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ASSESSMENT OF GROUNDWATER QUALITY OF PATNA URBAN AND SUB-URBAN AREAS FOR ITS USES AS DRINKING AND IRRIGATION WATER

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Abstract

Groundwater is a crucial resource for the survival of all life forms on earth. To address the growing issues of groundwater quality degradation, a hydrogeochemical survey was conducted in the Patna region, focusing on urban and sub-urban areas. Samples from 100 tubewells were collected and analysed for various water quality parameters related to drinking and irrigation purposes. pH, EC, TDS, and salinity were measured on-site. Major ions (anions: chlorine, nitrate, sulfate, and fluoride; cations: calcium, magnesium, sodium, and potassium) and heavy metals (aluminium, arsenic, cadmium, chromium, copper, iron, manganese, nickel, lead, and zinc) were determined using Ion Chromatograph and ICP-OES, respectively. Gibbs and Piper diagrams illustrated that the groundwater predominantly comprises calcium-magnesium-bicarbonate groups, with bicarbonates being the prevalent type. The Water Quality Index (WQI), based on IS 10500 (2012) guidelines, indicated that only 3% of samples were unsuitable for drinking and were categorized as 21% excellent, 63% good, 11% poor, and 2% very poor. For irrigation, indices including EC, SAR, Na%, RSBC, MHR, and KR were considered, revealing that 63% to 100% of water samples were suitable. MHR and KR identified 37% and 8% of samples as unsuitable, respectively, while SAR, Na%, and RSBC were found not to be unsuitable. In general, most of the water samples met the criteria for both drinking and irrigation purposes, providing valuable insights for future research and regional planning.

Key words: groundwater quality, hydrogeochemical, ion chromatograph, irrigation indices, water quality index

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