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**Cumulative Effects of Unconventional
Resources Development project in the
Fox Creek area (Alberta)**

C. Rivard

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CUMULATIVE EFFECTS OF UNCONVENTIONAL RESOURCES DEVELOPMENT PROJECT IN THE FOX CREEK AREA (ALBERTA)



In the last decade, unconventional resource development has raised environmental concerns about various issues, including water contamination and depletion, induced seismicity, wetland disturbance, forest fragmentation, and modification of the vegetation cover.

A multidisciplinary project on the characterization of non-saline aquifers and assessment of potential impacts of oil and gas (O&G) development activities in the Fox Creek area in west-central Alberta started in April 2019. One of the most active areas for hydrocarbon production in Canada over the last 50 years, the Fox Creek area has experienced some of the largest induced seismic events ($M_L > 4.5$) related to hydraulic fracturing.

The project focusses mostly on a 700-km² study area and combines fieldwork (including drilling several monitoring wells and their geophysical logging); laboratory analyses; interpretation and analysis of existing and newly acquired data; and numerical modeling. The different models currently being developed include a coupled surface water and groundwater model; a hydro-ecological model; a velocity model; and a geomechanical model of the entire sedimentary succession.

Because the Fox Creek area has been disturbed by the acquisition of seismic surveys and by the construction of pipelines, roads and well pads, NRCan later decided to build on this project to also study cumulative environmental effects. The project scope is now larger. It includes studies on vegetation, forest, wetlands and landscape evolution, as well as a general study on how to improve the assessment of cumulative effects within the framework of environmental assessments.

This 5-year project (2019–2024) aims to assess the cumulative impacts of hydrocarbon activities, mainly on water resources, landscape, and ecosystem services.

Aussi disponible en français sous le titre :

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EXPECTED OUTCOMES

This project will significantly increase the number of monitoring wells in this industrial area and provide information on:

- the potential effects of O&G activities on surface water and shallow groundwater
- deep and shallow fluid dynamics
- the origin of potential hydrocarbons found in near-surface groundwater
- an assessment of the integrity of the intermediate zone and its response to hydraulic fracturing and re-injection
- ecological stress and landscape evolution
- impacts on and the resulting changes to ecosystem services
- functional and structural recovery of the forest after O&G activities

The acquired scientific data and knowledge will support provincial water management regulations and policies that protect groundwater and minimize the effects of these industrial activities on the environment. The developed methodologies and results will be available to project proponents for conducting environmental assessments.

PARTNERS

Alberta Energy Regulator / Alberta Geological Survey, Alberta Environment and Parks, University of Alberta, Institut national de la recherche scientifique - Centre Eau Terre Environnement, Université Laval, CanmetENERGY, Canadian Forest Service - Great Lakes Forestry Centre and Northern Forestry Centre, Canada Centre for Mapping and Earth Observation, Northern Alberta Institute of Technology

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