



Groundwater vulnerability assessment for the karst aquifer of Tanour and Rasoun spring using EPIK, COP, and travel time methods

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Karst aquifers are especially sensitive to short-lived contaminants because of fast water travel times and a low storage capacity in the conduit system. Tanour and Rasoun karst springs located around 75 km northwest of the city of Amman in Jordan represent the main domestic water supply for the surrounding villages. Both springs suffer from pollution events especially during the winter season, either by microbiological contamination due to wastewater leakage from septic tanks or by wastewater discharge from local olive oil presses.

To assess the vulnerability of the karst aquifer of Tanour and Rasoun spring and its sensitivity for pollution, two different intrinsic groundwater vulnerability methods were applied: EPIK and COP. In addition, a travel time vulnerability method was applied to determine the time water travels from different points in the catchment to the streams, as a function of land surface gradients and presumed lateral flow within the epikarst. For the application of the COP and EPIK, a detailed geological survey was carried out to determine karst features and the karst network development within the catchment area. In addition, parameters, such as soil data, long term daily precipitation data, land use and topographical data were collected. For the application of the travel time vulnerability method, flow length, hydraulic conductivity, effective porosity, and slope gradient was used in order to determining the travel time in days. ArcGIS software was used for map preparation.

The results of the combined vulnerability methods (COP, EPIK and travel time) show a high percentage of "very high" to "moderate" vulnerable areas within the catchment area of Tanour and Rasoun karst springs. Therefore, protection of the catchment area of Tanour and Rasoun springs from pollution and proper management of land use types is urgently needed to maintain the quality of drinking water in the area.