

# Adaptation to climate change and potash mining in Saskatchewan, Canada: Case study from the Qu'Appelle River Watershed

## Background

This research examines how the potash industry in Saskatchewan's Qu'Appelle River Watershed is affected by and currently adapting to climate change and variability through six mine case studies (four producing and two not producing). The research aims to identify ways to enhance the competitiveness and adaptive capacity of the industry under a changing climate. Saskatchewan is a world leader in potash production, with export markets in the U.S., China, India, Brazil and other parts of Asia and Latin America. Saskatchewan produced an average of over 8.5 million tonnes of potash per year from 2000 to 2009 (Saskatchewan Ministry of Economy, pers. comm., 2013). Recent excess moisture events (i.e., rain and snow) in Saskatchewan have been problematic for the potash industry, since they result in increased volumes of brine for disposal, increased operating costs, and higher potential for flooding from offsite surface water. Climate change projections suggest that extremes – both excessive moisture and drought – will likely continue in the future, and in some instances they are expected to become more pronounced, making adaptation in the potash industry beneficial (Sauchyn and Kulshreshtha 2008).

## Adaptation lessons from the frontlines

Potash mining companies in the Qu'Appelle watershed are employing a number of strategies to adapt to climate variability and change (see Box 1). The main climate risks addressed by the adaptive strategies are excessive moisture and flooding, water scarcity, extreme weather events, and extreme temperatures. Adaptive strategies can be grouped into four categories: (1) investing in infrastructure, (2) water reuse and recycling, (3) innovative and alternative water sourcing, and (4) proactive planning. A number of factors drive adaptation actions, including previous experience with climate stressors, regulations and standards, economics, and voluntary measures. Lessons for future adaptation include the need to plan for events, such as extreme precipitation, that exceed those previously experienced, the need to consider the cumulative impacts of multiple or consecutive events in planning, and the opportunity to build off existing collaborations between government and industry to advance climate change adaptation.

## How could governments help support climate change adaptation?

Governments could play a key role in advancing climate change adaptation in the potash industry by enhancing research capacity, bridging science and industry, and promoting effective communication of climate change risks. Governments could help provide tools (e.g. climate risk assessment methods) to identify, screen, and assess climate change impacts and connect industry needs with ongoing climate research. For example, collaborative forums involving industry, academia and government can help scope and plan for relevant climate change risks. In a similar vein, government has a role in communicating emerging climate change risks to industry to help inform and foster climate change preparedness.

# Adaptation strategies in the Qu'Appelle River Watershed's potash industry

## Investing in infrastructure

Dealing with recent excessive moisture events has in some cases required additional infrastructure investments. Infrastructure investments include additional deep-injection wells to deal with excess volumes of brine and improved water retention and bypass systems to more effectively and safely manage water. This infrastructure helps improve preparedness for future climate events.



## Water reuse and recycling

Potash companies are actively optimizing their water use and ensuring that a significant amount of water is reused. Water can be reused and recycled in a number of ways and in different stages of the mining process. For example, companies could in some cases use excess water from their Tailing Management Areas in their milling processes. Although drought has not been a major problem for the industry in the past, ongoing efforts to conserve water help reduce sensitivity to future dry periods.



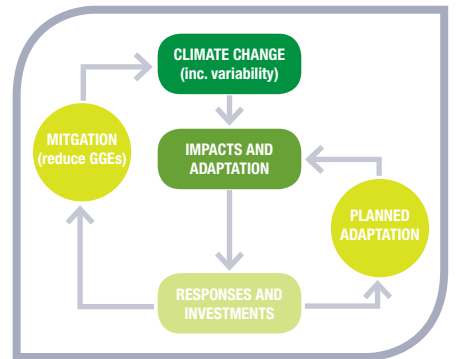
## Innovative and alternative water sourcing

Innovative and alternative water sourcing is also pursued by some potash companies. These companies have explored options as diverse as municipal wastewater, excess surface runoff and additional groundwater supplies. Exploring diverse sources allows the industry to improve its water security in a changing climate.



## Proactive planning

Proactive planning is a major component of climate adaptation in the potash industry and covers a range of topics, from determining surface locations for mines to emergency readiness. All of these diverse topics have synergies with climate change adaptation, since they help address risks associated with water supplies, tornadoes and extreme precipitation. Some companies are even planning to develop Climate Change Management Plans to start explicitly addressing climate change within their operations.



Web: [www.arctic-north.com](http://www.arctic-north.com)  
Email: [tristanpearce@gmail.com](mailto:tristanpearce@gmail.com)  
[james.ford@mcgill.ca](mailto:james.ford@mcgill.ca)

Email: [pittman17@hotmail.com](mailto:pittman17@hotmail.com)  
Tel: + 1 306 242 3545

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