



How Climate Change Could Affect Water Supply of Potash Solution Mining in Southern Saskatchewan

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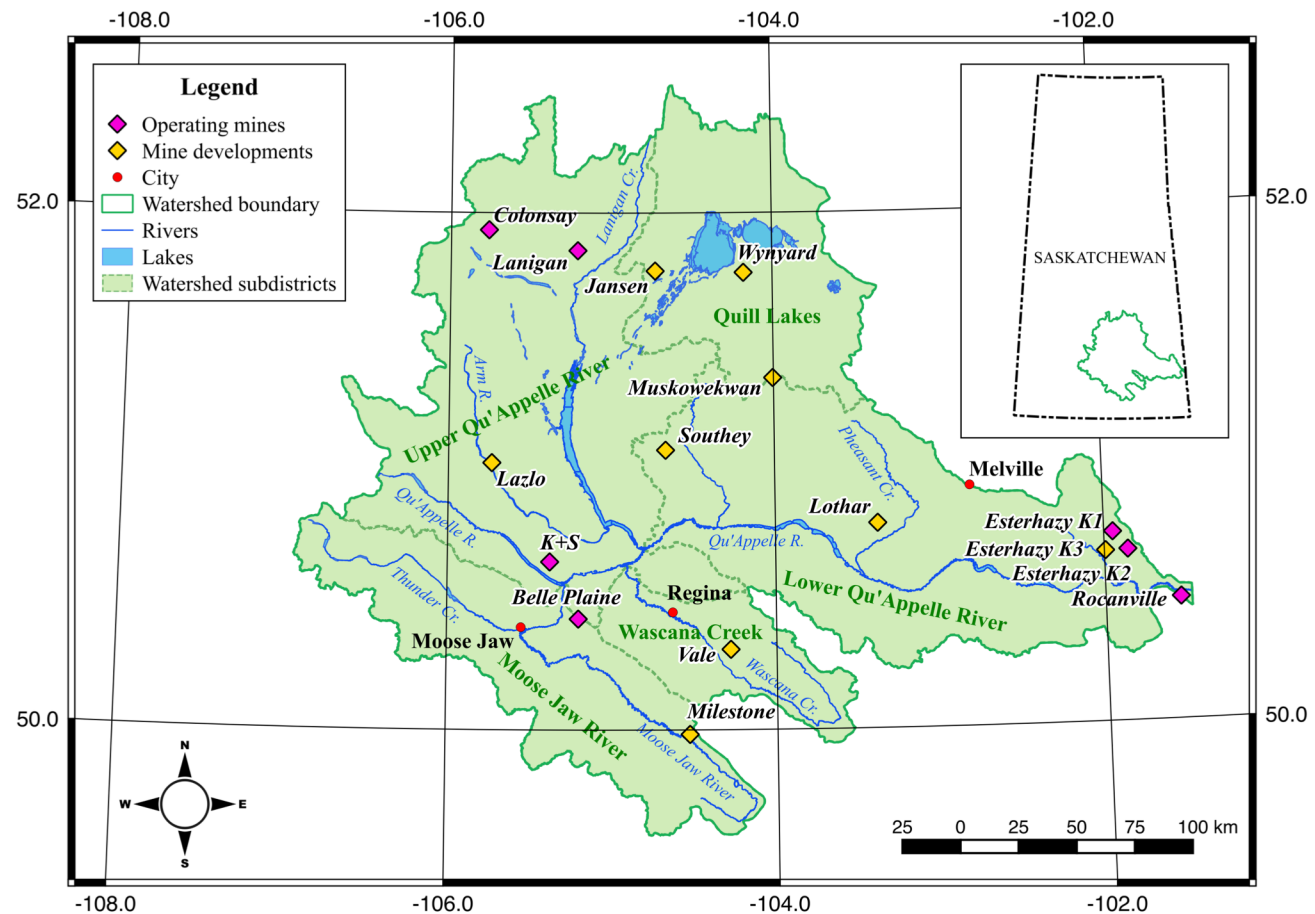
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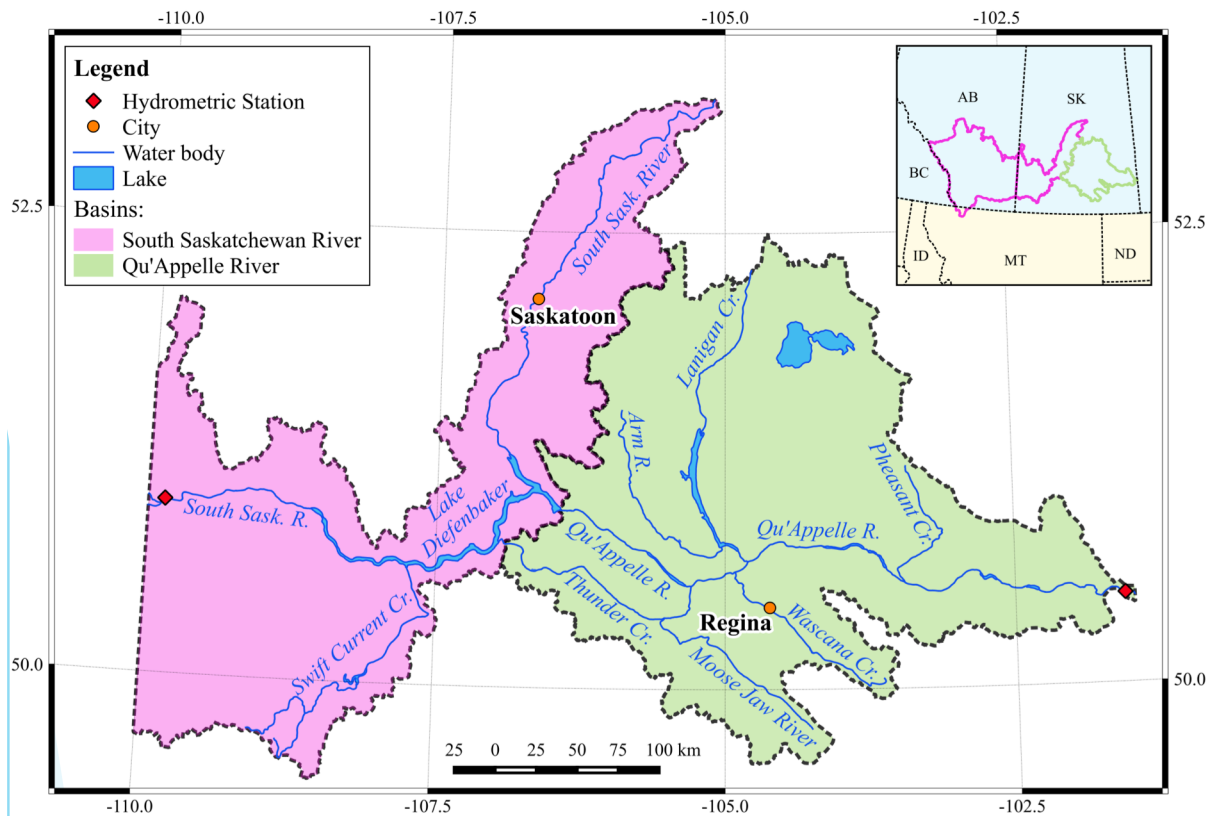
Victoria, British Columbia

Introduction

- ▶ Canada is the primary potash producer and exporter.
- ▶ 96% of Canadian potash is produced in Saskatchewan by 11 mines.
- ▶ 9 developments:
 - All, but one, solution method;
 - 6 approved.
- ▶ 7 expansion projects.
- ▶ Water use:
 - 2010: 22M m³
 - 2060: 127M m³



Research problem

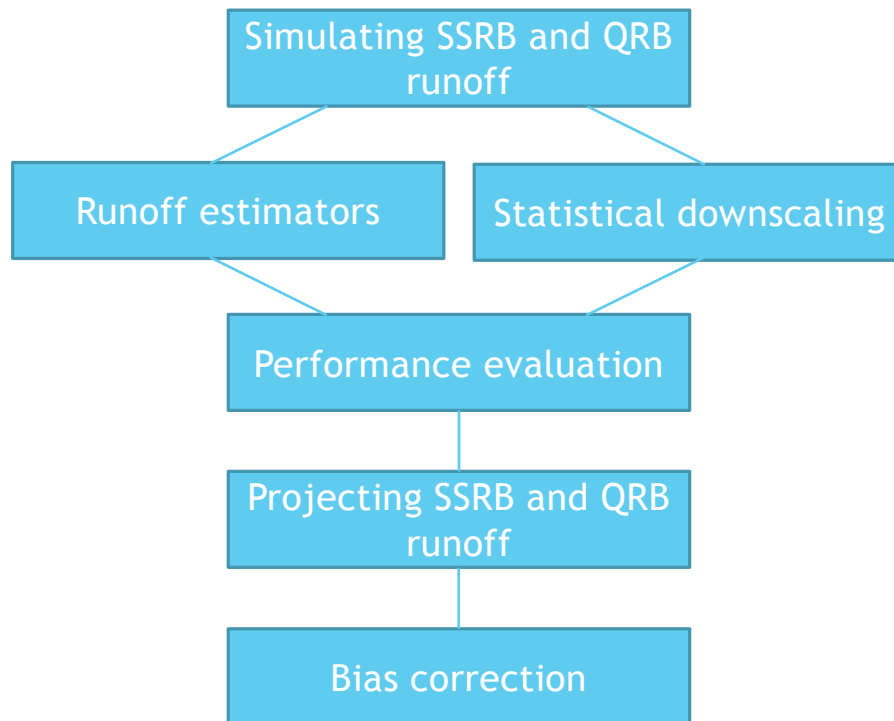


- ▶ Stable water supply in the QRB depends on water diversion from the SSR.
- ▶ Paleohydrology reveals possible prolonged droughts in the region.
- ▶ Design life of solution mine is up to 100 years.
- ▶ Possible effects of climate change on water supply need to be studied.

Research objectives

- ▶ Projecting the SSRB runoff for 2041-2070 using NARCCAP and CORDEX data.
- ▶ Projecting the QRB runoff for 2041-2070 using NARCCAP and CORDEX data.

Streamflow projection methodology



Research findings

- ▶ The South Saskatchewan River Basin (mrro):
 - Increase in mean of annual runoff by 24% (3 RCMs);
 - Increase in variance of annual runoff by 177% (4 RCMs);
 - Wetter spring and winter, drier summer.

Research findings

- ▶ The South Saskatchewan River Basin (SPEI):
 - Hargreave's PET: decrease in mean of annual runoff by 20% (5 RCMs) and increase in variance of annual runoff by 160% (2 RCMs);
 - Thornthwaite's PET: decrease in mean of annual runoff by 23% (5 RCMs) and increase in variance of annual runoff by 161% (3 RCMs).

Research findings

- ▶ The Qu'Appelle River Basin:
 - Potential increase in mean annual runoff by 29%;
 - Wetter summer and winter, drier spring;
 - Potential changes in seasonal distribution of the runoff.



Conclusions

- ▶ Water supply would remain relatively constant (mrro ↑ , SPEI ↓);
- ▶ Possible change in seasonal distribution;
- ▶ Potential declines of runoff (SPEI).