



Global Water Futures Brief to the House of Commons Standing Committee on Environment and Sustainable Development's *Study on Freshwater*

Submitted by:

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On behalf of the Global Water Futures programme. www.globalwaterfutures.ca

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1. Introductory information


a) Which issues related to protecting and managing freshwater does your organization work on?

Global Water Futures is the world's largest university-led freshwater research program and it is Canadian funded and driven. The overarching goal is to deliver risk management solutions—informed by leading-edge water science and supported by innovative decision-making tools—to manage water futures in Canada and other cold regions where global warming is changing landscapes, ecosystems, and the water environment. GWF is advancing world class water and climate science in the fields of:

- **Hydrometeorology and Climate Change:** understanding how climate change influences water availability and extreme events through the development and application of high-resolution atmospheric models.
- **Hydrology and Terrestrial Ecosystems:** understanding how hydrological and terrestrial ecosystems will co-evolve under a changing climate, with diagnosis and prediction of hydro-ecological change being central to many of the projects.
- **Water Quality and Aquatic Ecosystems:** understanding and predicting water quality impacts and health of aquatic ecosystems in response to changing climate, hydrology, and land use.
- **Human–Water Systems:** integrating economic tools with water resources systems models to improve valuation of ecosystem services and to assess different policy conditions and governance strategies.
- **Water and Health:** understanding how changes in climate, extreme events, and water quality will affect human health, with special impacts in Indigenous communities,
- **Big Data for Water:** developing a national network of 60 water research observatories in different physiographic settings and ecological regions across Canada's major river basins by integrating existing sites operated by GWF partner institutions with a history of research that has produced extensive and long-term hydrometric, hydrometeorological, ecological, and geophysical datasets.
- **Decision Support Systems:** developing and engineering software systems and visualization tools for decision support systems to give our stakeholder communities targeted, user-friendly access to the capabilities of our novel data and modelling tools.

GWF focusses on three key areas: 1) delivering new capability for providing water-related disaster warning; 2) diagnosing and predicting change to water futures; and, 3) developing new models, tools and approaches to manage water-related risks in a time of global change.

GWF is developing new tools to help decision-makers predict future water supplies, prioritize investments in water infrastructure, assess flood risks, improve flood risk management and floodplain development, provide early disaster warnings, improve reservoir management, the implications of water decisions in trans-jurisdictional boundaries, and quantify environmental flows, as well as measure water contaminants, identify their sources, understand their health impacts, and offer earlier, more



specific warnings of chemical pollution. GWF provides scientific advice to federal agencies, provincial governments, municipalities, communities, and Indigenous peoples. GWF is working with Indigenous communities on co-developing water-related research using both western science and Indigenous knowledge. The programme has embedded principles of equity, diversity, and inclusion in its research, operations and knowledge mobilization.

2. Interaction and collaboration with federal departments and agencies

a) Does your organization interact with federal departments and/or agencies on freshwater issues? If so, on which issues and with which departments and/or agencies?


GWF has established an unprecedented network of collaboration amongst researchers from 18 Canadian universities and 8 federal agencies including Environment and Climate Change Canada (ECCC), Agriculture and Agri-Food Canada (AAFC), Health Canada and the Public Health Agency of Canada (PHAC), Parks Canada, Natural Resources Canada (NRCan), Canadian Space Agency (CSA), Crown-Indigenous Relations and Northern Affairs Canada (CIRNAC), and Public Safety and Emergency Preparedness. The GWF research strategy directly supports Canada's Environment and Agriculture priority, specifically Water: Health, Energy, and Security¹. Our research program also advances Climate Change Research and Technology and Disaster Mitigation by translating research into cutting-edge tools that will enable stakeholders to mitigate water threats. GWF adheres to the principles that guide Canada's Science, Technology, and Innovation Plan by focusing on research excellence, fostering partnerships through national and international alliances, and exerting a far-reaching economic impact by spawning new technologies and by supporting Canada's key economic sectors with decision-making and risk management tools.

ECCC has representation on the GWF Strategic Management Committee, shared facilities and office space, and a memorandum of understanding to frame the collaboration. Collaboration on water model development, flood forecasting, observational technologies, Great Lakes, Lake Winnipeg Basin, water quality, and extreme events has occurred with ECCC because of this agreement and shared facilities. Further, GWF's User Advisory Panel includes representation from ECCC, AAFC, NRCan, Public Safety and Emergency Preparedness, and Parks Canada. GWF has an MOU with NRCan that forms a framework for cooperation in collaborative investigations and scientific exchanges to support water futures research². Specific research on groundwater, glaciers, climate change adaptation, and flood plain mapping has been undertaken in collaboration with NRCan under this agreement. We collaborate with Health Canada to assess water-related health risks associated with climate change and extreme events. We have also established a close connection with the Canadian Council of Ministers of the Environment, which provides a forum for regular interactions among Canada's environment ministers.

GWF links the university sector to federal and provincial/territorial agencies to provide a wholly new level of national scientific and technical support to governments and communities. We publish technical and non-technical reports and summaries and hold regional and thematic workshops to share findings with partners in federal, provincial and territorial governments, inter-governmental basin agencies, non-governmental organizations, and Indigenous communities, governments and organizations.

¹ https://www.nserc-crsng.gc.ca/professors-professeurs/rpp-pp/spgtargetareas-spsdomainescibles_eng.asp

² <https://gwf.usask.ca/articles/2018/usask-nrcan-mou.php>



b) Do the specific freshwater issues targeted by your organization fit within the mandate of a given federal department and/or agency or do they relate to more than one department and/or agency? If more than one, have you been able to identify a lead department and/or agency with which to engage?

Freshwater science, and therefore GWF's connection, spans the portfolios of many federal departments and often several directorates, agencies and services within individual departments. Whilst we have been successful in developing relationships with many key departments and individuals, the dispersed nature of water mandates amongst departments creates a fragmented approach to communication, partnerships, and ultimately effective water management. As a result, GWF has significant expenditures of personnel time to communicate with a myriad of federal freshwater interests. This is inefficient and ineffective, and the various departments, directorates, agencies, and services have no central coordination. We are often sharing information from one department to another in order to provide sufficient background to address water issues. The federal government needs to establish a formal interdepartmental structure which is mandated to coordinate federal perspectives on freshwater priorities. The federal government should provide national leadership by coordinating freshwater efforts that are currently spread amongst several different federal departments into a centralized water agency, as well as facilitating collaboration with other levels of government key freshwater issues.

c) Have you encountered notable successes in engaging with the federal government on freshwater issues? If so, please specify. If you have not had success in doing so, what in your opinion is the reason (e.g., no program available tailored to your needs, no identifiable service or unit within a department and/or agency with which to engage)?

Some notable successes in connecting GWF research to ongoing initiatives of the federal government include:

- GWF has partnered with ECCC to advance and apply the Modélisation Environnementale communautaire - Surface Hydrology (MESH) model to predict freshwater in Canada's major river basins. GWF model advancement focuses on improving the framework to include most of the important physical attributes that the model needs to have. The focus is on cold regions processes (i.e., improving glacier representation, frozen soils, how to deal with snowpack, handling high-relief, complex terrain, etc.). This leads to the more operational system that ECCC is developing. ECCC is focused, in part, on prediction (providing guidance to the provinces from ECCC's central numerical weather prediction system and including hydrology and river flows). This is a system that has taken science advances from GWF and applies the model in a number of key river basins in Canada (Great Lakes–St. Lawrence, Saskatchewan–Nelson, the Mackenzie, the Yukon, and others).
- In partnership with AAFC, GWF researchers have developed the first of its kind pesticide dataset and exposure risk model for the entire prairie agricultural region, providing new information regarding pesticide concentrations in wetlands at an extent not previously available.


- GWF researchers have contributed phosphorus mass balance to the Adaptive Management Committee under Annex 4 of the Great Lakes Water Quality Agreement as the Governments of Canada and the U.S. determine how successful they have been at meeting a 40% phosphorus loading reduction goal for Lake Erie and how to improve the action plan moving forward.
- GWF researchers have developed a new collaboration with Parks Canada aimed at implementing use of water isotope tracers and other approaches to formalize a state-of-the-art Parks Canada–led aquatic ecosystem monitoring program for the Peace-Athabasca Delta. This is a significant knowledge translation achievement of our research program and will address science and monitoring needs for the Peace-Athabasca Delta recognized by international (UNESCO) and national (Parks Canada) agencies.
- GWF researchers have pivoted research on developing environmental DNA techniques to focus on timely methodology for wastewater-based epidemiology to monitor SARS-CoV-2 (the virus causing COVID-19) as an early warning of infection outbreaks. The work has contributed to the national Advisory Committee established by the Canadian COVID-19 Wastewater Collation, direct advice to PHAC Working Groups, and is being further funded by the PHAC to deliver surveillance projects in Saskatchewan and Ontario.

Some failures of engaging with the Government of Canada on freshwater include attempting to access water quality information in a comprehensive way (current water quality databases are not centralized, hard to access, and poorly coordinated).

d) Do you foresee engaging with the new Canada Water Agency? If so, in what way? What are your organization’s expectations with respect to the Agency?

The new Canada Water Agency is critical to facilitating and convening collaborative solutions to Canada’s climate-water crisis. GWF is happy to see the Government of Canada commitment to establishing the Agency and foresees a huge opportunity to transfer science, tools, and decision support systems being built within the program to a central and overarching agency for operational applications. GWF is interested and willing to engage with the Canada Water Agency as research/knowledge generation partners and providers; data providers, data managers, and data users; and, predictive model and decision support tool developers. GWF sees the following benefits accruing through the establishment of the new Canada Water Agency: research-bridging with policy and practice through enhanced stakeholder co-ordination and support for evidence-informed decision-making; shared data and knowledge; access to partnerships with ministries, provinces, and territories for transdisciplinary and trans-sectoral data and research; and, research and targeted studies funding.

As one example, GWF committed to develop a national water forecasting and prediction system, and to work with ECCC on their national flow guidance system. Through successful pilots in the Mackenzie and Yukon rivers this system is novel and cutting-edge for Canada, representing unprecedented technological sophistication and advances in cold-regions processes that better predict changes in climate-induced flow regimes. Next steps are to extend this approach to other river basins in Canada and we foresee the federal government playing an increased role in providing the best available



modelling and prediction science as pan-Canadian support services to provincial flow forecasting operations.

We hope that the Canada Water Agency engages with the academic sector through co-location of Agency functions with university water laboratories, research funding subventions through tri-council or Grants and Contributions agreements to the academic sector to support the Agency and through support of university research chairs and centres that can provide capacity and resource to inform Agency functions.



3. Federal water legislation, policies and regulations

a) Does your organization interact with federal departments and/or agencies on policies, legislation, regulations, or funding programs related to freshwater? If so, please specify.


GWF is a university-led science program and as such is funded by and reports to federal tri-council programs, primarily through the Canada First Research Excellence Fund award of \$78M over 2016-2023. Many GWF researchers have also leveraged other federal funding envelopes to support their research programs, such as NSERC, SSHRC, Canada Foundation for Innovation, and Western Economic Diversification Canada.

Many GWF scientists are called upon by federal government scientists and policy analysts as experts in their fields and often provide data, publications, briefs, and scientific advice that contribute to updating federal policies and programs, especially with respect to the ministries of ECCC, AAFC, NRCan, and others (question 2). GWF also has formal agreements for scientific inquiry in partnership with ECCC and NRCan (question 2).

b) Can you identify any current gaps in federal water legislation, policies, regulations, and/or initiatives, or in general across jurisdictions? If so, please specify.

To align Canada's water management with the challenges of the 21st century, legislative reform is critical and must begin with renewal of the *Canada Water Act*, the federal government's primary freshwater legislation which has not been updated since first proclaimed in 1970. The modernization of the Act can begin by addressing large gaps in the current legislation, through:

- Broadening its focus on all aspects of water quality and quantity at the river basin level by creating provisions that explicitly recognize the imperative of governing and managing water in a way that meets Canada's climate change commitments, safeguards ecological integrity, and serves the best interests of present and future generations of Canadians.
- Including provisions to **enhance river basin planning** by bolstering opportunities for partnership and collaborative agreements between the federal government and provincial, territorial, and Indigenous governments.
- Undertaking a **legislative co-drafting process with Indigenous Nations** that is consent-based, rooted in nation-to-nation relationships, and consistent with the United Nations Declaration on the Rights of Indigenous Peoples (UNDRIP)
- Integrating **climate resilience and risk mitigation** into all federal water programs, including infrastructure investments, disaster planning, insurance programs, agriculture and industrial commitments, and military and national security assessments.
- Co-ordinating national support for **integrated flood and drought monitoring**.

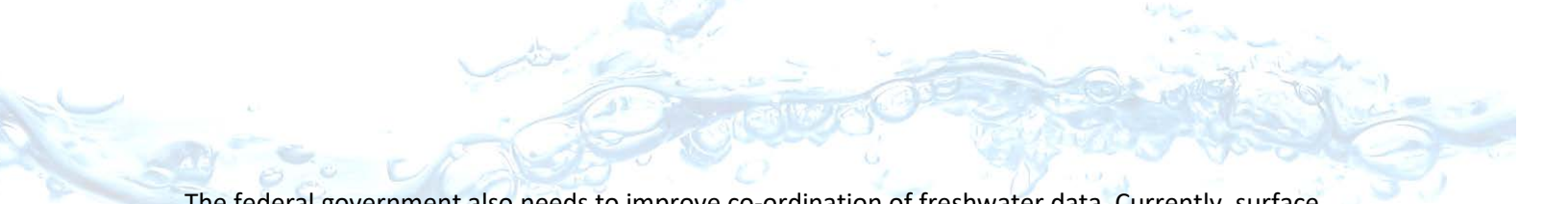
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- Mandating **gender-based analysis plus** (GBA+) in policy and programming design and in evidence-based recommendations
 - Committing to social and **health vulnerability assessments** based on intersecting identities and vulnerabilities.
 - **Enshrining the new Canada Water Agency** and its supporting pieces, including a Chief Water Sustainability Officer, in the renewed *Canada Water Act* and codifying provisions that mandate the Agency to report regularly and publicly on issues of particular concern and ensure transparency of key information related to the state of Canada's waters.

Renewal of the *Canada Water Act* should take precedence, but many other aspects of federal water law and policy are similarly outdated and in need of renewal. The 1987 Federal Water Policy is outdated with respect to climate change adaptation and the increasing role of the private insurance industry in flood risk mitigation and damage reduction, and advances an extremely outdated approach to Indigenous water rights, responsibilities, and governance roles. Other water-related legislation also suffers from serious deficiencies: toxic substance regulation is inadequate under the *Canadian Environmental Protection Act*, while the *Safe Drinking Water for First Nations Act* fails to account for source water protection off-reserve, the need to protect these waters, and to predict when water quality is unsafe for the aquatic ecosystem and human use.

c) Do you feel the federal government could play a more effective role in protecting watersheds in Canada? If so, which watersheds and how?

The federal government has an opportunity to play a leadership and convening role to strengthen interjurisdictional and transboundary water management by prioritizing healthy and intact river basins, as well as committing capacity to anticipate, investigate, avoid and resolve water-related disputes; providing national-scale leadership and guidance on water-related climate change adaptation strategies, including flood damage reduction; and, providing guidance regarding the introduction of international best practices in Canadian water management.

The federal government should also focus on building and providing a cooperative national water quantity and quality forecasting system. Provincial and federal governments are both investing in hydrometeorological and streamflow forecasting to increase capacity for accurate predictions and reduce risk to public infrastructure and health. Drought forecasting is conducted in AAFC but not connected to streamflow forecasting. Water quality predictions are in their infancy. It makes sense to realize economies of scale by pooling resources to create a Canada-wide water forecasting system and to develop a community of practice around this. A national flood, drought, water use, and water quality forecasting system must be backed by information and data that is critical for decision-makers in reducing and quantifying uncertainty, including integrated atmospheric models or forcing data, hydrological and water quality models, river models, small lake/large lake/reservoir models, and water economic and management models. The federal government can help provide equal access to this best-available modelling and water predictions to provinces and territories which would increase their capacity to inform forecasts, warnings, and timely best decisions to protect public health and infrastructure.



The federal government also needs to improve co-ordination of freshwater data. Currently, surface water quantity data are well archived by the Water Survey of Canada but this archive needs to be supplemented by currently inadequately archived data on groundwater, glaciers, snowpacks, water quality, icecover, and water use to form a comprehensive national water database.

d) Are there areas of freshwater policy, legislation and/or regulation where you feel the federal government should play a greater role?

Please consider our answers to 2b above as also relevant to this question.

e) Are there areas of freshwater policy, legislation and/or regulation that you feel the federal government should vacate and leave to another level of government or to the private sector?


The federal government needs to re-establish its jurisdiction in areas abandoned in the 1990s, not retreat further. The lack of federal leadership on water in the last quarter century is directly responsible for many regional water crises in Canada. The one area where the federal government should share current jurisdiction is with Indigenous nations, with whom some transboundary water management and development approval processes should be shared.

f) Are you aware of instances where federal freshwater policy, legislation, regulations, and/or initiatives have clearly benefited from your organization's input?

GWF undertakes frequent collaboration and interactions with Government of Canada scientists and policy analysts to connect science advances to the priority issues under the purview of the federal government. Some specific examples of GWF and Government of Canada collaborations with benefits to federal initiatives include:

As part of the work to support ECCC in its national flow guidance system (question 2d), ECCC has adopted the MESH modelling framework used in the Mackenzie River in their own operational system. A pilot project in partnership with ECCC and Yukon Environment set up, calibrated, validated, and operationalized a coupled version of GEM-MESH as an operational streamflow forecasting system for the Yukon River and its tributaries. The forecast system is run on Amazon Web Services to provide daily streamflow predictions to the Yukon Government. This system is novel and cutting-edge for Canada, representing unprecedented technological sophistication, including glaciers and frozen soil impacts on streamflow, and a strong collaboration with a territorial flood-forecasting agency.

In 2018 GWF organized a national meeting of scientists from ECCC, Statistics Canada, and Agriculture and Agri-Food Canada to evaluate how GWF and federal departments can better coordinate to promote more effective national water security research and development. A highlight of the meeting was the signing of an MOU between GWF and NRCan that forms a framework for cooperation in collaborative investigations and scientific exchanges to support water futures research. GWF has worked closely with federal, provincial, and territorial partners to develop national-scale capability and consistency. In 2019, GWF led and organized with ECCC and NSERC's FloodNet, an unprecedented National Workshop on Flow



Forecasting that included participation by streamflow forecasters from every Canadian province and territory, many from industry, ECCC, the hydrological modelling researchers in the GWF network. Workshop participants found advantages to pooling information products and resources for a Canada-wide community of practice to support forecasting as well as linking provinces/territories, federal government, and universities to help with development and coordination. GWF committed to enhancing models for forecasting systems and is strengthening partnerships to test and implement these systems with the provinces/territories, industry, and ECCC. A second workshop was convened in early 2021 with interest from all to continue annual working meetings.



4. Collection of information and data

a) Do you believe that there is sufficient data collected and made available publicly about freshwater in Canada?

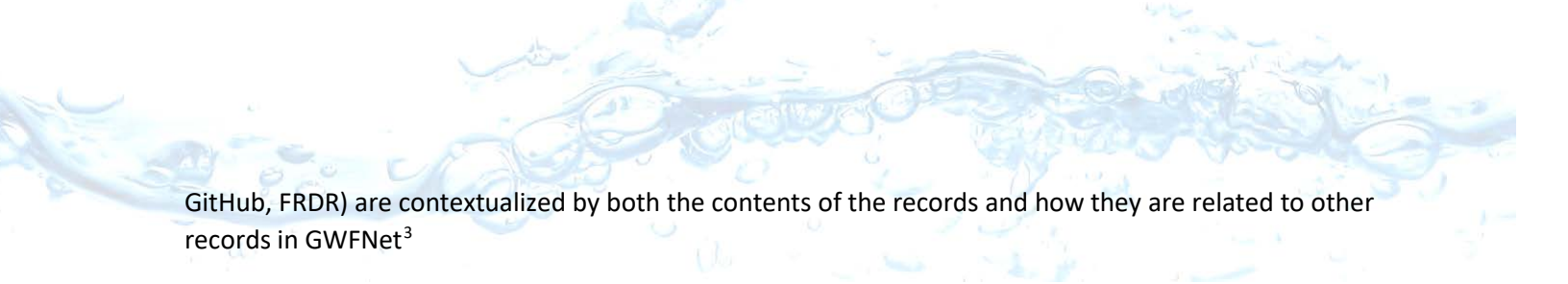
The federal government needs to improve co-ordination of freshwater data. Currently, surface water quantity data are well archived by the Water Survey of Canada but this archive needs to be supplemented by currently inadequately archived data on groundwater, glaciers, snowpacks, water quality, icecover, water use to form a comprehensive national water database. Canada also has significant water data that are dispersed, inaccessible, or not being fully utilized. There are historic data, data being collected within different government agencies, data collected with different standards and protocols, data locked in inaccessible databases, and privately owned data. The reuse of old data would need investment in consolidating, standardizing, and digitizing. There is tremendous potential in bringing these all together, mining data, and making data generally more publicly accessible.

More data are always useful for identifying issues, accessing threats, producing trends over time, and making better decisions, especially when biophysical and social data can be brought together. There are still many gaps in baseline data, monitoring programs, and infrastructure. As priorities, we need pan-Canadian floodplain, groundwater aquifer, wetland, and soil mapping, and consistent, available LiDAR and aerial imagery across jurisdictions along with locations of vulnerable infrastructure and building opening elevations. It is also critical to support Indigenous science methods, data, and information and the braiding of western and Indigenous science.

Data collected needs to meet international standards and be interoperable especially across data managers/users in shared basins for more effective integrated assessments that can identify cumulative effects and climate change impacts.

b) Do you believe there should be improvement in freshwater-related data-sharing?

Open data / open government policies are beginning to break down data silos, but logistical challenges of standardization, organization, storage, ownership, etc. remain. This is especially inhibiting for trend-analysis and decision making in shared basins with many data collectors and managers. The federal government can play a role in bringing existing data together. The GWFNet system under development by GWF provides a model for how this can be designed. GWFNet is a catalogue to extract and relate records on Canadian water science research, from special index records used to form hierarchical categories of information (Indigenous co-led research, ongoing model research, legacy research, research sites, etc.) to records on research groups, datasets, hydrological models, basins, observatories, stations, measurement locations, and key researchers and expertise; external links to other websites, wiki pages, federated repositories and other catalogues containing information (e.g., DataStream,



GitHub, FRDR) are contextualized by both the contents of the records and how they are related to other records in GWFNet³

Physical and biological data on water needs to be supplemented with socio-economic data to advance nuanced vulnerability assessments and adaptation strategies and to develop regional and national solutions to water problems.

c) Is there any specific type of data or information you would like the federal government to provide to freshwater stakeholders?

There is a need for a national water quality data platform and portal to search and access data and to document metadata and other related information. These data are currently dispersed and fragmented, posing a major challenge for scientists to track changes and to understand water quality drivers in different parts of Canada. This can be informed by a water quality data assessment at the national scale and a scoping workshop to frame out how to advance this. This should be integrated with water quantity data that is easily accessible from the Water Survey of Canada, and meteorological and landuse and cover data to align time periods, spatial extents, etc.

The federal government is also uniquely poised to bring together data dispersed among jurisdictions and scales to provide the big-picture set of conditions, needs, and threats across the country. With this pan-Canadian view, the federal government can provide value added data analyses, mobilization, and transfer to different audiences to ensure integration of evidence into decision-making. New information and communication products that help users understand the consequences of actions (and inactions) and that alert the public to emergency preparedness needs and health and safety threats (floods, toxic algal blooms, etc.).

d) Has your organization experienced challenges obtaining well-organized data from the federal government on issues relating to freshwater?

Yes, whilst water quantity data are easily accessible, groundwater, glacier, lake ice, water quality, and water use data are not easily available, and are not organized on the river basin basis, and not well organized.

e) Is the lack of standardized data or information across government jurisdictions a problem or challenge for your organization in accomplishing its objectives with respect to protecting and managing freshwater?

The lack of a centrally organized, open, searchable and comprehensive Canada water database has set research behind by decades and impedes the ability of Canada to quantify if it is in a water crisis and how to develop solutions to water problems. It is a national embarrassment.

³ <https://gwfnet.net/>



5. International and business issues

a) Should Canada play a greater role internationally in helping find solutions, either through government and/or the private-sector involvement, to the challenge of global freshwater security?

Canada is home to water-related research capacity, expertise, technologies, and industries that are key to solving the water-climate crisis and achieving sustainable water management in Canada, but which can also support other nation states to sustainably manage their water resources for the economy, healthy populations, and the environment. Opportunities exist to export made-in-Canada solutions through trade and international development.


Canada can reinvent itself on the world stage by using what we know about treating and managing water as a vehicle for expanding trade, while at the same time use our expanding expertise to model Canada's diplomatic and international development objectives. Canada has great experience in water management as it relates to international development and the increase in conflicts over water. Canada can model to the world:

- Lessons learned from a federal structure for transboundary water management.
- Solutions to addressing Indigenous rights to water in transboundary water management systems that address the UN Declaration on the Rights of Indigenous People.
- The example of a century of successful joint management of international North American waters, the Canada-US International Joint Commission, which can be applied to transboundary water management.

There are many existing opportunities through partnerships with the UN and UNESCO whereby Canada can support the international science agenda on glacier and high mountain snow and hydrological prediction programs. Through initiatives like the GWF program there is further opportunity to collaborate on water equity issues; world water balance and the water resources of the earth; hazard mapping of the glaciers; science policy; and, Indigenous water issues. Canada can also continue to support the UN Recommendation on Open Science to share access to the latest science and technology, data and information which will become one of the biggest contributions in decreasing the knowledge gap. A Trust Fund for Water would elevate Canada to the ranks of other countries and governments that bring together like-minded people to promote collaboration, cooperation, and sharing of information.

b) Do you feel Canadian private-sector companies, including financial institutions, can and should play a role internationally?

Canada has a wealth of private sector expertise within top-ranking engineering firms and environmental consultants that can respond to international needs to adapt water infrastructure to address climate change and development issues. The effective deployment of Canada's private sector skills in a highly competitive market requires the federal government to develop a coordinated framework that



champions Canada's culture of environmental innovation and which supports and sells our experiences, skills, capabilities, and expertise in the water sector.

c) What role can the federal government play in better supporting freshwater-related academic research, R&D, businesses, products, and services?

There is significant water research and monitoring strengths within academic institutions which can be harnessed to better inform governmental science, policy, and program development. Current federally-supported water research projects are time-limited and not renewable. There is a pressing need to ensure long-term national water research and development by reestablishing water research subvention programs through the Tri-Council federal research agencies. These funds are critical to developing centres of excellence in water science and technology for observing, understanding, and predicting future changes in water, including new integrated global water modelling.

Water is a critical input in many of Canada's most productive and important industries, but water use in economic sectors can also have significant impacts on water quality, the health of aquatic ecosystems, and therefore the health of individuals and communities. Monitoring changes in water quality and quantity is crucial, particularly given the changing demand for water resources due to economic factors, resource development, and ongoing changes in precipitation, temperature patterns, and extreme weather events due to climate change. Prioritizing water security in the form of clean, abundant water resources can only have positive benefits for the economic sectors that rely on it. The federal government has an important role to play supporting economic sectors in the development and implementation of sector-specific and innovative freshwater sustainability strategies. It should provide additional funding for research and development of innovative technologies, and their implementation, in all of economic sectors to promote sustainable freshwater management.

A Canada Water Agency through its water information service and predictions can be a catalyst for R&D outside of the government sector to help in addressing the myriad water problems afflicting Canadians. There is a substantial academic water science sector that has developed under GWF funding (180 professors, 970 students and researchers) that will be available for deployment when GWF ends in 2023. The CWA could capitalize on this capacity before it disperses to bring this significant talent and knowledge reservoir to bear on urgent water problems facing Canadians.