



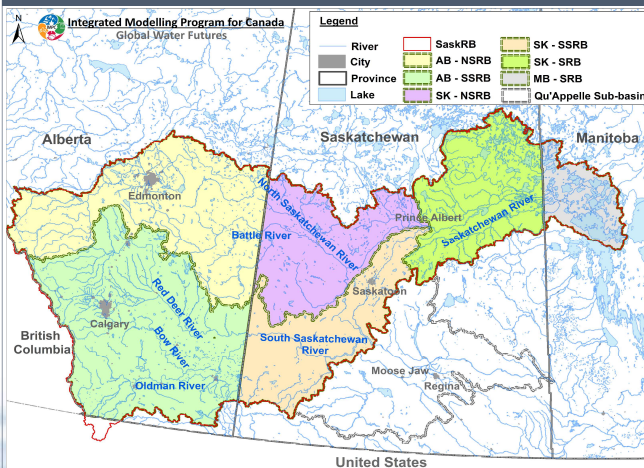
# The Economic Response of the Saskatchewan River Basin to Water Supply Restrictions due to Climate and Policy Change

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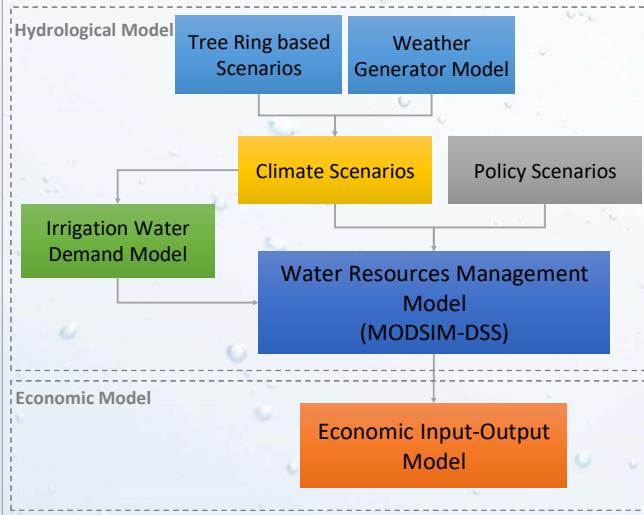


## Introduction

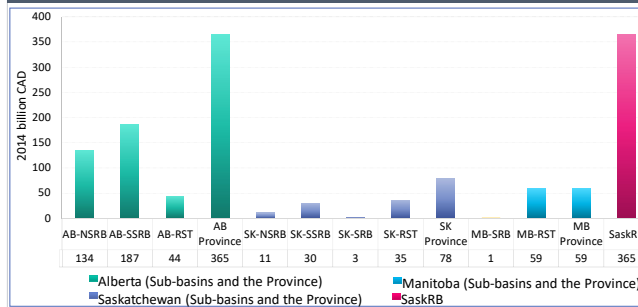


Changes in quantity and quality of water resources, due to human-driven activities and climate change makes water allocation among competing users become more complicated, particularly in large and multi-jurisdictional river basins such as Saskatchewan River Basin (SaskRB). Under such circumstances, an economic approach can be considered as a powerful tool for efficient water allocation. Therefore, we developed an *inter-regional hydro-economic model* for the SaskRB to evaluate the impacts of climate and policy changes on the economy of not only the *entire river basin*, but also its *sub-basins* and the *provinces* that share this river basin.

## The Structure of the Hydro-economic Model of the SaskRB



## GDP in the main sub-basins and provinces of the SaskRB in 2014



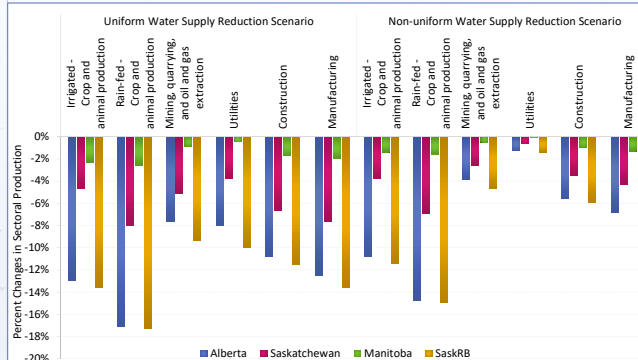
## Preliminary Water Supply Restriction Scenarios

- The First Scenario:
  - A uniform reduction in raw water intake and precipitation under climate change
- The Second Scenario:
  - A non-uniform reduction in raw water intake and precipitation due to climate and policy change

Main Sub-basins	First Scenario	Second Scenario	Main Water Use Sectors
North Saskatchewan River Basin	5%	5%	Irrigated - Crop and animal production
	8%	8%	Rain-fed - Crop and animal production
	5%	2.50%	Manufacturing
	5%	2.50%	Mining, quarrying, and oil & gas extraction
	5%	2.50%	Construction
	5%	0%	Utilities
South Saskatchewan River Basin	8.50%	8.50%	Irrigated - Crop and animal production
	11%	11%	Rain-fed - Crop and animal production
	8.50%	4.20%	Manufacturing
	8.50%	4.20%	Mining, quarrying, and oil & gas extraction
	8.50%	0%	Utilities

## Preliminary Results

### Percent changes in sectoral production in the three provinces and the SaskRB under Uniform and Non-uniform scenarios

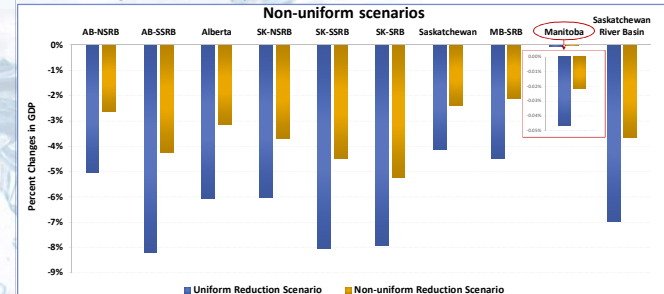


## Preliminary Results

### The main findings:

- Interconnections between various *sectors dampens* the **impact** of water supply restriction on the more water dependent sectors.
- The water supply reduction *within* the Saskatchewan River Basin affects **production** not only among sectors within the basin, but also in the rest of the three provinces.
- The estimated **economic losses** under *climate-change-induced* water supply restrictions can be reduced by almost **50 percent** in the SaskRB by *prioritizing sectoral demand* and employing supply-side management tools, such as making use of *alternative water sources* and available *technologies to recycle and reuse water*.

### Percent changes in GDP in the provinces and sub-basins of the SaskRB under Uniform and Non-uniform scenarios



## Challenges

1. Robust Economic Data for the Sub-basins:
  - Different temporal and spatial scales between the economic and Water Resources System models
2. Incompatible water use and economic data:
  - Water use data are in physical units, while economic data are in monetary units
3. Determining Actual Sectoral Water Use:
  - Some of licensees have not been reporting their actual water use properly
  - Several inconsistencies with the data (e.g., different industry classifications, ...)
4. Economic data for Agricultural Production are available without a distinction between Dryland and Irrigated Production.

## References

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