



Use of geographic information system and water quality index to assess groundwater quality for drinking purpose in Birjand City, Iran

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ABSTRACT

This study aimed at utilizing geographic information system (GIS) and water quality index (WQI) for evaluation of the quality of groundwater in Birjand City, Iran. This study evaluated the physical and chemical parameters of 19 wells located in South Khorasan Province, within the boundary of Birjand City (with an area of 5,400 km²). First, using ArcGIS 10.22 software, the zoning maps were plotted for pH, electrical conductivity (EC), total dissolved solids (TDS), total hardness (TH), bicarbonate, ammonium, sulfate, nitrate, calcium, magnesium, sodium, and potassium. Then, WQI was employed to evaluate water quality. According to the results, in over 90% of the studied area, EC, TDS, and TH values were above the allowable limit. Considering the zoning map and the results of spatial analysis of the parameters, the more we moved from the south of the studied region to the north, the parameters values increased, representing the worsened quality of water. Based on the results of WQI classification, only 10.5% of the studied wells were placed in the first group (excellent water), while the majority of sampling points (36.84%) were placed in the third group (poor water). The zoning and spatial analysis of water quality showed that water quality was suitable for drinking purposes only in 1,958 km² (36.28%) of the entire studied region. Moreover, in 3,437.53 km² (63.69%) of the studied area, water quality was unsuitable for drinking. Therefore, the application of WQI and spatial analysis through GIS was effective for monitoring groundwater quality in the studied region, and it can be considered as a promising tool for understanding the spatial patterns and changes.

Keywords: Physicochemical parameters; Geographic information system; Water quality index; Spatial analysis; Birjand

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