Brief concerning the potential creation of a Canada Water Agency

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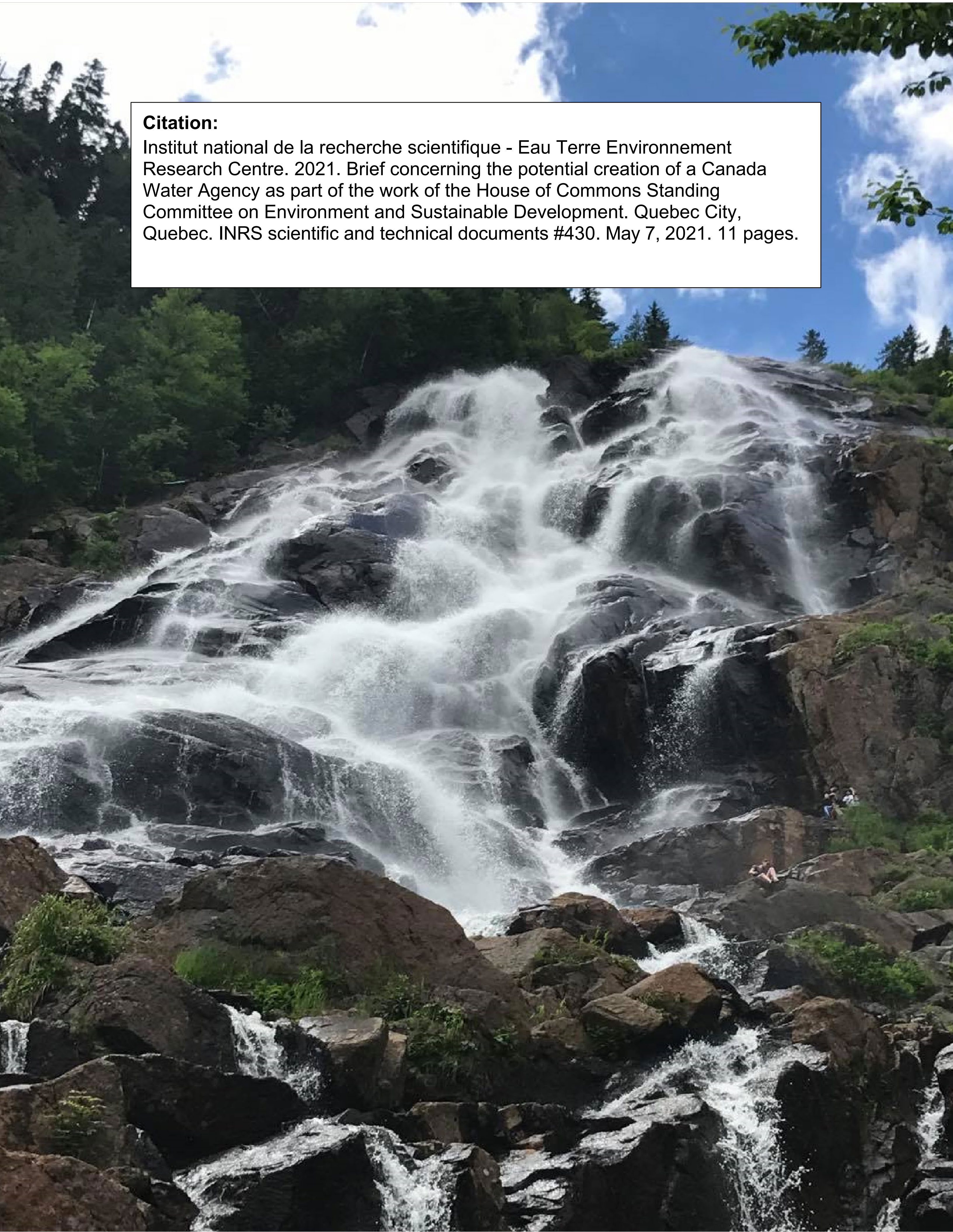

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About the Eau Terre Environnement Research Centre of the INRS

Founded more than 50 years ago, the Institut national de la recherche scientifique (INRS) is a university whose mission is to conduct fundamental and applied research for the cultural, economic and social development of Quebec through its graduate programs and the training of researchers. As its name indicates, a large part of the training and research at the Eau Terre Environnement Research Centre of the INRS deals with various fundamental and contemporary issues related to water. Sustainable water resource management is therefore one of the priorities of the Centre, which has one of the highest concentrations of university experts in this field in Canada. In contrast with other faculties, departments or research groups, the INRS research program touches on all aspects of water. The 2020–2025 strategic plan of the Eau Terre Environnement Research Centre of the INRS outlines the following priority research axes with water as a main theme:

1) hydroclimatology;
2) environmental technologies;
3) ecology, ecotoxicology and environmental genomics; and
4) geomatics and remote sensing.

In addition, our centre is a member of all the water-themed strategic research groups (e.g., CentrEau, RIISQ). The management of the EcotoQ network, a strategic group of Canadian and international ecotoxicology researchers, is overseen by a member of our faculty, as is that of the Environmental Decontamination Technologies and Integrated Water and Wastewater Management (TEDGIEER) program. With that expertise, the Eau Terre Environnement Research Centre of the INRS is well positioned to be a key partner of the Canada Water Agency (CWA).

Critical analysis of the consultation paper on the Canada Water Agency

In this brief, we describe the possible form of the partnership mentioned above. We also provide a critical and constructive analysis of the objectives introduced in the discussion paper published by Environment and Climate Change Canada (ECCC), entitled *Toward the Creation of a Canada Water Agency*.

According to the documents available, the CWA’s actions could include

- prioritizing scientific research needs around urgent national challenges relating to fresh water;
- taking freshwater management challenges into account; and
- mobilizing scientific knowledge to align it with users’ needs.

Although there are a number of challenges and needs at various levels, the approach of the Eau Terre Environnement Research Centre of the INRS complies with the respective jurisdictions of Canada's various levels of government. Thus, the Canadian Constitution recognizes that the provinces are the main trustees of water resources. However, the federal government has responsibilities related to the management of transboundary watersheds, international treaties, navigation and fisheries, among others. In addition, there are areas that have an impact on land use and, consequently, on water resources that are under shared jurisdiction (forestry, agriculture, etc.). Many Canadian municipalities—or supra-municipal organizations—are also very active in water management through their provision of drinking water services, wastewater management and its treatment prior to its return to natural waterways, as well as at rainwater management. Water management in Canada is therefore a complex issue that requires careful coordination among all government players. The new Canada Water Agency must obviously take note of and respect provincial jurisdictions.

In many cases, water crosses administrative boundaries drawn by human beings. Interprovincial cooperation is desirable in many respects, and the CWA could play an important role in this. Examples of cooperative structures already exist in Canada, and the CWA could use them as a model. For example, the Canadian Council of Ministers of the Environment (CCME) works collaboratively on environmental issues of national and international concern. The CCME coordinates some interprovincial efforts on air quality and climate change and sets Canada-wide objectives through its Canadian Environmental Quality Guidelines. This model could be used as a basis for structuring the CWA. Another example common to some provinces (e.g., Quebec, Ontario) involves water management through watersheds, within organizations that are well rooted in their communities and that bring together various experts and managers from the municipalities concerned. This is a model that transcends the boundaries of human politics and better respects the issues of water movement driven by geophysical constraints.

Mandate of a new Canada Water Agency

The mandate of a new Canada Water Agency will need to be defined. We believe that the CWA's responsibilities could include, but not just be limited to, the following themes, in priority:

1. Coordination of pan-Canadian research;
2. Canadian contribution to international research, particularly in support of emerging countries;
3. The multiple facets linking water management and climate change, including volumetric issues, quality issues, changes in precipitation regimes or in adaptation and land use planning (in partnership with the provinces);

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4. Water and agriculture (jointly with the provinces);
5. Aquatic ecosystems in the North and on First Nations territories;
6. The federation and quality control of hydrometric and water quality databases (in partnership with the provinces, particularly for follow-up data on pesticides or other emerging contaminants or programs to acquire knowledge of groundwater dispersed on the territory);
7. Groundwater research deserves more sustained and ongoing research. Characterization of groundwater use and recharge is a major strategic issue, particularly in the context of climate change. The creation of a national monitoring program would be a good example of integrating scientific knowledge into the management of this valuable resource;
8. The inclusion of citizen science (with the provinces) in modern monitoring and sampling methods;
9. The use of natural infrastructure (e.g., isolated and riparian wetlands) and phytotechnologies as methods of water regulation (purification, retention, groundwater recharge, etc.), including by perpetuating the investments made in this area in the Natural Infrastructure Fund matched by investments in the 2020–2030 Capital Plan of the Quebec Treasury Board; and
10. The CWA could also become an agency that facilitates access to research and project funding for all water-related issues.

There has been a recent paradigm shift in infrastructure budgeting and recognition of natural infrastructure by federal and provincial governments, in recognition of the ecological services provided by nature, particularly in water management. In the 2021 federal budget, a Natural Infrastructure Fund was introduced. Bridges, roads and buildings are not the only infrastructure recognized by the Government of Canada; it also recognizes natural infrastructure, such as parks, green spaces and waterfronts, as essential to making our communities livable. The Natural Infrastructure Fund will be created by providing $200 million over three years, starting in 2021–2022, to Infrastructure Canada. The objective of this fund will be to help improve well-being, mitigate the impacts of climate change and prevent costly natural disasters. The Quebec Treasury Board's 2020–2030 Capital Plan provides $343 million for 2020–2021 to ensure Quebec's contribution to projects that will be submitted to the federal fund.

The Eau Terre Environnement Research Centre of the INRS as a regional centre of expertise in Quebec

The discussion paper prepared by the federal government raises the possibility of a relatively decentralized structure for the CWA, with the creation of <u>regional centres of expertise</u>. These centres would develop research programs that are well

aligned with the specific priorities of each region. The most efficient way to set them up would be to use existing research centres. The first step (within the next year) would be to establish an agreement with regional partners to create these centres of expertise. For Quebec, the Eau Terre Environnement (ETE) Research Centre of the INRS is the ideal institution to host such a centre.

- The ETE Research Centre is the only graduate university centre that is entirely dedicated to research in water, environmental and earth sciences in Canada.
- Unlike other faculties, departments or research groups, the INRS research program touches on all aspects of water.
- Our faculty includes about 30 professors working in the field.
- There are a large number of researchers from the federal government (Geological Survey of Canada) we have already partnered with on research in hydrogeology and other areas.
- Researchers from other federal departments are adjunct professors at the ETE Research Centre [Agriculture and Agri-Food Canada (AAFC), Environment Canada (ECCC), and the Department of Fisheries and Oceans (DFO)].
- Research collaborations have already been established with all federal departments with water-related responsibilities.
- Numerous collaborations with provincial ministries and municipal water departments in Quebec have also been established.

Objectives of the CWA

The discussion paper proposes the following 10 objectives for the new CWA:

1. *Federal policies promote effective management and protection of freshwater resources and ecosystems in Canada for 21st century challenges and beyond— including adapting to climate change.*
2. *Canada has a state of the art prediction system for floods and droughts that informs climate change adaptation and disaster risk reduction.*
3. *Indigenous peoples play an increased role in the management of Canada's fresh water.*
4. *Canada is a leader in sustainable agricultural water management.*
5. *Canada's economic sectors have the fresh water they need to grow sustainably, and the tools they need to improve freshwater management and use.*
6. *Canada has and applies cutting edge science to tackle the freshwater challenges of the next century, including climate change.*
7. *Data and information are available to support informed freshwater decisionmaking at all levels.*

8. Collaborative arrangements are in place and support effective management of domestic and Canada-U.S. transboundary fresh waters.
9. Canada is a global leader in freshwater technology, innovation, and infrastructure.
10. Canadians are actively engaged in managing and protecting fresh water.

While all of these objectives are laudable, some are very general and policy-related (e.g., objectives 1 and 8), while others are very specific and technical (e.g., Objective 2).

With regard to Objective 1, some context is warranted. There is a federal water policy, but it is more than 30 years old and could use an update. The same is true for the *Canada Water Act*, which also needs to be updated. In its current form, this legislation does not reflect the urgency of climate change or the Canadian government's committed role in reconciliation with Indigenous peoples. Recent announcements regarding the right to a healthy environment in the announced reform of the *Canadian Environmental Protection Act* are commendable. The CWA could play a key role in those parts of the Act concerning water protection.

Objective 2 appears to us to be much more specific than the others. In French, the terms "prédiction" (prediction) and "prévision" (forecast) are not interchangeable. "Prediction" refers to the modelling of the probabilities of occurrence of events and the probabilities of their intensities in the future. Prediction depends heavily on climate change, whereas forecasting is done in an operational framework with time steps that can be very short (e.g., for the next day). It would be desirable to specify the time horizons targeted and, at the same time, to define whether the emphasis would be on predicting or forecasting.

It should be noted that this is only one component of what is needed in Canada to address freshwater management issues. If the focus is on modelling, it must be toward an integrated approach (across multiple spatial, temporal and trophic scales). While we do not discuss the importance of better understanding changes in extremes, we wish to point out that evaluation of these changes relative to a well-documented reference period is paramount.

Non-stationarity must be taken into account in projection systems. Similarly, it is necessary to include cumulative impacts, taking into account not only changes in the hydrological regime, but also impacts on water quality and ecosystem functions and services.

Objective 3 is obviously of primary importance in the current context. Our centre works with numerous First Nations and Inuit communities on water-related

projects. We encourage the federal government to be more specific in stating this objective and to recognize the importance of including Indigenous people in consultations concerning the creation of a CWA and their involvement in subsequent decision-making. Based on the collaborative experience of our researchers, we believe there is a unique opportunity to advance knowledge about freshwater management by incorporating the traditional knowledge and values of these nations into the strategy and vision of a CWA. *Note that more and more Indigenous Protected Area projects are incorporating holistic protection of both land (freshwater) and marine territories; that is certainly an important innovation in water governance in Canada that the CWA could use as a model*.

Objective 4 could, in our view, be better defined. Water issues in agriculture are numerous and developing rapidly. In Canada, the challenges related to water and agriculture vary from region to region, depending on drainage and irrigation needs. Note that many water quality-related monitoring activities, such as pesticide monitoring in agricultural areas and regionalized sales reports, are innovations that originated in Quebec and have been adopted by the rest of the country to ensure proper monitoring of water quality and human health epidemiological issues. Improved monitoring methods across the country, based on Quebec's best practices, would certainly be useful to federal agencies responsible for pesticide registration, including the Pest Management Regulatory Agency.

Objective 5 focuses on water supply challenges and includes the need for new management tools. In both cases, these objectives can be achieved through the development of regional centres, which will be more in tune with local challenges, with appropriate application of the principle of subsidiarity. The governance of water as a common good and not strictly a market commodity would be a worthwhile goal for the CWA, since it is a matter of Canada's national security, particularly with respect to free trade agreements. The royalties collected on drinking water from bottling companies and large water users across the country should be used to fund better water conservation and the restoration of degraded freshwater ecosystems across the country.

We believe that Objective 6 is vital. However, it must be implemented in light of the many research initiatives already underway. We believe that identifying the research groups and networks working in this area would be a good first step. The CWA's first priority could be to avoid duplication in this vast field of research.

Objective 7 is also critical. Environment and Climate Change Canada is the department responsible for monitoring and compiling information on water quality, flow and levels in rivers and lakes under federal jurisdiction. This department, along with other departments (e.g., Health Canada) and groups (e.g., the CCME),

promulgates water quality guidelines and establishes sustainable development objectives. We believe that one of the serious shortcomings of the current system is the lack of coordination among non-government initiatives. For example, the Eau Terre Environnement Research Centre of the INRS has set up a water temperature monitoring network (RivTemp: http://rivtemp.ca/?lang=en) in Eastern Canada. A number of provincial ministries, other universities and several non-profit organizations have also established water quality databases (e.g., DataStream, created by the Gordon Foundation: https://gordonfoundation.ca/initiatives/datastream/). Coordinating and federating all of these monitoring efforts is an ambitious project, but one that would add real value to the data collected across Canada. The CWA could develop and disseminate protocols to standardize the quality of the data collected. Sharing water data in real time and through open access should be a priority for the CWA, as it would improve the use of data by researchers and citizens interested in these issues.

Objective 8, while essential to the sound management of transboundary basins, including the St. Lawrence–Great Lakes watershed, appears to be a mere duplication of the role already played by the International Joint Commission (IJC). It would be a shame to duplicate an existing, functional and recognized structure. However, there are many emerging issues, particularly from the political cycle on both sides of the border, that remain critical and it is crucial for the CWA to help sustain the work and funding of the IJC, regardless of the geopolitical issues that arise.

The implementation of Objective 9 appears to be closely linked to Objective 6, and these two objectives could be merged by simply stating that the CWA will facilitate research and innovation in areas related to water technologies and infrastructure. However, the CWA must also recognize the critical importance of basic research in water-related fields. Lastly, a paradigm shift has been occurring at the federal level in recent years with the budgeting of natural infrastructure within the country's traditional infrastructure budgets. We note that one of the mandates of the CWA could be to continue this transition to ensure sustainable funding for natural infrastructure that contributes to water management. Indeed, numerous studies demonstrate the economic benefits of natural infrastructure that contributes to water management in relation to grey infrastructure. For example, the Municipal Natural Asset Initiative (MNAI) project evaluated the economic gains that could be made by integrating natural infrastructure into municipal infrastructure budgets (12 case studies were conducted across Canada) to mitigate issues such as flooding. Wetlands and forests must be seen as essential water management infrastructure that must be protected to maintain our country's economic competitiveness in the context of climate change adaptation. In more anthropized

environments, water management can be improved through phytotechnologies (bioretention, vegetated ditches, vegetated walls, riparian strips, etc.) that complement other natural infrastructure (forests, marshes, trees, etc.).

The last objective (Objective 10) is very promising, in our opinion. Citizen science is booming in Canada. However, efforts to include the public in water management are too often hampered by a lack of funding. This lack of funding is particularly true for Canada's northern regions. Not only is monitoring difficult in these regions without the involvement of local communities that know the territory, but participative water management in these territories could benefit from the inclusion of traditional knowledge if adequate funding becomes available. A program promoting citizen science, developed by the Fonds de recherche du Québec (FRQ) (Quebec research fund) could serve as a model for federal agencies, especially for the deployment of projects related to all facets of water that will be mandated to the CWA.

Conclusion

The Eau Terre Environnement Research Centre of the INRS is excited about the potential for collaboration generated by the implementation of a Canada Water Agency. Our Centre is ready to play a leading role in its implementation. We believe that it is the ideal partner to develop a Regional Centre with the CWA. Our scientific programming is part of an approach that recognizes the importance of multidisciplinarity. We can significantly contribute to achieving the objectives of the CWA and are available to develop the basis for this collaboration.

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