

STAYING AHEAD OF THE CURVE

UNDERSTANDING ALBERTA'S WATER RESOURCES

Rapid industrial, agricultural and municipal growth in the province is putting immense strain on water supplies. The Alberta government has responded decisively with the Water for Life strategy – an approach to water management that is designed to ensure safe, secure drinking water, healthy aquatic ecosystems, and reliable water supplies for a sustainable economy.

One of the focus areas of Water for Life is groundwater. In addition to being important for household and industrial use, groundwater is a major contributor to the flow of streams and rivers, the quality of lake water, and the preservation of wetlands. Although Alberta has large amounts of groundwater, there is a lot we don't know about the location and quantity of groundwater, its movement and interaction with surface waters.

Enter ARC's water resources team. Although ARC's expertise in hydrogeology dates back some 60 years, the current team takes an integrated approach to water resource issues through the study of groundwater, surface water and ecosystems. One key technique used by the group is environmental tracers. Tracers can provide information about many aspects of the hydrogeologic system including sources of groundwater and water quality, recharge, salinity and contamination.

"Tracers can help answer vital questions that will give us the science base to better manage water resources," says Dr. Sue Gordon, program leader. "That's why we're building up our tracer expertise at ARC. We are in a great position; we've assembled one of the strongest scientific teams in Canada, with skills in both surface water and groundwater."

ARC's water resources team is using tracers in a number of major, collaborative projects. A few examples include:

IMPACT OF COALBED METHANE DEVELOPMENT. Groundwater contamination from coalbed methane wells is a serious public concern in many jurisdictions. But methane in water wells can come from a number of sources. Advanced tracer technology can identify the methane that comes from coalbed methane wells. ARC is involved in a number of studies designed to address the possible effects on water quality and quantity issues arising from coalbed methane development.

IMPACT OF OIL SANDS DEVELOPMENT. Because it is anticipated that emissions from oil sands development will increase over time, it's important to ensure that acid deposition from these emissions do not affect aquatic ecosystems in the region. ARC is part of a pre-emptive study that is using tracer technology to monitor 50 lakes in northeastern Alberta for potential impacts.

PREVENTING PATHOGEN CONTAMINATION IN GROUNDWATER. The experience in Walkerton, Ontario, where seven people died from contaminated drinking water, showed that pollution can travel through groundwater. ARC scientists are involved in developing provincial studies aimed at understanding how pathogens such as bacteria and viruses move through groundwater and their potential impact on human health.

"All these tracer studies are vital because the pressures on water resources are increasing," adds Dr. Gordon. "As surface water is fully allocated, people and industry will turn to groundwater. Climate change will also affect groundwater and surface water supplies. Environmental and economic sustainability are closely linked to the sustainability of groundwater and surface water. We need to understand both water systems and the links between them."

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Dr. Alec Blyth, research hydrogeologist (left) Andrea Mellor, hydrogeologist (right)