Safeguarding clean water

Although water may seem like an infinite resource, in Canada it is often contaminated. The team at the Centre for Research, Development and Validation of Water Treatment Technologies and Processes (CREDEAU) is tackling the most pressing issues in drinking water, wastewater, rainwater, industrial wastewater and sludge treatment.

The research team

CREDEAU was established by a **consortium of four Quebec universities**: Polytechnique Montréal, Université de Montréal, École de technologie supérieure and McGill University. The research centre has **13 lead researchers** who work with a network of researchers in Canada and abroad, including postdoctoral fellows, students and technical staff. **Benoit Barbeau**, Director of CREDEAU, and **Michèle Prévost**, lead researcher at CREDEAU, jointly hold the Natural Sciences and Engineering Research Council of Canada (NSERC) Industrial Chair on Drinking Water.

The research

CREDEAU's research examines the entire water cycle "**from river to tap**" and addresses environmental and public health concerns. It also deals with the scientific and technical validation of innovations needed by water management stakeholders, such as municipal and other levels of government, industry and regulators. CREDEAU focuses on the **transfer of both technology and knowledge** to these users.

For example, CREDEAU has studied the presence of perfluorinated compounds (also known as PFAS, or "**forever chemicals**") in the water of several communities in Quebec and some in the rest of Canada. The research team documented the impact of these chemicals in the water and raised awareness about them among the general public and leading water management stakeholders. The team then went further, looking for solutions to improve water quality both at the source (by reducing the amount of PFAS released) and at the tap (by improving treatment).

About the Canada Foundation for Innovation

Since its creation in 1997, the CFI has committed more than $10 billion in support of more than 13,000 research infrastructure projects in all disciplines at 173 institutions in 81 municipalities across Canada.

Since CREDEAU was established, its research team has published more than 1,000 articles, delivered more than 1,200 presentations at conferences and other knowledge-sharing events, and been granted 35 patents.

The research infrastructure

CREDEAU was established at Polytechnique Montréal in 2004 with nearly $5 million from the CFI. Over the years, the facility has received additional CFI funding, including in 2012, when it received $1.9 million for infrastructure upgrades, such as water treatment pilot units, state-of-the-art water analysis equipment and a computer lab.

The upgrades have increased CREDEAU's capacity to work directly at water treatment sites, continuously collect critical data and provide analyses. The adaptability of the equipment also adds value, as it allows the team to research a wide range of water-related issues.

The partnerships

CREDEAU focuses on developing innovative water management solutions with a range of partners, including more than 40 researchers in postsecondary institutions; eight federal, and more than 25 provincial, agencies and departments; more than 25 industrial partners; and more than 70 municipal partners.

Municipalities turn to CREDEAU to understand new challenges or plan short-term or long-term responses, and the private sector works with CREDEAU to fill a gap when it comes to testing solutions before a large-scale rollout. "Private labs can't do this work on a sustainable basis, so it's up to universities like ours to support decision-making," says Barbeau.

"The equipment and expertise at CREDEAU allow it to do much more than most labs in the world," says Alain Gadbois, Vice-President of Technology at Veolia Water Technologies.

The impacts

While CREDEAU's priority is to improve the quality of drinking water, it also participates in efforts to **improve water quality at the source** and find ways to **reduce the environmental footprint of the water treatment systems**.

Protecting drinking water

The community of Trois-Rivières, Que., worked with CREDEAU on a **green infrastructure project for rainwater management** to protect its sources of drinking water. In 2018, the city installed bioretention areas along one of its main residential streets and used CREDEAU's equipment to measure their performance. Preliminary results indicate that this approach **supports biodiversity and helps protect the water table**.

Decontaminating water

A CREDEAU study documented the harmful effects that **high levels of manganese** in water can have on **children's neurological development**. With around 15 percent of Canada's groundwater sources having excessive levels of manganese, it is increasingly important to improve how manganese is managed and to set standards for its levels in drinking water. CREDEAU presented the results of its study to Health Canada, leading the department to **issue a recommendation** in 2019 and Santé Québec to **introduce a bill** in 2020 that established maximum concentrations of manganese in drinking water.

Reducing lead in water

Lead in water causes neurological damage in young children, and **high levels of lead** have been found in the water in some Canadian **schools and daycare centres**. CREDEAU worked with five major Canadian cities to help them revise their strategies for reducing the amount of lead in water. This work led to **new sampling requirements in schools in Quebec and Ontario**. In 2019, Health Canada used this work to strengthen the standards that apply to homes and schools.

Encouraging citizen science

Microfibres from laundry are one of the main sources of **primary microplastics released into the oceans**. CREDEAU participated in a citizen science project by evaluating the social acceptability of installing filters on washing machine outlets and testing their performance. This project showed that for a city the size of Montréal, 12.8 tonnes of microfibres could be kept out of the water each year. A motion was filed with the City of Montréal to request **legislation that would require washing machine manufacturers to install filters on their appliances.**

Controlling potential disease outbreaks

Sustained efforts to limit the use of water in large buildings have had the unintended consequence of causing stagnation, which in turn can lead to the transmission of **pathogens in drinking water**. CREDEAU took on the challenge of reconciling efforts to reduce water use with the need to ensure that the drinking water remains safe. It worked with more than 15 hospitals in two Canadian provinces to **control potential waterborne disease outbreaks**. It also advised provincial and federal committees in the review of their building standards and codes.

Managing septic systems

The Quebec government recently began reforming the regulatory framework for **wastewater disposal systems for isolated dwellings**, which had not been updated since 1981. The government worked with CREDEAU to support the **development of new design criteria for wastewater treatment systems** and to **propose innovative septic management solutions**.