EXPLORE RESEARCH PROGRAM

Protecting Canada's Freshwater

Beyond the myth of abundance





In this research initiative, we seek to explore how Canada can protect its freshwater in the face of heightened global uncertainty, competing demands, and shifting climate realities.

Access to clean, safe freshwater underpins every part of life, sustaining our communities, ecosystems, and economies.

From rivers to lakes to ice, Canada has a great deal of freshwater, but it is increasingly under threat. The changing climate is projected to destabilize our water sources by both depleting and contaminating them. Water-intensive industries are forcing communities to face difficult trade-offs. Drinking water infrastructure that is both aging and digitally connected is at risk of leaks and cyber attacks. Many Indigenous communities have long faced shortages of clean drinking water, which may worsen with increasing scarcity.

Globally, water shortages are heightening regional pressures and causing governments to consider drastic measures, such as relocating entire cities. Shifts in the international rules-based order may create uncertainties around water sovereignty and could heighten the risk of disputes over shared rivers and lakes.

Although Canada is often seen as a water-rich nation, these growing uncertainties could lead to a day when water is less available and must be rationed. In this research initiative, we seek to explore how Canada can protect its freshwater in the face of heightened global uncertainty, competing demands, and shifting climate realities.

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Future uncertainties

Over the next 5-10 years, Canada's freshwater resources face numerous challenges, driven by issues including:

Climate impacts: Climate change threatens freshwater access, with the federal government's *Canada's Changing Climate* report stating that "freshwater supplies in all regions of Canada are expected to be affected in one way or another" (p.268). Along with direct threats to freshwater levels, climate events like wildfires further exacerbate stresses on water systems.

Global pressures: Around the world, temporary water crises are evolving into "water bankruptcies," water conflict is growing, and some cities are considering relocation as local supply is no longer viable. As some countries struggle to source adequate water within their borders, water may become an issue of Canadian national security.

Fragmented governance and data gaps: Freshwater governance is highly fragmented, with varying challenges and approaches across jurisdictions as well as ecosystem data gaps. This leaves uncertainty around how to manage water resources in a coordinated way amidst growing systemic challenges and aging infrastructure.



Accelerating demand: Technological advancements – such as AI data centres – require vast amounts of water. As societies grow their technological capabilities, they are poised to face difficult decisions around freshwater access and how to appropriately allocate water rights.

Misconception of abundance: The idea that Canada has abundant freshwater is strongly entrenched in the public consciousness. However, Canada's water largely flows to the Arctic Ocean, is not significantly replenished by rainwater, and is unevenly distributed across the country. This perception of abundance may affect the willingness of Canadians to prepare for possible threats to our water resources.

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Potential research topics

To help protect Canada's freshwater systems, we will look across disciplines to understand and identify how Canada can evolve in its conception, use, and management of water. This research initiative seeks to bring together researchers to explore solutions and generate actionable insights on issues such as (but not limited to):

Ecological resilience

Climate extremes threaten every major watershed. Potential questions may include:

- How might projected climate extremes reshape freshwater quality and availability across Canada's major watersheds?
- How can new approaches to ecosystem monitoring and data transparency help alleviate existing information gaps, identify the cumulative effects of different water uses, and/or indicate early-warning signs of climate-related impacts?
- How do ecological restoration and/or nature-based solutions improve freshwater resilience under climate stress?

Technological opportunities and risks

Freshwater technologies create both new opportunities and risks for water management. Potential questions may include:

- How might decentralized or modular water infrastructure systems help strengthen resilience during global supply chain disruptions?
- How might new innovations – such as desalination, atmospheric water generation, advanced rainwater harvesting, or greywater reuse – impact water resilience?
- How can Canada leverage technology for water management while protecting sensitive resource data?

Governance and economics of water management

While governance of Canada's freshwater resources is highly fragmented across jurisdictions, coordination of watershed governance and economic instruments will be important for building water resilience. Potential questions may include:

- How can decision makers strengthen water governance systems, especially in the face of competing priorities and limited resources? What frameworks might facilitate collaboration across jurisdictions and help navigate difficult trade-offs?
- How might we strengthen the integrity of aging water infrastructure and the cybersecurity of its digital systems?
- How might economic mechanisms, such as freshwater markets or new investment tools, impact sustainable freshwater management?

Societal water access, uses, and perceptions

People rely on freshwater every day, but stewardship varies widely across the country and not everyone has reliable access. Nonetheless, everyone has a role to play in water system resilience. Potential questions may include:

- What new approaches might increase equitable access to freshwater across Canada?
- How might we reconceptualize freshwater stewardship in Canada to foster resilience amidst uncertainty?
- How do public messaging and community engagement shape the perception of freshwater availability? What framings have been most effective for mobilizing public action and behaviour change on freshwater issues in Canada?





About the CSA Explore Research Program

Explore is CSA Group's interdisciplinary, forward-looking research program, designed to respond to complex, emerging issues that transcend traditional boundaries. The CSA Explore Research Program convenes and supports experts from multiple disciplines to address systemic challenges on specific topics of relevance over the next decade and beyond. Individual research projects help advance discovery from the lens of their own disciplines. Together, their insights guide CSA's proactive response to future needs.

To learn more about the program and how to apply, please see: https://www.csagroup.org/standards/csa-research-centre/csa-explore-research-program/

The application deadline is June 1, 2026.

CSA Group always strives to provide up to date and accurate information. However, no representation or warranty, expressed or implied, is made that this information meets your specific needs and any reliance on this information is at your own risk. Please contact CSA Group for more information about our services.

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