



A multi-tracer approach to assess fingerprints of nitrate in an aquifer under agriculturally used land

Ernesto Pasten-Zapata (1), Rogelio Ledesma-Ruiz (1), Aldo Ramirez (1), Thomas Harter (2), and Jürgen Mahlkecht (1)

(1) Tecnológico de Monterrey, Centro del Agua para América Latina y el Caribe, Monterrey, Mexico (jorgen@itesm.mx), (2) Department of Land, Air, and Water Resources, University of California, Davis, USA

To effectively manage groundwater quality it is essential to understand sources of contamination and underground processes. The objective of the study was to identify sources and fate of nitrate pollution occurring in an aquifer underneath a sub-humid to humid region in NE Mexico which provides 10% of national citrus production. Nitrate isotopes and halide ratios were applied to understand nitrate sources and transformations in relation to land use/land cover. It was found that the study area is subject to diverse nitrate sources including organic waste and wastewater, synthetic fertilizers and soil processes. Animal manure and sewage from septic tanks were the causes of groundwater nitrate pollution within orchards and vegetable agriculture. Dairy activities within a radius of 1,000m from a sampling point increased nitrate pollution. Leachates from septic tanks incited nitrate pollution in residential areas. Soil nitrogen and animal waste were the sources of nitrate in groundwater under shrubland and grassland. Partial denitrification processes were evidenced. The denitrification process helped to attenuate nitrate concentration in the agricultural lands and grassland particularly during summer months.