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Multivariate Analysis to Assess the Quality of Irrigation Water in a Semi-Arid Region of North West of Algeria : Case of Ghrib Dam

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Abstract : Dams are critical to agriculture, industry, and the needs of humans and wildlife. This study evaluates the water quality of the Ghrib dam in north west of Algeria, using Irrigation Water Quality Index (IWQI), sodium absorption rates (SAR) and multivariate statistical methods (Clustering and principal component analysis). The study concerns the analysis of physical and chemical parameters (pH, EC, O2 , TUR, Ca, Mg, HCO3 , Na, K, BOD, DCO, Cl– , PO4 , SO3 . NH4 et NO3) which were measured at twelve selected points along the dam over 8 periods (dry and wet periods) using standard methods. Irrigation Water Quality Index values in the dam were found to be between 41 and 59, according to classifications for different water uses, values below 60 indicate that water is of poor quality for irrigation and treatment is recommended to make dam water more suitable for irrigation. The results of water analysis in our study area reveal the presence of acute pollution which is certainly caused by direct releases of either industrial or domestic origin, and we note that this pollution remains variable depending on the collection periods. Also, Chloride-calcium and sulfate facies are the most dominant in sampling periods for dam water, resulting in poor water quality for irrigation. In addition, water is, therefore, highly mineralized and is likely to be suitable for irrigation of certain species (cucumbers...) that are well tolerant to salt and on well-drained and leached soils.

Keywords : Ghrib dam; IWQI ; SAR ; physical and chemical parameters ; pollution ; water ; irrigation

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