Assessment of groundwater quality using GIS at north-east of Iran

Meysam Abedinpour*, Seyed Navid Nabavi
Water Engineering Department, Kashmar Higher Education Institute, Kashmar, Iran, email: abedinpour_meysam@yahoo.com

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ABSTRACT

The groundwater quality is equally as important as that of quantity. Mapping of spatial variability of groundwater quality is of vital importance and it is particularly significant where groundwater is primary source of potable water. Geostatistics was used to determine the spatial distribution of groundwater quality parameters in the study area using geographic information system and geostatistical techniques. Ordinary kriging interpolation techniques were applied to generate water quality maps. For this purpose, water samples were collected from 65 tube wells and analyzed for some physicochemical parameters such as electrical conductivity (EC), pH, total dissolved solid (TDS), total hardness (TH), sodium (Na\(^+\)), chloride (Cl\(^-\)), nitrate (NO\(_3^-\)), magnesium (Mg\(^2+\)), calcium (Ca\(^2+\)), potassium (K\(^+\)), bicarbonate (HCO\(_3^-\)), and sulfate (SO\(_4^{2-}\)) using standard methods in the laboratory. The results of analysis showed the following concentration ranges: pH (7.0–8.6), EC (724–12,755 \(\mu\)S/cm), TH (60–1,350 mg/L), TDS (456–8,000 mg/L), Cl\(^-\) (53–3,443.5 mg/L), NO\(_3^-\) (\(\leq\) 1 mg/L), HCO\(_3^-\) (11.26–400 mg/L), SO\(_4^{2-}\) (98–1,440 mg/L), Ca\(^2+\) (6–460 mg/L), Mg\(^2+\) (7.2–192 mg/L), Na\(^+\) (92–2,047 mg/L), and K\(^+\) (3.6–21.8 mg/L). Also, water quality index (WQI) was used to assess the suitability of groundwater from the study area for drinking purpose. From the WQI assessment the map showed that 70.06% (430.33 km\(^2\)) of the groundwater of the study area were found to be in the excellent water class, 8.21% (50.44 km\(^2\)) good, 7.02% (43.25 km\(^2\)) moderate, 5.29% (32.47 km\(^2\)) poor, 3.63% (22.28 km\(^2\)) very poor and the remaining 5.79% (35.59 km\(^2\)) was classified under very poor water class based on the computed WQI classification results.

Keywords: Analysis; GIS; Groundwater; Water quality index

* Corresponding author.