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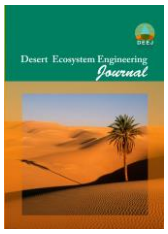

Groundwater quality zoning using WQI and Geo-statistical Methods for various consumptions

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Extended Abstract

Introduction: The ecological, economic, and social potential of an area for large and large uses is influenced by the quantity and quality of the waters. Therefore, appropriate methods of surface water and groundwater have been investigated qualitatively and quantitatively in order to use its results in assessing the power of the land. One of the important factors for sustainable development is the availability water resources for different uses, which imposed its quality is very important. Nowadays, groundwater resource management plays the main role in arid and semiarid regions. Investigations on the spatial variations of Water Quality Index (WQI) are very important to determine the best management program. Geo-statistical methods and ArcGIS software can be useful for this purpose. The aim of this study is WQI zoning for various uses (drinking, agriculture and industry) in the Silveh watershed (West Azerbaijan province).

Material and method: In this research, water quality zoning based on WQI method for different drinking uses (pH, TDS, HCO3, Cl, Ca, Mg, K, Na and SO4), agriculture (EC, SSP and Cl) and industry (pH, TDS, Cl, TH and SO4) were sampled from 145 points (springs) from the basin level representing the studied area, which was carried out in July 2012. Then, to measure the parameters, the samples were transferred to the laboratory of the Faculty of Natural Resources of Tehran University and tested and the parameters were measured. In this research, we try to compare different methods of interpolation and select the best method to base the groundwater quality zonation map using the WQI index. Initially, the WQI index was calculated for all sampling points. After calculating the water quality index, the zoning water quality in the area was used Inverse Distance Weighting, Global Polynomial Interpolation, Local Polynomial Interpolation, Radial Basis Function and Kriging methods. Geostatistical methods to evaluate and select the best method of ArcGIS is the ability to perform cross-validation techniques and statistical criteria Root Mean Square Error (RMSE) is used.

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Result: Water Quality Index (WQI) zoning in the Silveh watershed for various uses showed that this area has no limitations in terms of groundwater quality and the use of groundwater for drinking, agricultural and industrial uses. The lowest and highest water quality index for drinking water in the area was 33.08 and 38.67, respectively, which is in the high-class of water quality index (less than 50). The lowest and the highest water quality index for agricultural consumption in the area was 36.27 and 72.77, respectively, which is in the high and good class of water quality index (less than 50 and 100-100), and There is no limit to agricultural consumption. Also, the lowest and the highest water quality index for industry consumption in the area was 34.32 and 64.96, respectively, which is in the excellent and good water quality index (less than 50 and 100-100) respectively and for the unlimited use of the industry.

Discussion and Conclusion: Based on mountainous conditions and limited human activities (except for the southern and eastern areas of agricultural activities), the quality of water in the area is good. Although it is growing from the southeastern part of the city of Piranshahr, measures should be taken to prevent degradation of groundwater quality in the area due to various activities. Land use surveys show that agricultural use is about 19.97%, good rangelands are about 50.66%, good poor rangelands, 6.33% of the basin, and county of Birland and residential land cover 23.27% and 34% of the area respectively. The results also clearly illustrate the distinction of land use in the catchment area, because the water quality index in the agricultural and vegetation areas is in a good class (100-150). Given that 50% of the area is covered with good pastures (these rangelands do well to clean up underground water). The results of this study confirm the field performance in terms of high performance and water quality indexes, and recommends that similar research be used. Of course, the lithology of the area should not be ignored. Because water quality has a high correlation with the region's mineralogy. The existence of calcareous and dolomitic stones in the studied area is also a reason for the good water quality of the area.

Keywords: Groundwater, Geo-statistical, Silveh watershed, Water Quality Index.