

Transport and degradation of pesticides in a fractured dolostone aquifer in Southern Ontario, Canada

Context and objectives

Pesticides and their metabolites are often detected in groundwater. However, there is only limited information about the long-term fate of pesticides in aquifer systems. Most studies have investigated pesticide degradation in agricultural soils and are not representative for aquifers in which degradation might be slower. The objective of this project is to investigate (i) how pesticides migrate in a fractured aquifer taking into account its general hydrogeological functioning, (ii) at what rate they degrade and (iii) how degradation influences the maximum migration distance and long-term fate of these compounds. The study will be carried out in a fractured dolostone aquifer in southern Ontario, Canada that plays an important role for drinking water supply. The study will focus on Metolachlor, one of the most commonly used herbicides in agriculture.

Research approach and methodology

The following research approaches will likely be employed: (a) characterization of groundwater flow patterns in the fractured aquifer using a detailed multilevel monitoring network, (b) groundwater sampling and analysis for general hydrochemistry, pesticides and their metabolites; (c) use of advanced stable isotope methods to evaluate the degradation of the pesticides; and (d) potentially, integration of the field data into a numerical model to explore how degradation influences the contaminant spreading in the aquifer.

Partners and collaboration

The project will be supervised by Prof. D. Hunkeler and Dr. V. Ponsin from UNINE. It will be carried out in close collaboration with Prof. B. Parker, the director of a leading groundwater research institute in Canada (<https://g360group.org/>). The project provides a unique opportunity to apply a broad range of advanced field and laboratory methods in hydrogeology to a groundwater problem of high practical significance. It includes a visit to Canada for about 6-8 weeks during summer/fall to carry out field and some laboratory work. The student has also the opportunity to get to know a broad range of groundwater projects carried out by the G360 group.

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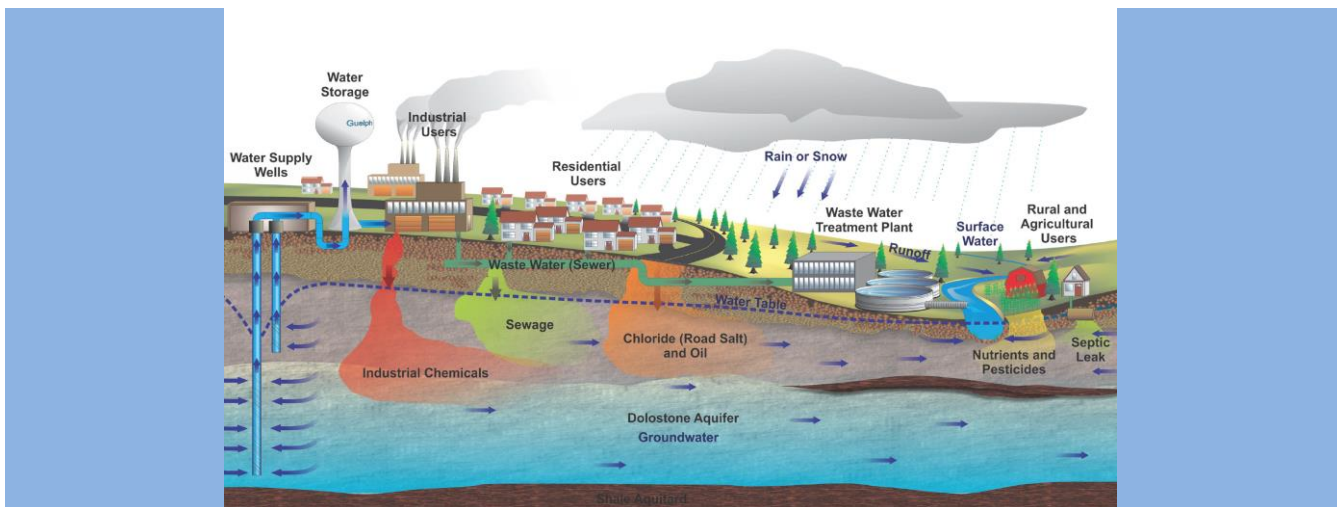


Image: G360