ALBERTA INNOVATES

CLEAN RESOURCES

ENVIRONMENTAL INNOVATION

WATER INNOVATION

Evaluating the Sustainable Use of Groundwater in Alberta: the Milk River Aquifer

Providing sufficient amounts of high-quality water is of key importance for Alberta's future economic development. In regions of Alberta where surface water is fully allocated, groundwater can be used to supplement water availability, though groundwater source-water sustainability is often unknown. This project uses a combination of novel and established groundwater age-dating tools to develop an accurate model of groundwater flow for a major aquifer in southern Alberta, the Milk River Aquifer (MRA). The project will increase: (i) our understanding of sustainable groundwater yield for the MRA in southern Alberta; and (ii) knowledge of how groundwater quality in the MRA evolves with groundwater age.

FUNDING DETAILS

RECIPIENT:
University of Calgary

PARTNERS:
University of Chicago, USA National Science Foundation

TOTAL BUDGET:
$746,508

AI FUNDING:
$336,754

PROJECT DATES:
OCT 2021 – MAR 2024

PROJECT TRL:
Not Applicable

APPLICATION

The opportunity pursued in this innovative project is to utilize a combination of novel (^{81}Kr) and more established groundwater dating tools (tritium, ^{14}C, ^{36}Cl, ^{129}I) to develop an accurate numerical model of groundwater flow for the Milk River Aquifer (MRA). The project will provide critical information to ensure a safe and secure water supply in the Milk River watershed in southern Alberta for the expected economic and population growth over the coming decades.

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PROJECT GOALS

The research project has two main objectives:

1. Determine the sustainable groundwater yield for the MRA in southern Alberta, and

2. Assess how groundwater quality in the MRA evolves with groundwater age.

The anticipated outcome is an accurate approach that enables the determination of the amount of high-quality groundwater that can be sustainably extracted from the MRA to supplement the demand for freshwater. The developed approach will be transferrable to other aquifers in Alberta.

BENEFITS TO ALBERTA

The project fills gaps in scientific knowledge to enable sustainable use of groundwater resources, using the Milk River aquifer as a test case. Broadly, the approach and results of this project contribute to: i) advancing water quality programs aimed at source-water protection information and planning; and ii) identifying priority water contaminants as outlined for safe, secure drinking water. An increased ability to assess groundwater quality and vulnerability to over-pumping will be demonstrated using novel approaches developed in this project. These approaches enable municipalities and other water users to address the challenge of ensuring Albertans have access to reliable, high-quality water supplies during periods of increasing dependency on water resources.

6 Publications

5 Students Trained

1-5 Project Jobs

CURRENT STATUS

DEC 2022

The project commenced as planned in the first project year with two field sampling campaigns. Subsequent, chemical, stable isotope, noble gas, and age dating analyses were conducted or initiated on the obtained samples followed by an initial interpretation of the data. An initial review of groundwater quality data of previously obtained samples was also conducted.