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GROUNDWATER QUALITY ASSESSMENT USING WATER QUALITY INDICES AND GIS WITHIN THE OUED GUEBLI DOWNSTREAM SUBBASIN (COLLO PLAIN, NORTHEASTERN ALGERIA)

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Abstract

Groundwater is the main source of drinking water for a number of towns in north-eastern Algeria located in the downstream sub-basin of the *Oued* Guebli, namely the urban areas of Ouled Ma'zouz, Hadjria and Guergoura, which are facing a serious threat of groundwater deterioration due to various sources of contaminants. In this respect, the present work focuses on studying the groundwater hydrochemistry of the shallow aquifer within the Collo plain, identifying drinking water quality levels and observing spatial evolution by combining statistical indexing approaches with GIS mapping techniques. To this end, thirty (30) groundwater samples were taken and analysed for thirteen (13) physico-chemical parameters to evaluate water quality. The Entropy-weighted Water Quality Index (EWQI) model was selected to ascertain groundwater potability using the drinking water limits of World Health Organization (WHO). The EWQI mapping showed that 50% of the samples analyzed belong to the "good" water quality class (EWQI<100), 43% to the "fair" quality class (100<EWQI<150), while around 7% of samples belong to the "poor" water quality class (EWQI>150). This poor class is mainly located in the littoral zone to the north-west of the plain (Ouled Ma'zouz), where anthropogenic activities are concentrated, such as agricultural activities and untreated domestic discharges, as well as marine intrusion caused by overexploitation of the aquifer, are considered to have a much greater impact on groundwater quality in the study area. A strong positive correlation was recorded between the EWQI and EC, Na^+, Cl^-, NO_3^-, NH_4^+, NO_2^- and PO_4^{3-} ($R^2 >0.7$), revealing that these elements strongly influence the EWQI values and are the elements responsible for the degradation of water quality in the study area. These results will help decision-makers to protect the groundwater of the Collo plain from degrading anthropogenic practices, and to ensure continuous monitoring of water quality and its sustainable management.

Key words: drinking water quality, groundwater quality, physicochemical properties, water quality indices

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