

# CLEAN RESOURCES

ENVIRONMENTAL INNOVATION

WATER INNOVATION PROGRAM

## FUNDING DETAILS

### Integrated Eastern Slopes Rivers (ESR) climate - groundwater - surface water assessment

Historically, river flow modelling and prediction have focused on surface water flow and climate, with groundwater baseflow relegated to a 'black box' compartment that belies its reliable contributions to rivers and complexity. In this project, snapshot and time series data of river flow and climate will be integrated with groundwater levels, geochemistry, and isotopic composition to 1) evaluate groundwater residence times, flow pathways, and fluxes of groundwater contributions to rivers; 2) investigate groundwater-surface water interactions among connected alpine lakes, springs, glaciers, and river and groundwater systems; and 3) evaluate annual to decadal-scale changes in alpine watershed hydrology induced by climate change.



#### RECIPIENT:

University of  
Calgary (Dr. Cathy  
Ryan)



#### TOTAL BUDGET:

\$1,536,200



#### PROJECT DATES:

MAY 2023 –

APR 2026



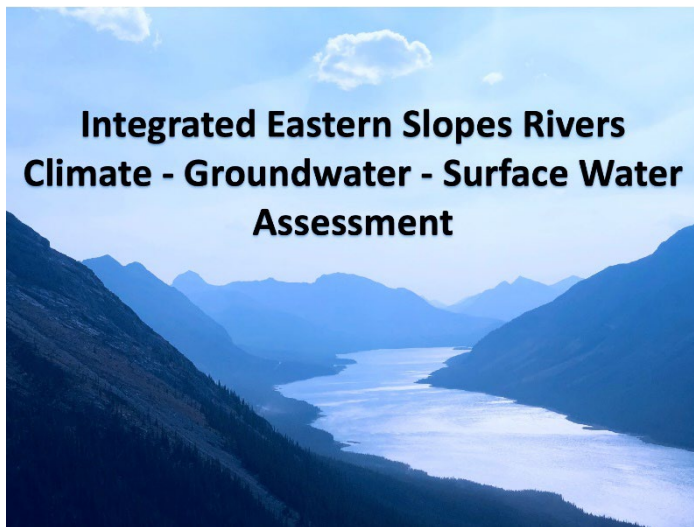
#### PARTNERS:

Alberta Environment  
and Protected Areas,  
City of Calgary, Town of  
Okotoks, MITACS,  
NSERC, EPCOR



#### AI FUNDING:

\$750,000



## APPLICATION

Knowledge generated through this assessment will ground-truth, complement, and advance hydrologic modelling and prediction; contribute to Alberta's water monitoring, evaluation and reporting programs; and support water management and policy at municipal, provincial, and watershed council levels.



# ALBERTA INNOVATES CLEAN RESOURCES

## ENVIRONMENTAL INNOVATION

### WATER INNOVATION PROGRAM

## PROJECT GOALS

Key outcomes include:

- quantify each main water source (especially groundwater) and understand their ages and flow pathways in Alberta’s mountain watersheds (or GROUNDwater towers) where almost all of the river flow is generated;
- understand climate change-driven variations in these water sources at several temporal scales (e.g., seasonal, interannual, and/or decadal scales); and
- examine linkages among climate and various water sources (in terms of both quantity and quality).

These three pieces of knowledge facilitate the overarching goal of the project, namely understanding the hydrologic system of ESR basins by integrating climate, groundwater, and surface water variables.

## BENEFITS TO ALBERTA

The eastern flow of the Rocky Mountain rivers is critical for seasonal water supply for use by municipalities, industry, agriculture, and the generation of hydroelectricity. Seasonal water supply is modulated by climate, surface water, and groundwater interactions in the mountain watersheds. An improved understanding of the interaction between climate, groundwater, and surface water in the eastern slopes rivers in southern Alberta will assist in identifying and addressing the following environmental impacts:

- how changing climate may affect critical river water supplies, including important information for the calibration and interpretation of hydrologic modelling;
- the role groundwater baseflow plays in providing resiliency to droughts under climate change which will affect river and groundwater-based ecosystems;
- the resiliency groundwater baseflow provides to droughts under climate change for surface water allocations and groundwater-based ecosystems
- climate-induced changes in river water quality on the decadal scale.



**4-6 Publications**  
(planned)



**14-18 Students**  
(planned)

## CURRENT STATUS

### JUN 2024

Year 1 of the project was successfully completed. Key activities included substantial preparation for new graduate students to conduct fieldwork in mountain areas, including field safety training, applying for research permits, setting up sub-agreements with partners, and recruiting team members.

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