Newsletter

December 2025

INSIDE

Welcome to the Winter 2025 edition of the Canadian Association on Water Quality (CAWQ) Newsletter!

By Dr. Oliver Iorhemen, Chair of the Media and Outreach Committee, CAWQ

This issue brings together insights from researchers and experts across Canada, presenting the latest in water quality research in short, accessible articles. We hope you will share these pieces with your colleagues and networks to help build a connected, water-informed community. In this edition, you will find contributions from leading researchers in Canada, as well as updates on past and upcoming CAWQ events, conferences, and initiatives happening nationwide. Whether you are a student, early-career professional, or seasoned expert, there is something here to spark your curiosity and inspire collaboration.

We are excited to continue engaging our community, highlighting cutting-edge research, and sharing knowledge that helps advance water quality in Canada. Stay connected, stay informed, and enjoy this Winter edition! We look forward to continually engaging our community and creating content on water quality research.

Message from the President

Dear CAWQ Members and Friends,

As we are moving into a new year with various activities, I am reminded of the unique strength of the CAWQ community: our ability to bring together researchers, practitioners, and students dedicated to advancing water quality science and practice across Canada and beyond. The challenges we face, from emerging contaminants to climate-driven impacts on water systems, demand collaboration, creativity, and knowledge exchange, which remain at the heart of CAWQ's mission.

This year, we are excited to continue building momentum through our regional symposia, workshops and student initiatives, and joint activities with partner associations. These events are vital opportunities to share research, foster mentorship, and strengthen connections across disciplines and sectors. I encourage you to engage and help amplify the impact of our community.

I also want to recognize the contributions of our volunteers, board members, and partners, whose dedication keeps CAWQ a vibrant and inclusive forum where ideas thrive. If you would like to be more involved, whether through organizing, mentoring, or shaping our future directions, please don't hesitate to reach out.

On behalf of the CAWQ Board, thank you for your continued support and commitment. Together, we can ensure that CAWQ continues to serve as a trusted forum for advancing knowledge, supporting young professionals, and informing the future of water quality in Canada.

Warm regards,

Baiyu Helen Zhang
President, CAWQ

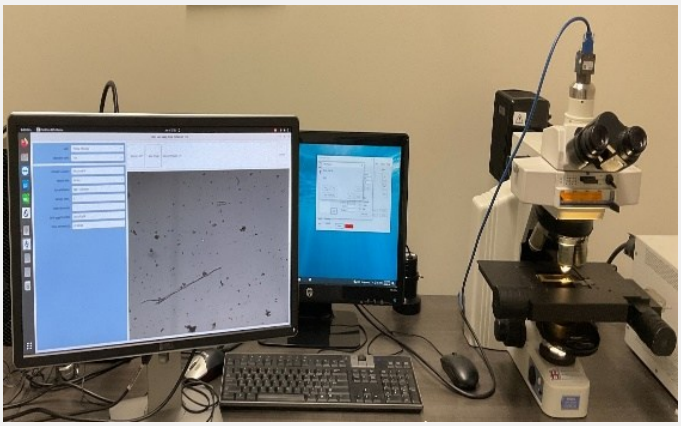
Research Highlights

Predicting harmful algal blooms using machine learning

Mennatallah Alnahas (PhD candidate), Husein Almuhtaram, Sebastian Goodfellow, Ron Hofmann

Department of Civil and Mineral Engineering, University of Toronto

Cyanobacterial and algal blooms are becoming increasingly common in freshwater systems, especially during the warmer months. These blooms not only pose a threat to aquatic ecosystems but also present serious challenges to drinking water treatment. Some cyanobacteria can release toxins, while others cause operational issues such as clogged filters, taste and odour problems, or increased coagulant demand. Many utilities now use algae sensors, or sondes, to monitor parameters such as phycocyanin (a pigment found in cyanobacteria), chlorophyll, turbidity, and temperature. However, interpreting this dense stream of time series data to reliably anticipate blooms is not straightforward, as there are no fixed thresholds that can reliably signal the onset of blooms. Conditions vary between lakes, seasons, and even across different depths, making early detection a persistent challenge. In response to this, the use of machine learning is explored to improve early warning capabilities. By using historical bloom data and sensor trends, machine learning models can be trained to detect subtle patterns that precede bloom events. This allows them to flag potential blooms before they become visible or disruptive. The approach can reduce the number of missed blooms while minimizing false alerts, which enables utility operators to respond proactively. As climate change continues to alter bloom dynamics and extend bloom seasons, tools like this could play an important role in supporting drinking water treatment and safeguarding public health. Ongoing work focuses on validating these models in real-world utility settings and making them more adaptable through various datasets collected from multiple utility partners across Ontario.

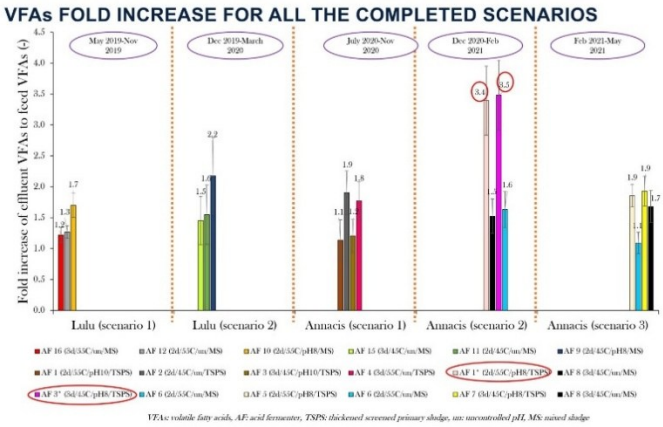


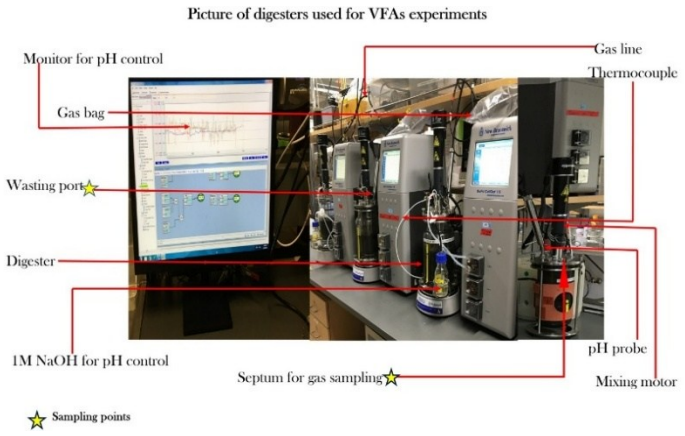
Lab-scale optimization and process modeling of anaerobic fermentation for maximizing volatile fatty acid production from municipal sludge

Resty Nabaterega, PhD (UBC-O, 2023), Postdoctoral fellow,

University of Northern British Columbia

Wastewater treatment plants (WWTPs) generate large amounts of sludge that contain harmful materials like pathogens, heavy metals, and chemicals. This sludge must be treated before it can be used or disposed of into the environment. Managing this sludge costs WWTPs about half of their operating budget. To reduce costs, technologies such as anaerobic digestion (AD) are utilized to break down sludge and produce useful by-products, including biogas, biohydrogen, bioethanol, volatile fatty acids (VFAs), and biofertilizer. One of the key by-products of AD is the VFAs, which help produce methane (a renewable energy source). VFAs can also be used in the chemical industry to make valuable products.

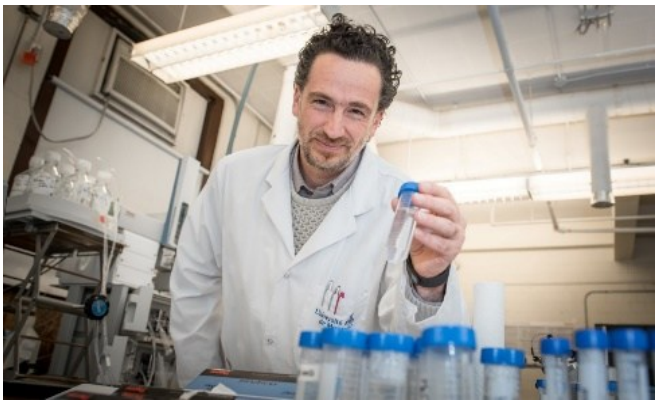




The study investigated methods to enhance VFA production by adjusting key factors, including temperature, pH, sludge retention time (SRT), and the type of sludge used in the digestion process. The optimal conditions for VFA production were determined to be a temperature of 45°C, a pH of 8, and a short sludge retention time of 3 days, using primary sludge. The study also used statistical models to optimize these conditions and found that under the right conditions, VFA production could be increased by more than three times. This research can help municipalities improve energy production and reduce costs by utilizing wastewater sludge more efficiently, converting it into methane (a biofuel) or other commercial products, such as biodiesel.

Turning data into safeguards: an approach to water and environmental safety

Lead: Dr. Sébastien Sauvé, Professor of Environmental Chemistry, Université de Montréal



Dr. Sauvé leads a team that follows contaminants from source to exposure and turns findings into protections for people and ecosystems. The team investigates PFAS, pharmaceuticals, cyanobacteria/cyanotoxins, agrochemicals and other emerging contaminants across drinking water, surface waters, soils, food, and treatment systems, mapping how pollutants originate, move, transform, and accumulate.

From PFAS Data to Decisions

- PFAS in drinking water across Canada: Nearly 400 public sites in Quebec (~500 samples) and samples across Canada revealed widespread detections of PFAS above USEPA regulatory limit. This has informed risk communication and policy dialogue across Quebec and Canada.
- PFAS in sewage sludge, soils, and crops: Multi-media assessments of PFAS in Québec and France clarify transfer pathways from sludge to soil and uptake by plants. Data generated from the team contributed to Québec's 2024 regulatory guidance on PFAS in sludge.
- Industrial footprints of PFAS: Evaluation of atmospheric deposition of PFAS from fluorochemical facilities to soil has led to local decision-making, holding polluters accountable.
- PFAS in groceries: Ongoing screening of common groceries (milk, eggs, produce, seafood) provides exposure-relevant data to citizens.
- Citizen engagement: As part of citizen-science, adopt a Lake campaign is raising awareness about cyanobacteria and cyanotoxins; 80+ individuals, organizations, and municipalities in Québec, Ontario, and Alberta have registered lakes they care about for sampling and analysis.
- Policy translation: Findings are routinely briefed to decision-makers in Canada and France.

Advanced oxidation processes and oil spill response

Wei Deng (PhD Candidate), Jianbing Li

School of Engineering, University of Northern British Columbia

Recent research at the University of Northern British Columbia (UNBC) is advancing solutions to some of the most pressing challenges in water and environmental engineering. Key areas of focus include advanced oxidation processes (AOPs), machine learning–based environmental analysis, and the optimization of marine oil spill response. Earlier investigations examined the detection and treatment of heavy-metal complexes in industrial wastewater. Machine learning methods were applied to enhance the detection of Ni complexes, while UV-activated persulfate was employed to degrade metal–organic contaminants. This work revealed a novel self-catalytic mechanism, in which copper undergoes valence transitions via ligand-to-metal charge transfer (LMCT). Reaction rates were found to accelerate under alkaline conditions and increase nearly tenfold under acidic conditions. Complementary studies critically reviewed heavy-metal recovery technologies, comparing removal mechanisms with their corresponding energy requirements. Findings from this research have been published in Environmental Monitoring and Assessment, Journal of Environmental Management, and Journal of Hazardous Materials.

Building on this foundation, current studies address the treatment of oily wastewater and marine oil spill response, particularly in cold regions where conventional methods often underperform. AOPs are being applied to treat oil-in-water emulsions under low-temperature conditions, providing new strategies for environments with limited remediation options. This line of work was presented at the Canadian Society for Civil Engineering (CSCE) Cold Regions Specialty Conference, where it received recognition for research excellence. Parallel efforts are directed toward the development of reliability-informed, multi-objective optimization models for oil spill response. By integrating machine learning, these models enhance decision-making under uncertainty, offering tools to balance effectiveness, cost, and environmental protection. Beyond oil spill applications, contributions to the broader field of energy and environmental engineering have been published in Energy and Buildings, where this work has been recognized as Highly Cited Papers in consecutive years. Together, these research contributions advance both the fundamental understanding of contaminant treatment mechanisms and the practical development of technologies for environmental protection, with direct relevance to wastewater management, pollution control, and ecological resilience in sensitive regions.

Conference Reports 2025

- ✓ 60th Central Canadian Symposium on Water Quality Research
- ✓ 3rd IWA Young Water Professionals (YWP) Canada Conference, “Bridging Communities, Shaping the Future of Water Together”
- ✓ Atlantic Symposium: PEOPLE 2025 International Conference, "Challenges and Opportunities in Environmental Sustainability under Climate Change”
- ✓ 38th Eastern Canadian Symposium on Water Quality Research

60th Central Canadian Symposium on Water Quality Research

Chaired by Dr. Rania Hamza

The 60th Central Canadian Symposium on Water Quality Research was held on February 23–24, 2025, at Toronto Metropolitan University. Jointly organized by CAWQ and the Faculty of Engineering and Applied Science at Toronto Metropolitan University, the symposium provided a platform for researchers, practitioners, and policymakers to share advances in water quality science, engineering, and policy. With over 120 abstracts and participation from students and professionals nationwide, the program highlighted innovative solutions for sustainable water management.

The symposium featured keynote addresses by Dr. Arthur Umble (Stantec Consulting), and Dr. Robert Andrews (University of Toronto) as well as a dynamic panel on "The Future of Water/Wastewater Research and Career Implications," discussing strategies for utility engagement, workforce development, and research integration. Technical sessions covered sustainable water management, advanced treatment, water reuse, emerging contaminants, microplastics, wastewater process intensification, resource recovery, and the application of AI and machine learning in environmental monitoring.

Participants also explored practical innovations, including cryopurification, advanced disinfection, and energy recovery from wastewater, alongside policy perspectives on PFAS management and net-zero wastewater systems. The event fostered collaboration across academia, industry, and government, with strong emphasis on student and early-career engagement. For more information about the 60th Central Canadian Symposium, including access to abstracts and session details, visit: CAWQ Symposium Page.

Award Winners:

Best Oral Presentation Awards

- 1st Place: Omar Abdelrahman, Toronto Metropolitan University
- 2nd Place: Omar Mohamed, Western University

Glen Daigger Awards (Poster)

- 1st Place: Juviya Mathew, York University
- 2nd Place: Nada Hosni, Toronto Metropolitan University

Three Minutes Thesis (3MT)

- 1st Place: Fatima-zahra Ezzahroui, Toronto Metropolitan University
- 2nd Place: Ani Memuduaghan, Toronto Metropolitan University

12th Western Canadian Symposium on Water Quality Research

Chaired by Dr. Bipro Dhar

The 12th Western Canadian Symposium on Water Quality Research was held on June 17, 2025, at the University of Alberta, hosted by the Faculty of Engineering. This year's symposium featured six technical sessions covering topics, including Advanced Water and Wastewater Treatment, Emerging Contaminants: Fate, Transport, and Mitigation, GHG Emissions, Climate Resilience, and Sustainability, as well as Circular Economy: Energy and Resource Recovery. The symposium showcased over 40 oral and poster presentations from researchers across Alberta, British Columbia, Ontario, Québec, and international contributors from Japan, Australia, Türkiye, and Italy.

"Among the many water-related conferences and symposiums, CAWQ events always stand out for being specifically dedicated to supporting students and young water professionals. In that spirit, over 90% of the presentation slots this year were reserved for graduate students, postdoctoral researchers, and early career professionals." said Dr. Bipro Dhar, Conference Chair. This year's keynote speakers included Dr. George Nakhla from Western University and Dr. Frank Gu from the University of Toronto. Additionally, the symposium featured five invited speakers from leading universities, government agencies, and industry, providing broader perspectives and expertise to develop innovative engineering solutions for the water and wastewater industries. For more information about the Western Canadian Symposium on Water Quality Research, including access to the 2025 program and abstracts, visit the CAWQ Website.

Award Winners:

Best Oral Presentation Awards

- 1st Place: Tae Hyun (Calvin) Chung, University of Alberta
- 2nd Place: Maha Dassouki Dit Tahan, Middle East Technical University, Türkiye/Toronto Metropolitan University

Best Poster Awards

- 1st Place: Sunanda Paul, University of Alberta
- 2nd Place: Shivani Sonkar, University of Alberta

3rd IWA Young Water Professionals (YWP) Canada Conference, "Bridging Communities, Shaping the Future of Water Together"

Chaired by Hadi Mokarizadeh

The 3rd IWA YWP Canada Conference took place from June 18–20, 2025, at the University of Alberta in Edmonton, under the theme "Bridging Communities, Shaping the Future of Water Together." This national gathering brought together 150 early-career professionals, researchers, and students in the water sector for technical sessions, networking, professional development, and a dedicated career fair. The conference featured a diverse program of technical sessions covering topics such as sustainable water management, advanced treatment technologies, water reuse, emerging contaminants, microplastics, wastewater process intensification, resource recovery, and the application of AI and machine learning in environmental monitoring. These sessions provided a platform for participants to share innovative solutions and discuss strategies to address pressing water challenges.

In addition to the technical sessions, the conference offered professional development opportunities, including a workshop titled "Navigating Career Growth in the Water Industry: From Early Career to Leadership." The event also featured keynote addresses from distinguished speakers, including Dr. Mohtada Sadrzadeh, Professor at the University of Alberta and Director of the Advanced Water Research Lab (AWRL), Dr. Oliver Iorhemen, Assistant Professor at the University of Northern British Columbia and founder of the UNBC Bio-Innovative Water and Wastewater Biorefinery (BioW^{2}B) Lab, and Dr. Youhei Nomura, Assistant Professor at Kyoto University. We were also honored to have Dr. Norman Neumann (Professor in the School of Public Health at the University of Alberta) and Gillian Edwards (Vice President, Regional Growth Leader, Water at Stantec) as our keynote speakers. These experts shared insights into cutting-edge research and developments in the water sector. The 3rd IWA YWP Canada Conference successfully fostered innovation, collaboration, and leadership among the next generation of water experts. It provided a platform for emerging professionals to connect, share knowledge, and contribute to shaping the future of water in Canada.

Award Winners:

Best Oral Presentation Awards

- 1st Place: Kizza Ronald, University of British Columbia
- 2nd Place: Nada Hosni, Toronto Metropolitan University

Best Poster Presentation Awards

- Anqi Mou, University of Alberta

Atlantic Symposium: PEOPLE 2025 International Conference, "Challenges and Opportunities in Environmental Sustainability under Climate Change"

Chaired by Dr. Bing Chen

The PEOPLE 2025 International Conference, jointly organized with the Canadian Association on Water Quality (CAWQ) in collaboration with the Faculty of Engineering and Applied Science at Memorial University, took place on July 21–25, 2025, in St. John's, Newfoundland and Labrador. The event brought together a diverse community of researchers, practitioners, policymakers, and students to exchange knowledge and foster collaboration on critical issues in environmental sustainability. The success of the conference was made possible through generous sponsorship from the Atlantic Canada Opportunities Agency (ACOA), the Hibernia and Hebron Project, and the Royal Society of Chemistry, along with strong support from the Government of Newfoundland and Labrador and the City of St. John's.

The PEOPLE 2025 International Conference brought together over 160 participants from more than 10 countries, including Canada, China, the United States, Poland, Denmark, Finland, Australia, Nigeria, France, and New Zealand, creating a global platform for dialogue on sustainability and climate change adaptation. With more than 120 abstracts submitted, the program highlighted diverse research, innovation, and practical solutions. The opening ceremony featured remarks from leaders in academia, government, and community organizations, including Dr. Bing Chen (Conference Chair), Dr. Tana Allen (Memorial University), Dr. Howard Alper (Conference Honorary Chair), Sheilagh O'Leary (Deputy Mayor of St. John's), and Dr. Baiyu Zhang (Conference Co-Chair). The scientific program included two plenary keynotes by Dr. Jingxu Zhu (Western University) and Dr. Edward McBean (University of Guelph), as well as a panel on "Emerging Environmental Challenges and Global Collaborations under Climate Change," featuring international experts and community representatives. In addition, 17 keynote presentations and 20 technical sessions showcased advances in research, policy, and practice, emphasizing collaboration in addressing pressing environmental challenges.

Networking and professional development were supported through social events and field trips. Highlights included the HQP Social Night, a conference banquet with over 110 attendees, and site visits to local water and wastewater treatment facilities, the Johnson GEO Centre, and Memorial University laboratories.

Award Winners:

Best Oral Presentation Awards

- 1st Place: Zhonghao Zhang, University of Victoria
- 2nd Place: Hao Wu, Memorial University

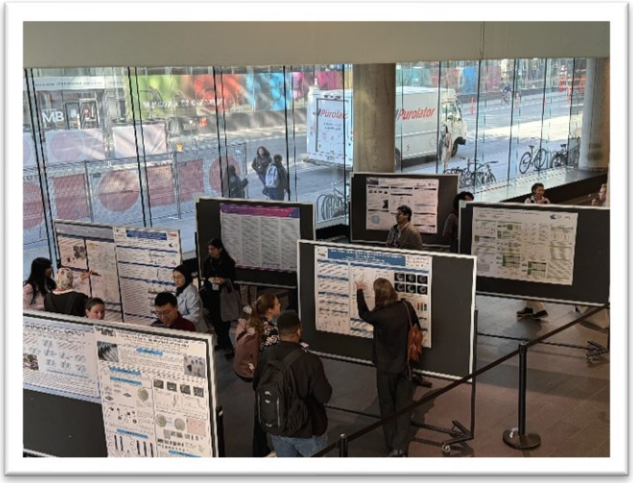
Best Poster Presentation Awards

- Negar Ahmadi, Memorial University

38th Eastern Canadian Symposium on Water Quality Research

Chaired by Dr. Chunjiang An and Dr. Maria Elektorowicz

The 38th Eastern Canadian Symposium on Water Quality Research, organized by the Canadian Association on Water Quality (CAWQ), was successfully held at Concordia University in Montréal, Québec, on October 16–17, 2025. The event brought together over 130 participants from academia, industry, government, and non-profit organizations, all committed to advancing water research, technology, and policy.



Over two days, the symposium featured more than 70 presentations, including keynote addresses, oral sessions, and poster presentations, covering topics such as emerging water quality issues, innovative treatment technologies, and collaborative research initiatives. The International Water Association Young Water Professionals Canada (IWA-YWP Canada) played an active role through networking and professional development activities.

The event fostered vibrant discussions, knowledge sharing, and new collaborations, offering a dynamic platform to explore cutting-edge research and future directions in water quality management and sustainability across Canada.

Award Winners:

Best Oral Presentation Awards

- 1st Place: Athanasios Latinis, Université Laval
- 2nd Place: Megan Ethier, McGill University

Best Poster Presentation Awards

- 1st Place: Dana Kadadou, McGill University
- 2nd Place: Elvis Wireko Boampong, Polytechnique Montréal

Upcoming Conferences

14th IWA Micropol and Ecohazard Conference

Toronto, Canada | May 31 - June 4, 2026

The 14th IWA Micropol & Ecohazard Conference will convene leading researchers, practitioners, and policy experts to share the latest findings on the occurrence, fate, effects, and management of trace contaminants in water, as well as innovative technologies for their removal.

Topics include:

- Pollutant classes in focus
- Climate change impacts
- Transport of micropollutants between the terrestrial and the aquatic environments
- Emerging, data-driven and AI-powered approaches
- Social and policy dimensions

Themes include:

- Occurrence and fate of micropollutants in the environment
- Effects and impacts of micropollutants on organisms, populations and communities.
- Removal of micropollutants in water and wastewater treatment systems
- Monitoring and analytical methods
- Transformation pathways and modeling
- Risk assessment, regulatory approaches and risk communication

For details on conference themes, topics, and abstract submission guidelines, please visit the official website: www.micropol2026to.org

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Great Lakes Fun Facts Quiz

1. Which Great Lake is the largest by surface area?
2. What percentage of the world's surface freshwater is contained in the Great Lakes?
3. Which Great Lake is the only one located entirely within the United States?
4. Which Great Lake has the highest average depth?
5. Which invasive species, introduced through ballast water, has dramatically changed the Great Lakes ecosystem?
6. Which Great Lake is connected to the Atlantic Ocean by the St. Lawrence Seaway?
7. Which Great Lake borders the most U.S. states?
8. Which lake supplies drinking water to over 11 million people in the U.S. and Canada, including Cleveland?
9. What nickname is given to the legendary "monster" said to live in Lake Erie?
10. True or False: The Great Lakes region would be the world's third-largest economy if it were its own country.