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SPATIAL-TEMPORAL EVOLUTION OF DEEP GROUNDWATER QUALITY IN BARCĂU HYDROGRAPHIC BASIN, ROMANIA

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Abstract

Groundwater constitutes the largest freshwater reservoir on earth. It is necessary to protect groundwater re-sources to protect human health, to maintain food supplies and preserve ecosystems. The aim of the research is to study the evolution of groundwater quality by using geospatial analysis means. 98 groundwater samples were collected from 14 drills used for supplying localities and for human consumption in well system. Twenty-two chemical parameters were analysed and compared with the standard guidelines recommended by the current legislation on the quality of fresh water and the quality of water used for human consumption. The data required for this study were provided by the Crișuri Water Basin Administration. Data processing was made with ArcGIS 10.6 software and, from the interpolation methods, the Inverse Distance Weighting (IDW) method was used to obtain the maps with the deviations of studied indicators. For the statistical interpretation of the data, multi-variate analysis was used, which consists of a sequence of multivariate statistical methods such as: Principal Component Analysis, Linear Discriminant Analysis, Multivariate Analysis of Variance and Hierarchical Cluster Analysis. The results emphasized the areas and chemical indexes which recorded deviations within the time frame 2016-2022. One hundred thirty-six exceedances of admissible maximum thresholds were identified for only 10 indicators from the total 22 analysed indicators. In conclusion, the study carried out highlighted an improvement process the underground water quality, in the studied area, characterized by the reduction of the number of exceeding maximum limits allowed for the year 2022.

Key words: drill, exceedances, groundwater, spatial-temporal analysis, water quality

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