Groundwater quality assessment and selecting the most appropriate interpolation method using GIS (Case study: Saghez city, Iran)

Hossein Salehi[1*]
Hossein Zeinivand[2]
Shadi Ahmadi[3]

1. PhD Student, Department of Range and Watershed Management Engineering, Lorestan University, Khorramabad, Iran
2. Associate Professor, Department of Range and Watershed Management Engineering, Lorestan University, Khorramabad, Iran
3. MSc Student, Department of Range and Watershed Management Engineering, Lorestan University, Khorramabad, Iran

***Corresponding author:**
ho.salehi2144@gmail.com

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Abstract

Increase of population, limited resources and the excessive exploitation of aquifers and surface water caused irreparable damage to the country's natural resources including groundwater resources. Contamination of groundwater has been published in numerous environmental hazards that directly affect their life. The aim of this study was to evaluate the quality of groundwater for drinking and irrigation purposes in the Saghez city, Iran. For this purpose, 188samples has been gathered from 2004 to 2012 water data and the parameters of salinity, chlorine, concentration of dissolved substances, sulfate, Nitrate, water hardness, sodium adsorption ratio were studied. Analysis of variance (ANOVA) and the LSD test was used to compare treatments and the differences between various stations respectively. For determining the most appropriate location and zoning methods for the above parameters, geographical information system (GIS) was used. Therefore, a geostatistic method of Circular Kriging, Gaussian and deterministic techniques such as inverse distance weighting, local estimator and general estimates was applied. The results showed that the quality of water in the Saghez city is appropriate and acceptable for drinking and irrigation. Spatial interpolation results according to the root mean squared error (RMSE), Mean Bias Error (MBE) and mean absolute error (MAE), among the different methods of interpolation techniques the IDW with 1 power for estimating the parameters of sulfate, sodium, chlorine and sodium absorption ratio, and the IDW with 2 power for estimating parameters of salinity, soluble solids concentration and total Hardness and the Circular Kriging method were the most appropriate methods for Nitrate.

Keywords: Groundwater quality, GIS, zoning, Saghez.

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