Bridging the Water Adaptation Gap (BWAG) - Pathways to Adaptation for Vulnerable Regions

Results from Canada's Objective Three Ecosystems Interviews

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EXECUTIVE SUMMARY

Objective Three of the Bridging the Water Adaptation Gap (BWAG) project assesses water security risks and possible impacts to four sectors (Infrastructure, Primary Economic Activities, Livelihoods, and Ecosystems) within Southern Saskatchewan. This report presents the results from nine interviews conducted with interviewees knowledgeable about the Ecosystems sector. The interviews were recorded, transcribed, and coded to identify key themes and insights that are grouped into seven different sections in this report.

Hazards (Section One) identifies climatic and non-climatic threats to human and non-human systems. Climatic hazards include climate change events such as increased drought and decreased water supply, shorter and warmer winters, more intense rainfall, and more frequent extreme weather events like ice storms and wildfires. Non-climatic hazards include land use changes, nutrient pollution from agricultural and urban sources, and wetland drainage, including a 2025 provincial policy that has a goal of further increasing wetland drainage. The report also discusses compound hazards, where multiple threats interact.

Impacts (Section Two) details the effects of these climatic and non-climatic hazards on humans and non-humans. Impacts on humans include mental health issues, with the mental health of farmers being particularly affected by the stress of managing unpredictable weather patterns and economic uncertainties. Drought and flooding have significant economic and social impacts on communities, leading to challenges such as reduced agricultural productivity, financial instability, and increased pressure on local services and infrastructure. Wildfires also pose a significant threat to humans, including the ability to engage in outdoor recreation during the summer.

Impacts on non-human actors include damages to aquatic ecosystems. Nutrient pollution from non-point sources (agricultural and urban runoff) and point sources (like urban wastewater treatment plants) leads to eutrophication and harmful algal blooms, which degrade water quality and disrupt the balance of local ecosystems. The loss of wetlands due to drainage and drought further exacerbates these issues by reducing the natural filtration capacity of the landscape, leading to higher concentrations of pollutants in downstream water bodies.

Vulnerabilities (Section Three) examines the sensitivities of different actors to hazards, including physical sensitivities of non-human actors (ecosystems), as well as social and/or economic sensitivities of human actors. For example, aquatic ecosystems in Southern Saskatchewan are naturally vulnerable to high algal growth due to the dry climate and productive soils, which exacerbates the effects of nutrient pollution. Small towns face significant challenges in maintaining services such as hospitals and schools as their populations decline and the tax base decreases. These communities also often struggle with adapting to climate change, including obtaining water supplies during drought and repairing infrastructure after floods. In addition, social and economic pressures such as farms growing in size, cattle producers retiring, and the high price of canola encourages producers to grow canola instead of raising cattle, which encourages agricultural drainage. Indigenous communities also face unique challenges related to practising their inherent and treaty rights in the face of opposing environmental changes and policy decisions.

Responses and Adaptations (Section Four) explores the adaptations of individuals, communities, and governments to mitigate water security hazards and their impacts, including adaptations currently in place and those that could be implemented. Individual adaptations include using rain barrels to manage water use and buffer strips to reduce soil erosion. Ecosystem inherent adaptations, such as restoring wetlands and researching conditions associated with water quality in dugouts, could also improve the health of aquatic ecosystems. Technological advancements, such as improving wastewater treatment and industrial water conservation, were also mentioned. Agricultural adaptations include improving drainage, variable rate fertilizer technology, artificial grain drying, rotational grazing, seeding drought tolerant crops, and managing soil through minimum tillage. However, these agricultural adaptations may have high financial costs.

Local community leaders often solve conflict and work with the government to implement programs dealing with issues such as water allocation during drought. Advocacy groups also play a crucial role in addressing water quality and environmental issues by raising awareness and trying to influence policy. Successful collaboration of these advocacy groups with scientists and government agencies, including effective knowledge sharing and communication, builds community confidence in the advocacy groups. One interviewee suggested that as environmental issues have become increasingly political and partisan, getting people with different views to talk to each other and find common goals may help with conflict resolution.

Several interviewees suggested Saskatchewan needs to improve governmental regulations to support sustainable practices, such as a provincial wetland policy that would require ‘no net loss’ of wetlands. However, some interviewees were concerned about whether this wetland policy was practical for producers. Financial adaptations include crop insurance (for smaller farms) and saving money in the long-term by improving building insulation. Maladaptations (adaptations that have negative consequences) mentioned include problems with climate change adaptation programs for First Nations. For example, while these programs provide funding for climate

change adaptation planning, the funding often cannot be used to implement the plans. Many First Nations also may lack the capacity and resources to apply for this funding.

Futures (Section Five) discusses what is desired and needed for the future of water security in Southern Saskatchewan, as well as uncertainties about the future. One desire was that water management should balance development and ecological preservation, which will require interdisciplinary approaches. **Sustainability (Section Six)** expands on this need for a balanced approach which considers both short-term and long-term impacts on human and non-human systems. Changes needed include continued evolution of agricultural practices, water conservation in industries such as potash and food service, improved communication from the government, and the need to reintegrate traditional Indigenous land management practices. Uncertainties include whether irrigation expansion is feasible given the high costs and impacts on water levels in reservoirs and uncertainty within climate change projections.

Finally, **Values (Section Seven)** highlights values that inform various perspectives within the interviews. For example, agricultural producers and their livelihoods are affected by many economic factors, including international trade agreements and wars, constraints in transporting their products to market, and grain and livestock prices. However, some interviewees said provincial policies place too much value on short-term economic success over long-term environmental consequences. Values of collectivism, cooperation and resource-sharing were seen as historically important in Saskatchewan. Interviewees also highlighted the tension between individual decision-making of producers with the collective harm of those decisions. Lastly, interviewees noted that producers have a lot of pride in farmland that has been in their family for several generations and cited the importance of incorporating Indigenous knowledge.

Overall, this report highlights the importance of a holistic, integrated and adaptive approach to managing water resources in the face of environmental pressures such as climate change and land use changes. The report provides a foundation for future project objectives, including further investigating values that inform adaptations, assessing adaptation gaps, and identifying potential adaptation pathways to work towards a more sustainable future for the region.

KEY INSIGHTS

- Agricultural drainage was a contentious and polarizing topic which, depending on the interviewee's perspective, could be considered within different sections of this report. For example,
  - Several interviewees were concerned about future negative ecosystem impacts of the Water Security Agency's (WSA's) 2025 Agricultural Water Stewardship Policy, particularly their goal of increasing wetland drainage to "around 60% of what's left" (ECO6).
  - These concerns are based on evidence that increased drainage increases the vulnerability of ecosystems to hazards such as increased aquatic nutrient pollution, decreased biodiversity of waterfowl, and increased greenhouse gas emissions. Drainage also

increases the vulnerability of social actors (particularly rural communities and producers) to hazards such as drought and groundwater depletion (see Section 1.4 for more details).
    - A common perspective from producers is that drainage is an adaptation to remove water from their land during flooding (ECO1) and increase their production without having to drive around wetlands.
- Similarly, irrigation was mentioned as a key adaptation for agricultural producers, particularly on the western side of Saskatchewan. However, there were also concerns with proposed irrigation expansion projects such as the Lake Diefenbaker expansion, including whether there will be enough water in the future for these projects and whether producers have the finances to engage in the expanded irrigation.
- There were often critiques of government bodies for not being transparent or incorporating stakeholder input about environmental issues. For example, there was concern that an irrigation expansion was being approved without consideration of the negative impacts to fish and waterfowl habitat.
- Several interviewees talked about climate change denialism and politicalization within Saskatchewan, with some suggesting that this is partly due to a lack of natural science education within the public.
    - Suggestions to combat climate change denialism and politicalization included more interdisciplinary work, requiring natural science education in high schools, and trying to avoid the term 'climate change' to make the topic less political.
- Interviewees emphasized the importance of effective knowledge mobilization of natural science, with one interviewee noting that "adaptation comes from knowledge".