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GROUNDWATER QUALITY ASSESSMENT FOR DRINKING AND IRRIGATION IN MADURAI NORTH TALUK, TAMIL NADU, INDIA

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Abstract

Groundwater serves as a vital resource for drinking water supply and irrigation, especially in regions like Madurai North Taluk, Tamil Nadu, India. This study comprehensively evaluates groundwater quality in the region over a 15-year period (2008–2022), with a focus on its suitability for drinking and irrigation purposes. Groundwater samples were collected systematically during both pre-monsoon and post-monsoon seasons and analyzed for 17 key physico-chemical parameters, including Total Dissolved Solids, pH, Total Nitrogen, Fluoride, Calcium, Magnesium, Sodium, Chloride, Sulphate, Carbonate, Bicarbonate, Electrical Conductivity, Total Hardness, Sodium Adsorption Ratio, and Residual Sodium Carbonate. Box-and-Whisker plots were used to display the distribution of datasets. The findings show that groundwater in the region is slightly alkaline, generally suitable for consumption and irrigation. Most of the samples meet irrigation standards for SAR, RSC, and Na%, though high salinity in some areas poses risks to soil and crops. Localized TDS, Total Nitrogen, fluoride, and chloride exceedance, linked to agricultural runoff and rock dissolution, raise environmental concerns. Electrical conductivity suggests low to moderate salinity, supporting irrigation suitability in most cases.

Key words: drinking water, groundwater quality, hydrochemistry, Madurai North Taluk, physico-chemical

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