



## **Hydrobiogeochemical processes and managing ecological risks of groundwater pollution: The case of the Ziz valley (Morocco)**

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Semi-arid regions, as southern Morocco experience high interannual variability of the scarce rainfall distribution are most vulnerable to climatic changes. This is likewise true for changes in land use, population density and other factors, that determine water demand.

Most Moroccan groundwater systems are highly vulnerable to pollution, and some aquifers are already confronted with serious contamination problems. Demographic density and agriculture are well-known factors contributing to contamination waters in Morocco. Dams and “Khattara” systems are causing the drying up of rivers and springs and the encroachment of saline water into aquifers. Quantifying recharge and discharge to an aquifer is a basic prerequisite for sustainable groundwater development and planning.

An interdisciplinary approach involving the collection of hydrological, physicochemical and biological data was developed to determine the spatio-temporal pattern of groundwater contamination along Ziz Oasis valley polluted with septic tanks. The study of the spatio-temporal distribution of meio- and micro-organisms was the only approach that provided evidence of the dispersion of contaminants throughout the less permeable parts of the aquifer during times of active groundwater recharge. This finding highlights the importance of integrating faunal investigations into the framework of interdisciplinary research programmes on groundwater contamination.

Sustainable use can only be achieved if groundwater management is part of an integrated approach (surface water, environment, physical planning) and if instruments

are available providing information on the maintenance of potential functions and biodiversity.