The Mackenzie River: Management Approach for Groundwater in a Unique Transboundary Basin

Isabelle de Grandpré, Government of Northwest Territories, Canada
Andarge Baye, Government of British Columbia, Canada
Guy Bayegnak, Government of Alberta, Canada
Kei Lo, Government of Saskatchewan, Canada
John Miller, Yukon Government, Canada
Mackenzie River Basin

- 20% of Canada’s land surface (1.8 million square kilometers)
- 1% of Canada’s population (400,000 people)
- Crossing 5 jurisdictions (3 provinces, 2 territories)
- Water flowing South to North into the Arctic Ocean
- More than 50% of the land surface is used by indigenous people for traditional activities
Mackenzie River Basin Aquifers

Source: Rivera et al., 2018
Groundwater Characterization
Challenges

1. **Big territory, low population**

   How to understand the basin dynamic and to implement a monitoring network in an immense territory with low human and financial resources?
Challenges

1. **Big territory, low population**
   How to understand the basin dynamic and to implement a monitoring network in an immense territory with low human and financial resources?

2. **Different uses and interests**
   How to manage economic and human development with respect of aboriginal treaty and right, and without perturbing the integrity of the ecosystems?
Challenges

1. Big territory, low population
How to understand the basin dynamic and to implement a monitoring network in an immense territory with low human and financial resources?

2. Different uses and interests
How to manage economic and human development with respect of aboriginal treaty and right, and without perturbing the integrity of the ecosystems?

3. Climate changes
How to be resilient to climate change?
Mackenzie River Basin (MRB)
Transboundary Waters Master Agreement

In 1997, the MRB Transboundary Waters Master Agreement was signed by Canada, British Columbia, Alberta, Saskatchewan, NWT and Yukon.

Main purposes:
- To establish common principles for the cooperative management of the water resources in the Mackenzie River Basin in a manner consistent with the maintenance of the ecological integrity of the aquatic ecosystem.
- To make provisions to create Bilateral Water Management Agreements.
Bilateral Water Management Agreements (BWMA)

Agreement between two neighbouring jurisdictions to:

• Address specific water issues for transboundary basins/aquifers
• Provide a quantitative framework on the quality, quality and flow of water
• Develop collaborative work plans
• Establish learning plans
• Establish a mechanism for information sharing, notification and consultation
• Use a Risk Inform Management Approach (RIM)
Bilateral Water Management Agreements

- BC/Yukon (Liard River) (2017)
- BC/NWT (Liard River) (2015)
- BC/Alberta (Liard, Hay & Peace Rivers)
- Yukon/NWT (Peel River) (2002)
- AB/NWT (Hay & Slave Rivers) (2015)
- SK/NWT (Tazin River)
- AB/SK (Lake Athabasca)
Risk Informed Management (RIM)

An approach for managing transboundary waters where risk is assessed and management actions are commensurate with identified risk.

Transboundary water bodies are categorized based on risk.

Management actions increase in intensity with increased risk.

- **Class 1** – No action required
- **Class 2** – Learn, monitor and study
- **Class 3** – Continue to monitor and study, set objectives.
- **Class 4** – Actions required to return to meeting objectives ASAP so aquatic ecosystem health is maintained
Groundwater Management

- Concept of share groundwater areas
- Knowledge acquisition
- Trilateral discussions
- Dealing with climate change
Conclusion

The unique situation of the Mackenzie Basin in terms of its size, geographical location, population density and cultural diversity raises several challenges for the management of water resources.

The state of knowledge of groundwater quality and quantity remains in its infancy in the basin due to challenges associated with its vast territory, its low population density and economic constraints.

Although the Master Agreement, bilateral agreements and RIM approach provide guidance to address some of the challenges related to groundwater management within the MRB, more work is required to better understand and better manage groundwater in the basin, including the definition of shared groundwater areas, aquifer characterization and tri-lateral management discussions.
Thank you