UNTANGLING THE EFFECTS OF DEVELOPMENT ON GROUNDWATER DEPENDENT ECOSYSTEMS

GROUNDWATER— WATER STORED BELOW THE EARTH'S SURFACE— PLAYS A CRITICAL AND OFTEN OVERLOOKED COMPONENT OF HEALTHY WATERSHEDS AND OUR WATER SUPPLY.

Groundwater helps sustain the hydrological and geochemical balance of surface water systems, including lakes, rivers, and certain wetlands. These inputs can be foundational in supporting ecosystems that rely on its availability or chemical qualities for either the whole, or a portion of their water and nutrient needs.

These ecosystems are called groundwater-dependent ecosystems (GDEs).

For Indigenous communities, whose livelihoods and cultural practices rely on the land and watershed for harvesting plants and animals, the health of groundwater is essential.

RESOURCE DEVELOPMENT CAN IMPACT GROUNDWATER

A conceptual model has been developed to help explain potential stressors and mechanisms, and to predict the effects of development on GDEs in Alberta's oil sands region. The researchers who developed the model noted that stressors from mine construction and operations, wastewater storage and disposal, steam injection, and reclamation activities may be priority stressors to focus further research on due to their potential effects on groundwater.

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It is not always clear whether changes in groundwater conditions can be attributed to specific oil sands stressors or whether changes are within natural ranges. However, current monitoring and research is helping to clarify these connections and improve GDE monitoring.

SOLVING THE MYSTERY

MAPPING GROUNDWATER

Cutting-edge research by scientists at ABMI and InnoTech Alberta uses **machine-learning mapping** to determine where GDEs exist to better monitor changes in aquatic and terrestrial ecosystems.

BASELINE DATA

Collaborating with Indigenous communities, who have long monitored their water systems, is essential to understanding the broader impacts of groundwater change on human and environmental health.

A pilot program to inventory Indigenous

Knowledge in the MacKay River watershed aims to collaboratively monitor and provide baseline information on groundwater using Traditional and Western Knowledge.



KNOWLEDGE NETWORK

Canadian Conservation and Land Management

TO LEARN MORE ABOUT THE GROUNDWATER-DEPENDENT ECOSYSTEMS CONCEPTUAL MODEL ON THE CCLM VISIT, <u>WWW.CCLMPORTAL.CA</u>

References:

S.J. Birks et al. (2025) Groundwater vulnerability in the Athabasca and Cold Lake oil sands regions: gaps, opportunties, and challenges



