



GLOBAL WATER FUTURES

SOLUTIONS TO WATER THREATS IN AN ERA OF GLOBAL CHANGE



Water Security for Canadians

This document is a consolidated account of the breakout sessions held during the virtual workshop *Agriculture Considerations for the Canada Water Agency* on June 25, 2020. Content was derived from 21 breakout sessions with approximately 150 people. Attendance included diverse participation of university students and faculty, politicians, water professionals, all levels of government and non-for-profit organizations, and individuals. The content highlights common threads of conversation, organized by the [Government of Canada's PlaceSpeak engagement questions](#), and is not listed in any particular order, level of importance or number of references.

1. From an agricultural perspective, what are the most pressing freshwater challenges nationally, and in your region of Canada?

Water consumption

- We have good data on allocation, and this is what is often used in planning and management, but this can vary from what is actually consumed and/or returned to water systems.

Disconnect between federal and provincial policies

- Some provinces have networks while others do not or are currently working on it; we need financial support for provinces that contribute toward national action.
- There is a disconnect between provincial and federal policies, but the water issues/challenges exist at the local/municipal level. It is imperative the Canada Water Agency manages at this level.

Flooding

- We lack pan-Canadian flood mapping to support management and adaptation.

Groundwater

- Groundwater use tends to get less attention than surface water, but it is spatially important for agricultural and other rural needs.
- National level comparisons are lacking so we can't understand what is happening across the country.
- There are too many boil water orders/advisories across the country.

- Nitrogen in groundwater has been neglected (i.e., in ON and eastern Canada) and is a pressing concern. We need to manage more than a single nutrient at a time (i.e., look at multiple contaminants and their interactions).

Nutrient loading

- Algae blooms are a growing problem that requires reducing the transport of contaminants to lakes.
- Agronomic phosphorus needs are larger than what is safe for waters. We need to do better at balancing agriculture production and water quality.
- Concerns about farmers' compliance with water pollution regulations. It is an increasing challenge for farmers to reach new guidelines, and for farmers to face public opinions on nutrient pollution.
- We need strategies for addressing and managing legacy phosphorus.
- We have a short growing season in the prairies, but a lot of water contributes to the landscape in the winter. Can we reduce soil moisture waste with winter water accumulation and needs for the growing season?

Green infrastructure

- We lack consistent codes of practice and national strategies across the country.

Climate change

- Extreme weather events are the major problem for farmers (droughts and floods) and at this moment we are particularly unprepared for the decadal scale droughts which are predicted.
- Concern for how climate change may drive changing agricultural practices and how these changes will affect water quality and quantity.

Water security (including supply and irrigation)

- It is important to improve the efficiency of water use (e.g., irrigation systems) and storage capacity (which the Prairie Farm Rehabilitation Administration gave great support for and which CWA could continue).
- Water security concerns in terms of the gap between water availability from mountain runoff and the need for irrigation during the growing season is increasing.
- Increase water security by building canals for Lake Diefenbaker to extend the access of water to a larger area and increase resilience, as an example.
- Wetland drainage impacts, both in terms of quantity and quality of downstream water flow.
- We need data on agricultural drainage, including what has already been done so we know how to solve the problems.

Protecting the coastline of the Great lakes

Food security

Salinity and water pollution

- Saltwater intrusion and enhanced nutrient leaching, especially in Atlantic Canada.

Water taking

- From a water quantity perspective there are competing priorities for water resources in the form of permits to take water

Equality and justice

- Especially in agricultural regions, we need to ensure there is equal access to water so that everyone has enough water when they need it, including enough water going downstream.

Lack of consistent economic drivers to improve water quality

- Sporadic programs and variability in take-up of programs

Interjurisdictional challenges

- Challenging governance between provinces (particularly SK-MN) has direct downstream flow impacts for people to the east.
- Changes in roles and responsibilities and how are these roles change or transfer (or not) when an organization agency changes or dissolved (e.g., the elimination of the PFRA).

2. What in your opinion are the essential agricultural-related science, data, policy, and program gaps that need to be filled in relation to these freshwater challenges?

Science and Management considerations and approaches

Implement science-based, sound and practical solutions

- More science-based evidence is required to understand impacts (e.g. of drainage).
- Ensure frameworks and policies are informed by science and Indigenous knowledge.
- Address gap between science and policy and communicate knowledge and ideas from scientists to government policy makers?

Manage across disciplines and issues

- Ensure engagement with Agriculture and Agri-Food Canada and universities to make sure that the solutions are based in science.
- Take an integrated approach to address water quantity and quality issues, and economic and environmental considerations.
- There needs to be a partnership of food and water security within Canada Water Agency in order to work together and solve water-food nexus issues collaboratively.
- Multi-disciplinary backgrounds working together in science (hydrology, biogeochemistry, biology, etc.) are essential to agricultural-related science on water quality concerns (source, management, restoration).

Long term management planning (including planning for climate change)

- Be forward-looking in the strategies and approaches being proposed and implemented.
- We need strategies designed for the future, not those that are based on “right now” or systems of the past.
- Rethink what is truly in the public interest in light of this current global pandemic and for continued changes to our climate that are primarily anthropogenically-driven.
- We need to be more proactive going forward rather than the current crisis reaction.
- Learn from different regions that have adapted to variable climates which has resulted in different coping ranges. For instance, the socioeconomic systems in the prairies are adapted to

much more extreme climate changes than other parts of the country. We need to continue to expand our coping ranges in the face of climate change.

Promote transparency through more participation from stakeholders

- Create a common language between stakeholders from various sectors and interest groups.
- Irrigators vs dry land farmers have different views; the conversations that need to happen between those groups are not necessarily happening.

Avoid additional bureaucracy and keep the focus on action

- Ensure that standards do not become additional regulation to meet versus replacing/modernizing existing fragmented (provincial/municipal) standards.
- Ensure that individual departments remain functional and that CWA acts as a body that supports the functions of other organizations/departments that are already working well.
- A reorganization of all water-related scientists and policy experts into the CWA would have undesirable consequences.
- CWA needs to be given the authority to lead objectives that improve actual practices and spur action.

Equity and fairness

- We need to ensure water distribution priorities in times of drought (i.e. some crops are more sensitive to drought), which requires infrastructure and a decision-making framework that supports quick-response decisions to move water to where it is needed most.
- We need to improve the ways we value different water uses (agriculture, mining, ecosystem needs, etc.) and proper valuation is needed to prevent aquatic systems from becoming too degraded.

Solutions and management strategies for specific water issues

Nutrient management

- We need more knowledge on the current level of BMP adoption, including improved tracking of adoption and enhanced knowledge on the relative effectiveness of the BMPs on mitigating poor water quality.
- Further research on how, when, and where to target BMPs. For example, we do not have nutrient transport coefficients to figure out critical areas, or critical practices.
- Better translation of the complex information to those implementing BMPs.
- We need more risk management tools.
- We need targeting funding for applying phosphorus related BMPs to phosphorus hotspots.
- Look to Ontario's approach to nutrient management which resulted in improvements in the agriculture sector, including implementing new standards for how nutrients are used and how land is farmed. Can we move to a global conversation about water and how these standards compare cross provinces?
- With regards to Ontario's 4R certification and the Western Canada designation program: The balance of environment and agricultural needs varies across Canada and there are also significant differences across Canada in terms of the level of commitment from industry and their willingness to take action. This effort requires standardization that is relevant for every

province. Race to bottom can be a problem when trying to get standards acceptable to producers across all areas.

- We need greater emphasis on establishing better incentives for farmers.
- We need to increase organic content in the soil, which increases porosity, soil moisture retention and microbial activity.

Green infrastructure / wetlands

- Wetlands can play a big role in meeting our needs for the future, and we can rely on them instead of building grey infrastructure in response to loss.
- We need a definition, acknowledgement, understanding, recognition and support for green infrastructure on the agricultural landscape. Wetlands are not anti-ag, anti-rural, anti-development or pro-conservation or pro-urban. They are the universal infrastructure for flood damage reduction, drought mitigation, climate change resiliency building, biodiversity, erosion control, groundwater recharge, water quantity, water quality, etc.

Flood mapping

- The development of flood mapping is essential to predict what will happen in the case of floods and other unexpected events. A nationwide comprehensive map is essential for prediction and management. NRCAN is working on this but the work needs to be further developed.
- Drought planning needs to happen during floods and flood planning during droughts so that we can ensure we have the knowledge/resources/programs in place ahead of time.

Infrastructure and storage capacity

- If we anticipate that the consequence of climate change will result in more water on the prairies, but less predictability, what would our storage capacity need to be to protect against a long-term drought, for example? Infrastructure is needed to deal with the greater unpredictability of water management in the future.

3. What role would you see a Canada Water Agency playing in filling these agricultural-related gaps?

Improve data sharing, coordination and access

- Open access
 - It will enhance the workability and comparability across jurisdictions, data needs to be shared.
 - It will identify what groups and agencies are collecting what types of data, where, when, how, etc.
 - CWA could provide an open data warehouse available for multiple academics to work on data in an integrated fashion
 - Even after publication, data is still not being shared in a way that's widely accessible. We need multi-stakeholder engagement in data collection and disbursement in a standardized way. This requires rewarding contributions for these data.

- We can learn from the US-EPA which standardized the system in the US, while also appreciating the Canadian context of federal and provincial government roles in data monitoring and gathering.
- Storage
 - We need discussions on whether data should be kept in one location or several locations and standards on how to prepare the data for this.
 - Having an information and data warehouse that farmers and industry can obtain information that is validated, (un)biased (requires metadata), and standardized is critical. It can help avoid reinventing data collection (wastes money/time) and provide more place-based data so that models can be more reliable for water quality and quantity decision making.
- Analysis
 - We need comparable data to understand problems with cumulative impacts from accumulating nutrients in lakes and water systems.
 - To help with lack of temporal data created recently, we could mine past historical data (may need to invest in digitizing old data to make it more available) that has been collected over the decades across Canada. Local knowledge and insight from farmers and First Nations is also critical to support projects or research programs.
- Acquisition of data
 - The types of data we collect might not always reflect the circumstances for non-human species.
 - We need data on Indigenous territory.
 - We need to coordinate data collection across jurisdictions. Bridging organizations can help in connecting data between different agencies, translating science-based evidence into practical use and provide other support as needed (e.g., some roles within the irrigation districts).
 - Important that we have a purpose for our data. Targeted data can trigger actions by jurisdictions or other responsible groups.
 - We still need more data, such as soil maps.

Monitoring and forecasting

- We need to support monitoring activities (and coordination) at a national level.
- Weather monitoring/gauging stations are sparse in SK compared to other provinces, which means that the concerned authorities and public can't get access to it in a timely manner.
- Methods for forecasting could be homogenized across the country so that we have data that's comparable and interchangeable.
- We need to take a national approach for a groundwater, hydrometric and meteorological monitoring network.
- In the US, there are algae bloom forecasts (led by NOAA) that have multiple-stakeholder engagements. The up-to-date information (days) can help stakeholders link events (actions/mitigations/weather) with impact on algae.
- We need an organized monitored system with instrumentation across the country and annual report cards.

Infrastructure building / engineering

- The Prairie Farm Rehabilitation Administration (PFRA) built much of the infrastructure in prairies and a CWA could take over this mandate.
- The CWA should have an engineering mandate (e.g. water infrastructure in agriculture)

Relationship-building / convener / collaboration agent to coordinate/leverage ongoing activities

- Facilitate relationship building with water as a foundation. This is critical to think about in terms of reconciliation and can play an important role in connecting with Indigenous food sovereignty and security.
- Provide a collaborative space for the complex nature of intergovernmental cooperation where many voices, ideas, needs, are to be heard.

Research and development

- Ensure that AAFC's living labs trickle into provincial level collaboration, and on-the-ground research.
- Enhance R&D from an agriculture-water perspective, but while also adding a climate change lens.
- Help address the silos that exist in research.
- Foster advances in science, innovations, implementations.

Facilitate development of funding streams/programs to fix problems

- Help provide funding across government departments and levels of government.
- We need an agreement on compensation/funding to correct past management errors.
- The federal government needs to guarantee that funding will be directed towards this agency to carry out this mandate and that this funding be made available for on-the-ground, action projects in the agricultural sector.
- Need to coordinate a standardized operational and financial support system that will provide efficiency in all provinces and territories.
- The Canada Water Agency should track proactive progress rather than reactive measures.

Communicate and promote solutions

- The Agency could help do a better job of mobilizing the knowledge we have and communicate more effectively the things we already know about.
- Facilitate learning across Canada through knowledge exchange across experts.
- Better communication is needed to approach the cultural shift required at the grassroots level in the agricultural sector.
- Help remove the gaps and barriers that allows us to move data and knowledge from one organization to another, rather than through people.
- Share learnings and best practices across jurisdictions and bring to light success stories, and share amongst representatives, even if the contexts may not be exactly transferable.
- Provide syntheses of research and case studies and make available to all.

Become a leader that inspires necessary paradigm shifts in water management

- Champion local projects that address local needs.
- Support projects that help control reliability of water delivery and water levels, to meet agricultural and environmental needs.
- Adopt a view that water has its own rights and that people have responsibilities to water.

- Support and test changing rewards systems in farming and new models in sustainable agriculture, including farm size, crop types, and adaptations to the changing climate.
- CWA can provide a framework to manage transboundary issues and solutions. Existing approaches, such as cap and trade, work well for global problems, but may be difficult to extend to water quality due to the local and regional scale of effects on water. However, trading programs may provide a revenue stream and encourage and support science towards quantification.

4. Recognizing the important role of provinces and territories in agricultural water management in Canada, how should a Canada Water Agency work to enhance federal-provincial-territorial coordination and cooperation?

Coordinate action across regions while recognizing unique regional differences

- Management of water and water flow is a regional issue and the priorities of different areas need to be acknowledged while also addressing common/shared issues.
- A national Agency should not try to impose a one-size fits all approach/solution(s) but needs to keep regional differences in mind.
- Ensure that we are not reproducing the same (transferrable) work in different regions.
- Help to sustain large-scale coordination and effectiveness across Canada. Lessons can be learned from other agencies/organizations that have proven such coordination can be effective across stakeholders across a wide geographic area (e.g., Prairie Habitat Joint Venture).
- There is a deep need for standards (i.e., data collection, reporting, observation, regulatory) to be established and standardization of production practices and industry initiatives across provinces (e.g., 4R nutrient stewardship, environmental farm plan programs).
- Set the expectation of being accountable to an environmental/sustainability benchmark rather than a “race to the bottom” which can occur when standards try to be everything to everyone.
- Look to the Canadian Council of Ministers of the Environment as an Agency model, but with more commitment to follow-through and longer-term change.
- Fund areas where problems are greatest.
- A Canada Water Agency could work to enhance a Prairie Water Strategy that addresses gaps in agricultural-environmental policies such as provincial wetland policy alignment between Prairie provinces (i.e., MB and AB have policies, SK does not).

Make the connection between governance scales

- Better connect program and policy development at the federal level with the local level, where water and wastewater is managed (and needs to be planned).
- Support local capacity (traditional knowledge, farmers, etc.), and local level governance where projects actually happen.
- Facilitate and support bottom-up approaches and different responses to water management.
- Facilitate collaboration between levels of government.

5. *What role should a Canada Water Agency have in working with Indigenous peoples on agricultural-related freshwater management issues?*

Process of engagement

- Apply a government-to government relationship with Indigenous communities that can enhance participation of Indigenous governments.
- Directly consult with Indigenous rights-holders through an official process.
- Ensure all perspectives within Nations are heard.
- Discussions with communities can help gain a base understanding to build a strong foundation.
- Ensure women and youth voices are better represented.
- Consider a 100% Indigenous-led and driven

Decision making

- Indigenous rights-holders must hold a decision-making role within the CWA, either a co-management arrangement or Indigenous oversight body informed and developed by a diversity of Indigenous people in every watershed across Canada.
- An advisory council can give direction for any issue that may impact Indigenous communities.
- Defer to traditional Indigenous leadership for decision making in their communities.
- Acknowledge and respect First Nations' sovereignty to manage their own affairs.
- Recognize that Indigenous peoples do not solely live on reserves and that Indigenous territory extends to the whole of Canada.

Indigenous knowledge

- Indigenous perspectives and knowledge have credibility, value and communities have interest, capacity and successes which need to be more naturally woven into managing water resources.
- Co-develop tools to bridge western and Indigenous ways of knowing and the incorporation of traditional knowledge.
- Ensure that Indigenous peoples' knowledge has conduits to, and support from, the scientific and policy communities so that Indigenous peoples' farming management practices are scientifically tested, proven, promoted and integrated in programs and policy.

Capacity and support

- We need resources to access Indigenous knowledge and enable it to be leveraged.
- Support new ideas for sharing including a potential consortium to enable leveraging of funds or community organizers to share expertise and build capacity across communities.