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The influence of lithology and climatic conditions on the groundwater quality in the semi-arid-regions: case study of the Eastern Middle Cheliff alluvial aquifer (northwestern Algeria)

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كل الحقوق محفوظة للمدرسة الوطنية العليا للري.

Abstract : Over the last few years, the Eastern Middle Cheliff plain has witnessed remarkable economic growth, particularly in the agricultural sector. However, the overexploitation of the alluvial aquifer, coupled with agricultural practices involving the use of fertilizers and pesticides, significantly contributed to the degradation of groundwater quality. The primary objective of this study is to comprehend the mechanisms governing the water chemistry of the Eastern Middle Cheliff alluvial aquifer. A total of 42 samples were collected and analyzed during the dry periods of the 2012 and 2017. The data processing and representation involved the utilization of analytical tools including Principal Component Analysis (PCA), Piper diagram, Stabler classification, binary diagrams, base exchange indices, saturation indices, and geostatistical methods. The interpretation of these data revealed the following findings: i) the groundwater in both the dry periods of 2012 and 2017 is characterized by the presence of two dominant hydro-chemical facies, namely calcium chloride and sodium chloride, as indicated by the Piper and Stabler diagrams; ii) the hydrochemical quality of the groundwater varies across different regions of the aquifer, fair to poor in the eastern and central regions, with the presence of certain contaminants resulting from the application of nitrates in agricultural activities. The quality is classified as very poor in the western region, primarily due to high salinity influenced by the lithology of the aquifer, the rise of deep salty water through the Cheliff fault due to the earthquake of the year 1980 and possibility by two climatic factors, namely evaporation and rainfall. Overall, this study provides new insights into the water chemistry dynamics of the Eastern Middle Cheliff alluvial aquifer, highlighting the varying hydrochemical facies and the impact of agricultural activities and climatic factors on groundwater quality in different areas of the aquifer

Key words : Groundwater quality, Hydrochemistry, Evaporation, Rainfall, Nitrate, Eastern Middle Cheliff

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