

IMPACT OF AGRICULTURE ON GROUNDWATER QUALITY

Contexte et objectifs

Agriculture has often a strong impact on groundwater quality. During groundwater recharge across agricultural land, agrochemicals such nutrients and pesticides can be leached to groundwater. In agricultural areas, evaluated nitrate concentrations are particularly common. If water quality standards are exceeded, often land use measures are implemented in order to improve water quality. At several locations, these measures have not been as successful as expected.

The main aim of the project is to investigate the relationship between agriculture land use and nitrate concentrations in groundwater. The project will be carried out in region in Switzerland (Gäu, Kanton Solothurn) where intense agricultural overlaps with an important alluvial aquifer that supplies drinking water for more than 50'000 people. At the site, measures to improve water quality have been implemented.

Méthodologie et approches

The study will combine field approaches with numerical modeling. At the study site, a comprehensive monitoring system has been installed covering the soil-groundwater continuum with devices to characterize the hydrology of the system (meteo-station, soil moisture sensor, piezometers) and to determine the water quality (soil, vadose zone, groundwater sampling points). The student will be involved in data acquisition, but has also access to existing time series. He/she will compare data from areas with different land use (meadows, cropland) to establish relationships between land use and water quality. Using numerical modeling, he/she will then investigate how quickly and to what extent measures to reduce nitrate leaching propagate through the vadose zone and become apparent in groundwater. The modeling will make use of data from a tracer experiment to investigate solute transport towards groundwater.

Partenaires et collaborations

The project will be carried out in the framework of a larger research programme involving the CHYN, FIBL (institute for organic agriculture), ETHZ and Agroscope. The field work will be supported by a PhD student (Hannah Wey) working in the project, the modeling component by a postdoc (Dr. Landon Halloran).

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