Environmental Engineering and Management Journal



"Gheorghe Asachi" Technical University of Iasi, Romania



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

Abhishek Kumar Mishra, Nityanand Singh Maurya*

Department of Civil Engineering, National Institute of Technology, Patna, Bihar, India – 800005

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 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

Received: December, 2023; Revised final: March, 2024; Accepted: April, 2024

^{*} Author to whom all correspondence should be addressed: e-mail: nsmaurya@nitp.ac.in ; Phone: +91 9430692342