



**Geoffrey F. Bruce Fellowship  
in Canadian Freshwater Policy**

**Addressing Contaminants of Emerging Concern (CECs)  
in Canada's Water Systems**

Policy Brief

by

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## **Executive Summary**

Contaminants of Emerging Concern (CECs) encompass a wide range of substances, including pharmaceuticals, personal care products, pesticides, and industrial chemicals, which are increasingly detected in Canada's water systems. These contaminants, often unregulated in drinking water standards and inadequately monitored, pose significant risks to aquatic ecosystems and human health. Despite growing evidence of the presence and potential impacts of CECs, existing policies and regulatory frameworks in Canada remain insufficient to effectively manage these threats.

This policy brief highlights the urgent need for a comprehensive approach to address CECs in water systems, even beyond PFAS that has recently attracted much attention. It outlines the current challenges, evaluates potential policy options, and provides strategic recommendations for government action. The proposed measures aim to enhance water quality protection, safeguard public health, and ensure the long-term sustainability of Canada's water resources.

## **Introduction**

Water is a vital resource that supports ecosystems, human health, and economic activities. In recent decades, the detection of contaminants of emerging concern (CECs) in water bodies has raised alarm among scientists, environmentalists, and policymakers [1–5]. Unlike conventional pollutants, CECs are not typically regulated under existing water quality standards, leaving a critical gap in environmental and public health protection efforts [1,3–5].

CECs originate from various sources, including pharmaceuticals flushed down the drain, chemicals from personal care products, and industrial effluents [6,7]. These substances can enter water systems through wastewater treatment plants, agricultural runoff, and improper disposal practices [6,7]. Once in the environment, CECs can persist and bioaccumulate, leading to adverse effects on aquatic life and potential risks to human health through contaminated drinking water and food sources [8–11].

Despite the growing awareness of the issue, the management of CECs in Canada is hindered by several challenges, including limited data on the occurrence and effects of these contaminants, a lack of standardized monitoring protocols, and insufficient regulatory frameworks [12]. Addressing these challenges requires a coordinated and proactive policy response that involves all levels of government, industry stakeholders, and the public.

## **Current Status, Challenges and associated risks of CEC**

The increasing presence of CECs in Canada's water systems presents a significant environmental and public health challenge. These contaminants, which include substances such as pharmaceuticals and personal care products (PPCPs), per- and polyfluoroalkyl substances (PFAS), bisphenol A (BPA), polycyclic aromatic hydrocarbons (PAHs), microplastics, and illicit drugs, are not adequately regulated under current water quality standards. As a result, there are no established limits for CECs in drinking water or wastewater effluents, preventing effective monitoring and management practices across the country. However, a few CECs such as PFAS and disinfection by products are currently considered in the Canadian Drinking Water Quality Guidelines (CDWQG). Nonetheless, Canada has made notable progress in establishing a regulatory and institutional framework for chemicals management through the Chemicals Management Plan

(CMP). The CMP is designed to evaluate and address the risks associated with chemical substances used in Canada, including those on the Domestic Substances List (DSL) in line with the Canada Environmental Protection Act (CEPA, 1999). However, a majority of the chemicals captured on the CMP list [13], with proven health risks, are excluded in CDWQG [14]. Ubiquitous CECs in Canadian surface water such as BPA and PPCPs [15] are conspicuously missing in the CDWQG [14].

The potential risks associated with CECs are multifaceted. For aquatic ecosystems, exposure to CECs can disrupt reproductive and developmental processes in wildlife, disrupt food webs, and can result in biodiversity loss [6,9,16]. For humans, the presence of CECs in drinking water raises concerns about long-term health effects, including hormone disruption, antibiotic resistance, and increased susceptibility to certain diseases [3,6,9,10,17]. Despite these risks, the full extent of the impact of CECs on human and environmental health remains poorly understood, due in part to the lack of comprehensive research and data monitoring [3,18,19].

Moreover, public awareness of CECs and their potential impacts is limited, which hampers efforts to reduce the release of these contaminants into the environment [11]. Current wastewater treatment technologies are not designed to fully remove CECs, leading to their continued discharge into water bodies [3,6,8,11,19]. Without targeted interventions, the accumulation of CECs in the environment is likely to intensify, exacerbating the risks to water quality and public health. Prompt effective policy action will prevent future environmental degradation and health risks associated with CECs. It is imperative that Canada leads by example in tackling this emerging issue, setting a standard for water quality protection that can further inspire global efforts. Addressing the issue of CECs is not only crucial for safeguarding Canada's water resources but also for ensuring the long-term health and well-being of all Canadians. As such, there are several options the government could take in addressing the issue.

### **Policy Options**

1. **Delayed Action.** With a slow response to addressing CECs, existing challenges will persist. This inaction would continue to expose more Canadians to emerging drinking water threats. Over time, the absence of comprehensive intervention could place additional strain on the healthcare system due to the long-term health risks associated with CEC exposure. Ultimately, this option would delay critical decision-making, allowing current issues to persist without establishing a clear strategy for resolution.
2. **Strengthening Regulatory Frameworks** by updating existing water quality regulations to include specific limits for key CECs. The federal government should lead efforts to revise and expand water quality standards to include limits for priority CECs. This approach will ensure that these contaminants are consistently monitored and managed across Canada. Current regulations focus primarily on conventional pollutants, leaving CECs largely unregulated. Establishing clear limits for CECs will provide a legal basis for enforcement and help ensure that water treatment practices are aligned with emerging environmental health standards. Regulating a broad range of CECs could be daunting, however, engaging with scientific experts to identify priority CECs for regulation would be beneficial.
3. **Enhancing Research and Monitoring** by investing in targeted research to better understand the sources, occurrence, and health impacts of CECs in Canadian water

systems. Comprehensive data on CECs is essential for informed decision-making. Enhanced monitoring will provide critical information on the presence and distribution of CECs, while research efforts can focus on understanding their long-term effects on health and the environment, as well as removal strategies. A national monitoring program could be established through the Canada Water Agency to track CEC levels in surface water, groundwater, and drinking water and map out areas of concern. Partnering with academic institutions, environmental organizations, and industry to conduct research and monitoring would help to develop standardized protocols for CEC detection and their removal.

4. **Promoting Public Awareness and Education** by launching public education campaigns to raise awareness about CECs, their sources, and ways to reduce their release into water systems. Engaging communities through citizen science initiatives and encouraging them to participate in monitoring and reporting efforts is vital for the effective implementation of policies aimed at mitigating CECs. Educating the public about the risks associated with CECs and promoting responsible behaviors (e.g., proper disposal of pharmaceuticals) can significantly reduce the input of these contaminants into water systems. To achieve this, educational materials can be developed in collaboration with environmental NGOs and public health agencies. Various media platforms can also be used to reach diverse audiences, including schools, healthcare providers, and industry professionals.
5. **Encouraging Industry Responsibility.** This approach will involve enforcing stricter regulations on industries that are significant sources of CECs, while promoting the adoption of best practices for minimizing the release of these contaminants. Additionally, introducing incentives for industries to invest in cleaner technologies and reduce the use of harmful chemicals can further drive efforts toward minimizing CECs and enhancing environmental protection. As industrial activities are a major source of CECs in water systems, holding industries accountable for their environmental impact is essential for reducing CEC emissions. Incentivizing innovation and cleaner production methods can also lead to long-term reductions in CEC levels by working with industry associations to develop sector-specific guidelines for CEC management, and providing financial incentives, such as tax credits or grants, for companies that adopt sustainable practices and invest in advanced wastewater treatment technologies to eliminate CECs.

## Conclusion

The growing presence of CECs in Canada's water systems represents a significant challenge that requires immediate action from policymakers. By strengthening regulatory frameworks, enhancing research and monitoring, and promoting public and industry engagement, the government can take proactive steps to protect water quality and public health.

The federal government, through Health Canada, should lead efforts to revise and expand water quality standards to include limits for priority CECs. This will ensure that water treatment facilities across Canada are held to consistent standards and that public health is adequately protected. In collaboration with Environment and Climate Change Canada, this effort can be followed up by implementing stricter regulations on industries that are significant sources of CECs, such as pharmaceuticals, personal care products, and chemical manufacturing, encouraging the adoption of best practices for reducing the release of CECs, and provide incentives for industries to invest in cleaner technologies and sustainable practices. Ultimately, specialized NSERC and CIHR funding for research on the environmental and health impacts of CECs should

be considered. Prioritizing studies that investigate the long-term risks associated with CEC exposure and evaluate the effectiveness of different water treatment technologies will be beneficial in addressing the growing challenge.

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