The Use of Multivariate Statistical and GIS for Characterization Groundwater Quality in Laghouat Region, Algeria

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Abstract : Due to rain Shortage and the increase of population in the last years, wells excavation and groundwater use for different purposes had been increased without any planning. This is a great challenge for our country. Moreover, this scarcity of water resources in this region is unfortunately combined with rapid fresh water resources quality deterioration, due to salinity and contamination processes. Therefore, it is necessary to conduct the studies about groundwater quality in Algeria. In this work consists in the identification of the factors which influence the water quality parameters in Laghouat region by using statistical analysis Principal Component Analysis (PCA), Hierarchical Cluster Analysis (HCA) and geographic information system (GIS) in an attempt to discriminate the sources of the variation of water quality variations. The results of PCA technique indicate that variables responsible for water quality composition are mainly related to soluble salts variables; natural processes and the nature of the rock which modifies significantly the water chemistry. Inferred from the positive correlation between K^+ and NO_3^-, NO_3^- is believed to be human induced rather than naturally originated. In this study, the multivariate statistical analysis and GIS allows the hydrogeologist to have supplementary tools in the characterization and evaluating of aquifers.

Keywords : cluster, analysis, GIS, groundwater, laghouat, quality