Abstract:

It is important to study the process of time and place changes in groundwater quality in water resources management. In this research, the long-term changes in groundwater quality in Mazandaran plain are investigated using non-parametric Mann-Kendall, Spearman rho test and Sen's slope estimator. For this purpose, 31 years (1985-2015) qualitative analysis of chemical analysis of groundwater samples of 55 wells (deep and semi deep) and 13 springs in Mazandaran plain was used. The quality parameters used in this study were Na^+, K^+, Ca^{2+}, Mg^{2+} , So_4^{2-}, Cl^-, Hco_3^-, Co_3^{2-}, Sodium absorption ratio(SAR), Sodium percentage(Na%), Percentage of reaction error(E), Residual Sodium Carbonate(RSC), Residual Sodium Bicarbonate(RSBC) and Potential Salinity(PS) and the total sum of cation and anion. In this study, the spatial variability of groundwater quality parameters of Mazandaran plain was investigated by using semivariogram. The spatiotemporal distribution pattern was determined using Kriging geostatistical method in GIS environment. The results of the trend analysis showed that the variables K^+, Ca^{2+} and the sum of the anions were the highest among the variables studied there has been an increasing trend among the stations. Comparison of different methods in evaluating the quality of the variables in the study area shows similar results in determining of positive trends at all stations. Results Geostatistical analysis indicated that the values of variables were high in the central and northeastern in the study area. So in Mazandaran basin appropriate solutions such as managing and controlling groundwater withdrawals to prevent quality degradation Groundwater seems to be necessary.

Keywords: Long-term trend, Groundwater quality, Mann-Kendall, Spearman rho test , Sen's slope estimator.

University of Zabol

Graduate School

University Campus

Department of Water Resources Engineering

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Trend Analysis of Groundwater Quality of Mazandaran Plain using Nonparametric Methods

Supervisor:
Dr. M. Delbari

Advisor:
Dr. O. Mohammadrezapour

By:
Kobra Mehmandoost Khjedad

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