



## Determination the effects of physico-chemical parameters on groundwater status by water quality index (WQI)

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### ABSTRACT

The quality of drinking water, in addition to the presence of physicochemical parameters, depends on the type and geographical location of water sources. In this study, groundwater quality was investigated by sampling total dissolved solids (TDS), electrical conductivity (EC), total hardness (TH),  $\text{Cl}^-$ ,  $\text{Ca}^{2+}$ , and  $\text{Mg}^{2+}$  parameters in 13 sites, and 40 water samples were sent to the laboratory. Electrometric, titration, and spectrophotometer methods were used. In the next step, the water quality index (WQI) was used to investigate the impact and weight of each parameter in the groundwater. The results showed that only the mean of magnesium ion ( $40.88 \text{ mg L}^{-1}$ ) was lower than the guidelines of World Health Organization (WHO). Interpreting the WQI based on the WHO guidelines showed that the statuses of 21, 11, and 7 samples were very poor, poor, and average quality, respectively, and one sample had excellent quality. Among the studied parameters, the means of EC ( $2,087.49 \text{ mS cm}^{-1}$ ) and  $\text{Cl}^-$  ( $1,015.87 \text{ mg L}^{-1}$ ) exceeded the global and national limits. Classifying water quality about TH was very hard (87.5%), hard (7.5%), and moderate (5%), respectively. Based on the geographical distribution, the drinking water index in sites 4 and 11 did not have acceptable quality. Chloride ion was identified as the responsible pollutant and the most important ion for raising the index. The outputs of statistical tests and Spearman correlation had significant and direct correlation ( $p < 0.05$ ,  $r > 0.7$ ) between TDS, EC, and chloride, EC and chloride, as well as TH,  $\text{Ca}^{2+}$ , and  $\text{Mg}^{2+}$ .

*Keywords:* Water quality index; Groundwater; Chloride; GIS; Garmsar

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