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Hydrogeochemical Assessment, Spatial and Temporal Distribution of Groundwater Quality in Handri river basin, Southern India

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ABSTRACT

Groundwater is the most efficient and effective tool in the world for consumptive purposes. The present study was conducted to assess the water quality and the spatial distribution of physicochemical parameters and hydrogeochemical characteristics of groundwater in Kurnool district's Handri river basin. Groundwater samples from 41 sites were collected during pre and post monsoon seasons are analyzed for their physicochemical constituents like pH, EC, TH, TDS, major ions (Na^+, K^+,Ca^{2+}, Mg^{2+}, F^-, Cl^-, HCO_3^-, NO_3^-, SO_4^{2-}). The analytical findings were matched with water standards as approved through the World Health Organization for domestic usage and irrigation suitability. In the study area the groundwater pH is slightly alkaline. The Electrical conductivity, TDS, TH, chloride and concentration of nitrates were beyond the maximum allowable limits where as sodium, potassium and calcium concentrations in most of the groundwater samples are within the desirable limits for the both the seasons. The major hydrochemical facies were identified using Piper's trilinear diagram. This plot showed that most of the samples fall in the field of NaCl, $CaCl_2$ type for both seasons. Parameters like percent sodium (%Na), residual sodium carbonate (RSC), sodium adsorption ratio (SAR), permeability index (PI), and kelly's ratio (KI) implies that majority of samples of groundwater were not ideal for irrigation purpose. The USSL and Wilcox diagrams proposed that most part of groundwater samples belongs to C3-S4, C4-S4 and C3-S1, C4-S1 class, signifying high salinity, low alkali hazards and high salinity, high alkalinity hazard water, mostly unsuitable for irrigation for pre and post monsoon seasons respectively. The present study presumes that greater part of the samples in the study area is unsuitable for domestic and agriculture purposes.

High Lights:

- The predominant hydrochemical facies of groundwater was observed as NaCl, CaCl2 type.
- Groundwater is unsuitable drinking purpose as fluoride and nitrate concentration were exceeded the WHO Limits.
- Various indices calculated for groundwater showed that groundwater is unsuitable for irrigation purposes in both the seasons.

Keywords: Hydrochemistry, Spatial distribution, Groundwater quality, Handri basin, South India.