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GIWS Global Institute for
Water Security
USASK

CLIMATE RESILIENCE FOR WATER AND WELL-BEING **WORKSHOP**

SYNTHESIS REPORT





In November 2023, the Global Institute for Water Security at the University of Saskatchewan and the Saskatchewan Council for International Cooperation held a workshop to discuss water-related climate resilience from a water quality and from an extreme events perspective. Held at the University of Saskatchewan on Treaty 6 Territory and the Homeland of the Métis, the workshop focused on the impacts that water scarcity and security have on different groups of people and different sectors in order to identify existing solutions and pathways to new innovations.

“WE NEED RECONCILIATION WITH THE LAND AS WELL AS WITH EACH OTHER”

-Anthony Blair Dreaver Johnson

The workshop was opened by Anthony Blair Dreaver Johnston, a Knowledge Keeper with Mistawasis Nêhiyawak, who shared his perspectives on climate resilience.

Over the past two decades, Mistawasis Nêhiyawak has seen record snowfall and rainfall events that have disrupted community life and affected people’s health. They have come together as a community and with external partners to build resilience and reconciliation, and out of partnership has grown friendship. However, reconciliation is not just between Indigenous and non-Indigenous people, but also with the land. This is why bringing the bison back to Mistawasis Nêhiyawak is a critical stage in their community planning, which also includes bridging land, water, and sky for food and water security.

The Government of Saskatchewan is also working towards resilience through its many ministries and agencies. For example, the Ministry of Environment is responsible for Saskatchewan’s Climate Change Strategy in support of Saskatchewan’s Growth Plan for 2020–2030, which speaks to ensuring that economic growth builds better quality of life and delivering on reductions in carbon emissions. The Water Security Agency is financing more resilient water and wastewater systems as well as mapping flood hazards, building drought response capacity, and providing data to inform decision-making.





Water Quality and Climate Resilience

Lakes are very sensitive to nutrient pollution, but also resilient in their degraded state. The science is many decades old, but development of solutions has not kept pace. Additionally, new challenges have emerged in recent years, such as harmful algal blooms (HABs). Blue-green algae, the species responsible for many HABs, is difficult and expensive to treat, increasing the costs of water treatment and sometimes causing treatment plants to have to shut down until the bloom is less severe (e.g., Toledo shut down their water treatment plant for three days in 2019). Other costs include the inability to use these lakes for some recreational activities, property values, and the inability to use the water for spiritual and ceremonial purposes. Some regions, such as the Prairies are naturally more nutrient rich, making it difficult to identify baseline levels. As such, socially acceptable levels of water quality for algal blooms become a useful threshold.

Incremental reductions and the basic premise that “less is better” should drive solutions. Given that treatment and removal are prohibitive, solutions are context dependent, but involve reducing nutrient loads to receiving waters through place-based nutrient management. Many of these solutions are land-based and come with tradeoffs against, for example, on-farm water and soil management and therefore crop productivity. This requires consideration of the right balance and collaboration on solutions. However, there are some quick wins with respect to beneficial land management practices, such as banning winter spreading of manure. Programs such as the Prairie Watersheds Climate Program, delivered by the Saskatchewan Association of Watersheds, provides financial incentives for producers to invest in best management practices such as improved nutrient management, greater adoption of cover cropping, and expansion of rotational grazing.





Nutrient pollution is not the only challenge facing our lakes, rivers, and streams. Chemical pollution is responsible for 9 million premature deaths annually – 15 times more than conflicts and three times more than HIV/AIDs – as well as adversely affecting the health of our environment. On the Prairies, declining water quality compounded by changes in climate and land use is having a significant effect on migratory birds. Weather and habitat have been demonstrated to influence energy expenditure and amounts of time spent feeding, which in turn affects reproductive behaviour. As a result, where birds stage (stop at points on migratory routes to refuel) can provide insights into quality habitat and inform conservation efforts.

Extreme events compound pollution effects. Floods remobilize contaminants in soils and sediments and compromise storage and wastewater treatment infrastructure, while droughts concentrate them in shrinking water bodies. Urban runoff is an important source of pollution, even when rainfall or snowmelt is insufficient to generate floods. Retention ponds can reduce flood effects, but they can also improve water quality if designed properly, by capturing sediments and pollutants. However, this sediment needs to be dealt with appropriately and it can be very expensive to dredge ponds and treat the contaminated sediments for disposal. Pollution is also an issue of equity and environmental justice. Many sources of pollution, such as chemical plants, dumps, and mining operations are located in close proximity to Indigenous, racialized, or socio-economically disadvantaged groups. This is referred to as environmental racism, a term coined by Benjamin Chavez in the 1980's, and formally recognized by governments in Canada and the USA.



Water Quality and Climate Resilience

Key Messages

Research collaboration:

- Identification of issues and needs to be driven by users, which necessitates greater engagement, communication, and collaboration between groups.
- Collaboration across disciplines is essential to drive research forward within academia, but collaboration across research, policy, and practice is essential to operationalize research and implement solutions.
- Research (and solutions) needs to be co-created through collaborative approaches among diverse disciplines and partners.
- We need to understand the context of solutions – where they work and why.
- We need to bridge the gap between science and society; use citizen science, art, and social media, for example, to ensure that information is accessible to those who can use it.
- Universities need to support researchers to go out into communities, work with communities, and communicate research.

Capacity:

- Design thinking and systems thinking are required.
- People need to be aware of the challenges and consequences of declining water quality as well as opportunities for enhancing resilience – we need a common understanding.
- We need to be more explicit about the linkages between agriculture and water.
- Peer learning is very effective and influential.
- Capacity is needed to implement solutions (technical, institutional, political, social, and financial).
- Student and researcher capacities need to be enhanced for better communication and collaboration.
- Relationships are the most significant resource (i.e., our social capital).





Implementing solutions:

- Trust and relationships are key.
- Identify locations where specific solutions can have the most impact; understand local contexts and community needs.
- We need to share knowledge and share success stories.
- We need to be able to deal with the uncertainties associated with our changing climate.
- Solutions need to be considered from a systems perspective to identify and avoid inadvertent consequences or increased harm to some population groups.
- We need to be able to assess the trade-offs and co-benefits associated with different solutions (e.g., flood risk reduction strategies that reduce water pollution).
- Solutions need to be implemented as part of an iterative approach, with users applying and evaluating innovations.
- Education incentives (not just economic incentives) are needed to drive adoption of voluntary measures and incentives need to be designed based on public versus private benefits.
- There needs to be a balance between economic, social, and environmental costs and benefits; decisions cannot be driven by economics alone – they need to account for intangible costs and benefits.
- Solutions need to include everyone, including youth, newcomers, rural populations, and Indigenous Peoples.

Challenges:

- Finding ways to provide trusted and accessible information and data while respecting privacy.
- Finding ways to meet with people to facilitate collaboration.
- Lack of communication and fractured relationships.
- Polarization.
- Access to funding and funding timelines – there is a need for longer term research programs that work.
- Policy loopholes.





Water and Extreme Events

Floods can carry a heavy price tag for municipalities and for individual households. However, there is significant uncertainty around future flood magnitudes and frequencies that can make it difficult to make decisions on infrastructure upgrades, such as stormwater management. In the City of Saskatoon, research indicates that under most future anticipated rainfall events, the cost of building new systems to cope with potential flood events is higher than the cost of the flood events themselves to the municipality and municipal infrastructure in many neighbourhoods. However, this does not account for the cost of damages incurred by individual households or intangible costs such as social disruption. Solutions include retention ponds and redesign of streets to increase retention and infiltration, reducing flood depths and extents. It is important to understand who bears costs and who benefits (or not).

Ecosystem services, as provided by forests, wetlands, and land management practices, can reduce effects of extreme events. The Saskatchewan Watersheds Association has partnered with entities such as Nutrien and Environment and Climate Change Canada to deliver programs such as Caring for Our Watershed, that solicits proposals for action from youth, the Tree for Life program, and climate adaptation planning and demonstration sites for knowledge and technology transfer. We also need to invest in source water protection planning and watershed planning.





Extreme water-related events have been frequent and severe in recent years. We have also seen increases in multi-hazard events, such as floods simultaneously occurring with COVID-19 outbreaks. This has resulted in a shift in emergency management from individual hazards to an all-hazards, whole community approach that brings together government and non-government partners as well as recognizing specificities associated with individual hazards. Emergency management is a set of activities designed to plan for, mitigate effects of, and manage emergencies. During emergencies, such as flood and wildfire events, it is essential that there is co-ordination of resources and communication. As such, relationships are the most critical resource and needs to be invested in ahead of time. There also needs to be specific recognition of and planning for vulnerable groups, such as those experiencing homelessness.

Extreme events result in direct and indirect human health effects. Wildfire smoke and dust, for example, can result from drought conditions and affect air quality. Poor air quality has been linked to adverse cardiovascular, reproductive and development, respiratory, and psychological impacts as well as death. In turn, these create a burden on health sectors. Impacts can be intensified or reduced depending on availability of community resources, policies, strategies, and services.





Water and Extreme Events

Key Messages

Research Collaboration:

- We need to evaluate BMPs to know that they are working.
- We need to recognize and invest in citizen science.
- Research needs to be inclusive in order to increase awareness and create ownership over outcomes.

Capacity:

- Education and outreach can be effective in generating incremental change, especially when connecting with people's experiences.
- We need to invest in water literacy, particularly in our youth.
- We need to invest in trained facilitators to bridge experts, grass roots, and governments.
- We need to leverage community and organization networks.
- Diversity of perspectives and ways of knowing enrich understanding of problems, development of solutions, and decision-making.

Implementing solutions:

- We need to identify ways of catalyzing transformational knowledge into action.
- We need proactive planning and place-based management.
- Our values and privilege affect how we talk about solutions; we need to be aware of differential impacts, particularly for vulnerable populations.
- Look to nature to help restore balance through nature-based solutions.
- Stormwater ponds, green roof initiatives, and floating wetlands have multiple benefits.
- There is no single solution – we need context-specific, community engaged solutions.
- Investments in monitoring and evaluation are necessary to ensure accountability.

Challenges:

- Urban-rural divide.
- Adaptation needs to be a priority that transcends politics.



Summary

Participants underscored the urgency for action across many domains. This includes breaking down silos between governments, researchers, producers, communities, and Indigenous Peoples and committing long term sustainable funding for identifying solutions, incentivizing change, and building resilience. They also revisited the human-natural system connectivity and the different relationships, perspectives, and values that this represents. Blame has no place in a solutions-orientated approach. Rather, we need to come together collectively and co-operatively as diverse groups using a shared language and stories to develop solution envelopes in which benefits and trade-offs are clearly identified – benefits and tradeoffs to wellbeing, the environment, and the economy. This requires a social justice lens and not simply an economic one. It also requires diversity of perspectives and recognition of vulnerable populations, in order to identify and implement the best of the imperfect solutions available. Ultimately, we need to bring nature back into our solutions, and generate and implement solutions through user-driven and user-focused research and enhanced capacities across sectors and roles. We need to become more climate resilient for social wellbeing, for economic strength, and for environmental integrity.

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Contact & Further Information

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