

The hydrochemical characterization of the underground waters of the plain of Sidi Bel Abbès (northwestern Algeria).

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ARTICLE INFO

Article History :

Received : 17/10/2017

Accepted : 28/03/2018

Key Words:

Plio-Quaternary aquifer,
Mekerra river, salinity,
anthropogenic activities,
evaporation, water/rock
interactions

ABSTRACT/RESUME

Abstract: The population of Sidi Bel Abbès has become over the years more dependent on the neighboring cities of Tlemcen and Mascara to satisfy its growing needs of potable water. The absence of dams with big storage capacity combined with the semi-arid climate characterizing this region (irregular and low to medium rainfall rates) is superposed to the poor knowledge of the underground waters potential in the area. The Plio-Quaternary aquifer of the Sidi Bel Abbès plain can however be considered an exception. This unconfined aquifer, which stretches over 800 km² is by far the most important underground water reservoir in the region. The aquifer is mainly drained by the Mekerra River and is exploited by an impressive number of pumping wells (legal and illegal), destined for their majority to irrigation. The strategic importance of this water resource for the city of Sidi Bel Abbès is thus, immense and its characterization both qualitatively and quantitatively vital. The hydrochemical study of the Plio-Quaternary aquifer waters shows that they vary from fresh (Total Dissolved Solid < 1 g/l) to extremely saline (Total Dissolved Solid > 5 g/l) waters. The results demonstrate that the salinity of the Plio-Quaternary aquifer waters is derived from the combination of a multitude of processes. The anthropogenic activities materialize in the contamination of the aquifer's waters, both directly by the polluted waters (industrial and domestic water wastes) of the Mekerra river and septic fosses (absence/weak coverage of sanitization networks) and indirectly due to the extensive usage of fertilizers and pesticides in farming, which reach by soils leaching the aquifer, during the rainy and irrigation seasons. The hydrochemical results illustrate the important contribution of the evaporation in the salinization process of the Plio-Quaternary aquifer waters, especially East and North of the plain of Sidi Bel Abbès where the aquifer is shallow and its section and thickness small. They also emphasize the major role of the water/rock interaction (dissolution of carbonates, ion exchange processes and silicates weathering) and its influence on the salinity, hardness and geochemical facies of the Plio-Quaternary aquifer waters.