized to deliver a safe space for utility leaders across Canada to share their management responses and challenges during the COVID-19 pandemic. Outside experts were also brought in to share their knowledge as the situation evolved. This highlights the value and flexibility of strategic sharing groups to form and wrap-up as needed. Insights from these groups are shared with members of the Consortium Leadership Group, and in some cases, more general insights are shared with the broader community.

Leading National Conversations

Researchers, governments, industry and other organizations see the Consortium as an important group to connect with about municipal water issues and perspectives.



Identifying Priorities in the Municipal Water Sector

Bi-annual Consortium meetings provide an important opportunity for decision makers in the leadership group to exchange ideas, learn about new research findings, and discuss critical challenges and emerging issues. The 2019 Consortium Leadership Group fall meeting was hosted in Calgary, Alberta. Participants benefited from learning about the City of Calgary's customer-centric approach to utility governance and innovative flood resilience initiatives in the Eau Claire area along the Bow River in the downtown core.

Invited guests included Dr. Steve E. Hrudey from the University of Alberta who talked about his experience with the pendulum swing in attention from key priority concerns (such as pathogens) and emerging high-profile priorities, and the interplay of science and current opinion on policy. Albert Cho from Xylem articulated insights on how equity is becoming a key driver and consideration for utilities in the U.S., and increasingly globally, within the context of climate change impacts, changing customer expectations and the new age of data in which utilities operate.

Discussions among the Consortium Leadership Group were structured around the opportunities and challenges of increasing data use, affordable and equitable revenue generation, wastewater resource recovery, crossing the public-private divide and increasing uncertainty. Some of key takeaways were:

- A shift toward customer-centered governance is challenging but necessary.
- Stormwater and flood management remain top priorities for many Canadian municipalities.
- The inevitable movement toward transparency and open data requires improved use of analytics and managing a difficult balance between trust and liability.
- Clarifying the role of developer charges in equitable and affordable revenue generation is an opportunity and need in Canada.
- There is ongoing tension to resolve between revenue generation, equity and affordability.
- New competencies are needed for the utility of the near future.

The insights from these discussions have informed the Consortium's work plan for the year to come.

WHAT TO WATCH FOR IN 2020

In 2020, CWN plans to structure the Consortium's conversations and initiatives along four high-level narrative themes, many of which have taken on even greater importance for water operations during COVID-19:

- Crossing the public-private divide and working with private property owners to address water issues like lead and legionella
- Achieving equity and improving public engagement in municipal water management
- Prioritizing and addressing "forever/everywhere" chemicals (emerging contaminants)
- Creating a business case for cross-sector opportunities that result in shared risk and multiple benefits

The Fall Consortium Leadership meeting is currently planned for October 27-28, 2020 and will be held in Winnipeg.

Key Trends, Needs and Leading Practices in Canada's Municipal Water Sector

PROJECT PARTNER: Federation of Canadian Municipalities

Download a summary of the report at: **cwn-rce.ca/trends-in-municipal-water-management**

With financial support from the Federation of Canadian Municipalities, CWN undertook a qualitative research project on key trends, needs, leading practices and opportunities within the municipal water sector. CWN conducted in-depth interviews with selected sector experts and a national survey of water utility managers. Municipal water managers had an opportunity to provide their perspective on high-level sector trends, desired outcomes, utility objectives, technology and innovation choices, leading management practices, barriers to implementation and innovative solutions.

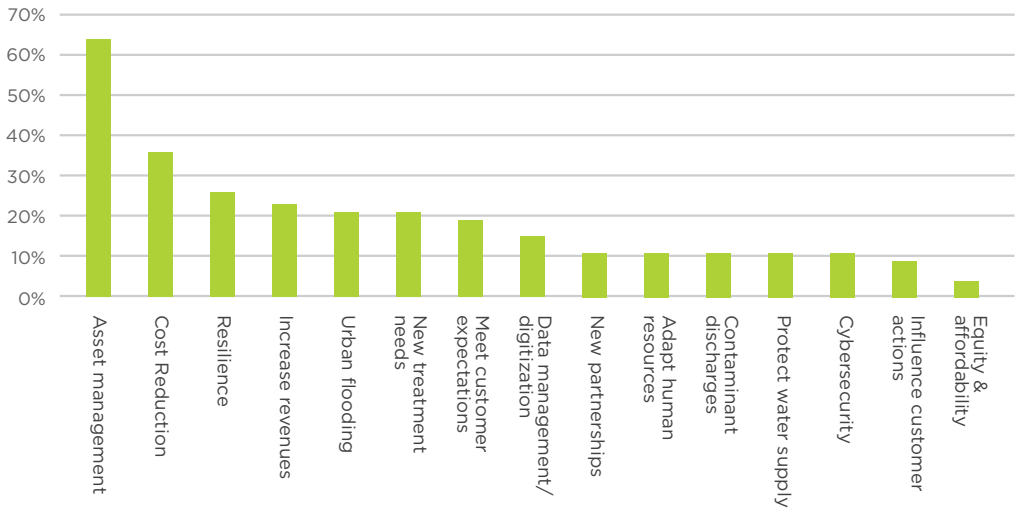
The project identified five important trends that are driving current and future decisions in municipal water: financial sustainability, the expanding role of water utilities, changing public expectations, increasing uncertainty and new technology. A set of 15 utility objectives that could be advanced to achieve desired outcomes of the associated broad sector trends were also identified. CWN's national survey of utility managers asked respondents to assign a level of priority to each of these objectives: immediate (currently working on this objective); high (planned within the next 5–10 years); medium (would like to advance, but requires additional support or changed conditions); and low (unlikely to advance). The survey also asked the respondents to select three objectives that their utility or municipality would invest in over the next ten years.

The 47 respondents from coast-to-coast indicated that their top five priorities over the next 5-10 years were to:

- Undertake proactive asset management
- Reduce operating costs
- Increase system resilience
- Improve revenue generation
- Manage urban flooding

The national survey also allowed respondents to select from a list of 45 leading practices, which was designed to provide insights on what actions municipalities and utilities are currently pursuing, including their relative immediacy, co-benefits, opportunities and barriers to implementation. To meet the objectives outlined above, utilities from across Canada are actively implementing the following leading practices: systematically identifying and prioritizing vulnerabilities of infrastructure to climate change, completing asset inventories, improving the reliability of data collected, reducing system losses and upgrading wastewater treatment processes. Emerging practices to achieve municipal objectives that are planned or under consideration in the next ten years include user-pay approaches, green infrastructure, customer incentives, emergency planning, municipal bylaws and stormwater maintenance.

Figure 3: Objectives selected as key areas for investment or focus



SECTOR OUTREACH

Detailed insights from the project were shared with the Consortium Leadership Group in October 2019. A summary of these findings was co-published by FCM and CWN in March 2020 and discussed during a five-part FCM webinar series on innovations and opportunities in municipal energy, waste, water, transportation and land use initiatives. More than 300 people registered for the water webinar on March 19, 2020. Although organizations were scrambling to implement first responses to the COVID-19 pandemic that week, close to 200 people participated.

Shaping National and International Narratives on Water Management Issues

WATER REUSE IN CANADA: In November 2019, CWN participated in a panel discussion on water reuse in Canada at the National Water and Wastewater Conference. CWN situated water reuse in the context of evolving water sector trends and needs, and helped to frame the discussion around why water reuse has or may emerge as a viable solution to water management challenges.

WILDFIRE IMPACTS ON SOURCE WATER AND DRINKING WATER TREATMENT: Following Australia's catastrophic bushfires in 2019, CWN connected Water Research Australia to the leading research that has been undertaken by the forWater NSERC Network for Forested Drinking Water Source Protection Technologies. Relevant documentation was shared with members of the Water Services Association of Australia and discussion is currently underway for the development of a webinar series in 2020.

DRINKING WATER SAFETY: Bernadette Conant, CEO, Canadian Water Network is scheduled to chair a workshop at IWA's 2021 Congress in Copenhagen, Denmark. *Learning from Experience – Critical Case Studies for Drinking Water Purveyors*, will include four case studies on a recent drinking water health tragedy, lead contamination, legionellosis outbreak and fluoridation overdose. Internationally recognized Canadian experts will share insights on what warning and monitoring signals were missed, the errors that were committed (passively or actively) and how to establish a culture of continuous learning from close calls.

DATA COLLABORATION: In 2019, CWN entered into a partnership with the National Water and Wastewater Benchmarking Initiative to access the rich database that they have generated over the past 23 years. CWN will be analyzing this data at a strategic level to enhance and leverage the insights generated through CWN's work. This arrangement is mutually beneficial to both organizations, and by extension, of benefit to the entire water and wastewater sectors.

EXPERT ADVICE: The Canadian Mountain Network was awarded a 5-year federal Networks of Centres of Excellence (NCE) grant. In 2019, they contracted CWN to provide insights on setting up their new governance and research management structure. CWN operated as a successful NCE for 16 years and is one of the only NCEs that has successfully transitioned into an independent organization.

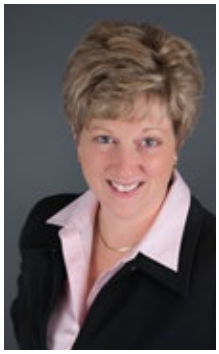
KNOWLEDGE MOBILIZATION: Over the past six years, CWN developed a series of end-user reports for the Water Economics, Policy and Governance Network to convey research project findings in plain language to a broader audience. CWN's CEO also served as a Director for the Network, which wrapped up their operations at the end of February 2020.

Looking Ahead

New Consortium Director

In the fall of 2019, Dr. Bu Lam accepted a position at the City of Kitchener as Director of Sanitary and Stormwater Utilities. We thank Bu for his contributions to CWN over the past five years and wish him every success in his new role.

Please join us in welcoming Sandra Cooke as the incumbent Director, Municipal Consortium. Prior to her arrival at CWN, Sandra managed the Grand River Conservation Authority's watershed water management plan and was their senior water quality supervisor. She's held a number of progressive leadership positions at the Conservation Authority and the government of Alberta and has a rich history of bringing municipalities and other water stakeholders together.



Strategic Areas of Focus

Initiatives delivered through the Consortium cover a range of strategic areas which cut across drinking water, wastewater, stormwater, and corporate strategic management pillars. For 2020, these cross-cutting narrative themes include:

- Crossing the public-private divide and working with private property owners to address water issues like lead and legionella
- Achieving equity and improving public engagement in municipal water management
- Prioritizing and addressing "forever/everywhere" chemicals (emerging contaminants)
- Creating a business case for cross-sector opportunities that result in shared risk and multiple benefits

To advance these strategic areas, CWN will be exploring new initiatives in 2020 focused on customer affordability in a Canadian context, the role of development charges in water management, and proactive identification and integration of new competencies for future-facing utilities. CWN will also continue to deliver insights on strategic areas of focus through a variety of platforms, including reports, webinars, CLG strategic sharing groups, expert workshops and Blue Cities Discussions.

Expanding the Consortium's Reach

In 2019, the Consortium Leadership Group continued to grow in its role of informing and shaping the narrative around national priorities and defining the sector's needs and included the addition of five new members. In the past year, CWN has explored the development of additional Consortium expansion by identifying options to bring in new partners who can contribute to the Consortium's ability to accelerate, advance and improve strategic-level management decisions.

In 2020, CWN is looking to expand the reach and impact of the Consortium by engaging a broader range of progressive municipalities that share the same goals as the Consortium Leadership Group. A pilot initiative will ensure that these new partners add value to the Consortium and benefit from participation. This "Progressive Group" will initially include leading municipalities with populations around or under 100,000 who can contribute to and benefit from the Consortium's strategic, insights-driven initiatives. Look for more details in the coming year as the Consortium explores the potential for other sectors to more formally contribute to municipal water management, such as the private sector and academic partners.

MARK YOUR CALENDARS:

2022 IWA World Water Congress in Canada

The International Water Association's World Water Congress and Exhibition is a global event for water professionals covering the entire water cycle. Canada has been selected to host this prestigious event in Toronto in August 2022. Canadian members of the conference organizing committee include: Peter Vanrolleghem (President), Université Laval; Yves Comeau, Polytechnique Montréal; William Fernandes, Toronto Water; Nancy Kodousek, Region of Waterloo; Mike Lywood, Amec Foster Wheeler; Carl Yates, CWN Board Chair; and Robert Haller, CWWA.

LID for Stormwater Management in Canada

Low impact development (LID) approaches are increasingly being considered as an option to help build resiliency in cities to extreme wet weather events. While there is a large and growing body of literature available on LID, many resources do not provide adequate information on the applicability and performance of LID in Canada's unique environmental and regulatory context. In order to properly determine the feasibility and benefit of LID approaches for Canadian municipalities, decision makers need clear, consolidated insights that are relevant and applicable to their local conditions.

In 2018, CWN and Toronto and Region Conservation Authority partnered to synthesize leading knowledge on this topic. In 2020, CWN is pivoting to derive insights from Canadian municipal water managers, practitioners, and peer-reviewed and grey literature to consolidate the state-of-the-knowledge for key aspects such as LID performance and other considerations in different climatic regions, suitability for infill and greenfield development, and impact of maintenance.

International Water Research Valuation

CWN is leading an international research project with members of the Global Water Research Coalition to identify how and where investments in water research and innovation provide value and develop a range of metrics that can be used to guide the evaluation of return on investment in water research and innovation. There will be three phases to the project, which will wrap up in the year 2022. For further details about the project, see page 16.

Strategic Sharing Group: Levels of Service

CWN's strategic sharing groups provide meaningful peer-to-peer sharing opportunities for members of the Consortium Leadership Group. A new group focused on levels of service will launch in 2020. We also recommend that interested Consortium Leadership Group members participate in the online Blue Cities Discussion, Balancing Revenue Impacts and Level of Service Demands. For more information about this new strategic sharing group, see page 17.

Advancing Flood Mapping through Data Curation

CWN and the Insurance Bureau of Canada have embarked on a project to inform the implementation of the federal government's flood mapping commitments, and to generate recommendations on the successful structuring of the Canadian Centre for Climate Information and Analytics (C3IA) as an authoritative source of climate information and decision analysis. The final report, which will be published in 2020, will inform the development of a made-in-Canada solution for better data and knowledge sharing to improve our ability to achieve flood risk evaluation, identification and mitigation in Canadian communities. For further details, see page 9.

Strategies for Reducing Lead in Drinking Water

In the fall of 2018, with the knowledge that Health Canada would be releasing revised guidelines, CWN conducted a survey of water utility practices to provide a baseline understanding of how communities were addressing this issue. During CWN's analysis of the evolving practices and knowledge needs in this area, Health Canada released the new guidelines in March 2019 and a study was published by the Concordia Institute for Investigative Journalism, followed by a nation-wide series of articles by media outlets late in the year. This media attention significantly increased public attention on the issue, resulting in increased focus of municipal councils and governments across Canada on the issue. In response to the evolving conditions, CWN decided to reframe the document it was producing to not only synthesize the challenges and practices underway by Canadian municipal utilities, but also help create a much clearer framing and narrative on the interconnected issues to support the ongoing national conversation around lead in drinking water. Utilities and governments need mechanisms that better enable clearer evidence-informed approaches to identifying appropriate strategies, ensuring effective regulatory structures, aligning the support of city councils and allocating the resources to deal with the issue. CWN's pending report in 2020 will provide the context of where we are, what we know and don't know, and options for setting a productive path forward to cross the public-private divide and get the lead out of Canada's drinking water.

Canadian Water Network's

Canadian Municipal Water Consortium

For more information, visit cwn-rce.ca