

## Sensitive bedrock aquifers: a field study of agricultural impacts on water quality in Ontario

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It is necessary to understand the presence, movement, and persistence of contaminants in aquifers in order to develop adequate protection plans for groundwater resources. Fractured bedrock aquifers with thin overburden cover are particularly sensitive to contamination, and little is known about transport processes from the ground surface to depth in this setting. This lecture will describe research undertaken at a field site in eastern Ontario to improve the understanding of agricultural impacts on water quality in a natural fractured bedrock aquifer with minimal overburden cover. The temporal and spatial variations of several contaminants and indicators (including nitrate and *E. coli*) were examined. Also, a unique infiltration tracer experiment was conducted to simulate the transport of solutes from the ground surface to wells. Results showed that the temporal variability of nitrate and *E. coli* concentrations is an important consideration for those drinking groundwater in this setting, as concentrations may be acceptable one month while unsuitable another month (or even another day for fecal bacteria). The infiltration tracer experiment illustrated that solute transport from the ground surface through thin soil to wells in fractured bedrock can be extremely rapid (on the order of hours). This is an important consideration for private and municipally-owned drinking water systems that draw water from shallow bedrock aquifers. Indeed, protecting water at the source is imperative to preserve water quality in sensitive fractured bedrock aquifers with minimal overburden cover.