



Major hydrochemical processes controlling groundwater quality deterioration in the coastal aquifer of Taleza, Algeria

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Abstract

Located in north-east of Algeria, the coastal aquifer of Taleza contains hundreds of private wells used by the local population for several purposes including drinking water supply. Recently, groundwater of this aquifer has become more and more salinized. Furthermore, organoleptic problems recently appeared (bad odor smelt as rotten eggs) in the groundwater pumped from certain wells. In general, the groundwater quality is controlled by two factors: 1) natural processes related to water/soil-rock interactions and 2) anthropogenic activities. However, anthropogenic activities are considered to be the most serious sources of groundwater contamination in Taleza aquifer. Hydrogeochemical and stable isotopes groundwater characterization, including the analyses of major chemical elements anions and cations, water stable isotopes $\delta^2\text{H-H}_2\text{O}$ and $\delta^{18}\text{O-H}_2\text{O}$, and stable isotopes of nitrate $\delta^{15}\text{N-NO}_3$ and $\delta^{18}\text{O-NO}_3$ was carried out. The sampling program included 25 groundwater samples collected from private wells, 4 surface-water samples collected from two rivers bordering the study area, and 1 surface-water sample collected from the Mediterranean Sea. It is determined that Taleza aquifer suffers from saltwater intrusion originated both from Mediterranean Sea and the two rivers. Furthermore, other anthropogenic sources contribute to groundwater contamination. Nitrates in groundwater, in particular, were revealed with excessive concentrations mainly generated from poor private sanitation systems. Consequently, urgent, efficient and durable planning is required over the plain of Taleza, including installation of a reliable sanitation network for the existing urbanised sectors, to limit and possibly remediate groundwater contamination related to anthropogenic activities.