

MAJOR AND TRACE ELEMENT'S CHARACTERIZATION IN GROUNDWATER OF ARCHEAN HARD ROCK REGION OF CHITTAR SUB-BASIN, THAMBARAPARANI RIVER BASIN, TAMIL NADU, INDIA

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Abstract

Twenty groundwater samples have been collected from Open wells and Bore Wells during the month of July, 2014 in Chittar Sub-basin of Thambaraparani River basin to identify groundwater quality and its suitability using hydrogeochemical characteristics and a few trace elements. Geologically, the region comprises of Charnockite and Hornblende-Biotite gneiss and the major geomorphic unit is a pediment. pH, EC and TDS were measured in the field and their values varied from 6.9 to 8, 339.06 to 2006.25 mohs/cm, 217 to 1284 mg/l, and Total Hardness value varied from 167.4 to 994.7 mg/l. Concentration of the major elements Ca^{2+} , Mg^{2+} , Na^+ , K^+ and Cl^- , HCO_3^- , SO_4^{2-} , NO_3^- varied from 36 to 165 Mg/L, 14 to 142 Mg/L, 21.6 to 152 Mg/L, 0.3 to 31.5 Mg/L, 69 to 612 Mg/L, 104 to 500.2 Mg/l, 0.19 to 90 mg/l, 7 to 195 mg/l, 0.001 to 7 mg/l, 22 to 109 mg/l respectively. Trace elements Cu, Fe, Mn, Zn, Ni, Cr, Co, Cd and Pb were analysed and their concentration varied from 0.011 to 0.041 mg/l, 0.118 to 0.334 mg/l, 0.022 to 0.096 mg/l, 0.01 to 0.09 mg/l, 0.107 to 0.365 mg/l, 0.127 to 0.216 mg/l, 0.014 to 0.402 mg/l, BDL to 0.009 mg/l and 0.016 to 0.23 mg/l respectively. To identify groundwater suitability for irrigational purposes, data were interpreted using standard methods of Stuyfzand's classification, Sodium Adsorption Ratio (SAR), Residual Sodium Carbonate (RSC) and Permeability Index (PI). Spatial maps were prepared and suitability of drinking is compared to WHO (2004) standard. Major elements of Mg, Cl and NO_3^- were found to be high at a few locations and the trace elements Fe, Mn, Zn and Pb were also found to be marginally high in a few locations. The study reveals that though higher concentration was noticed in a few locations, overall, the groundwater of the study area is suitable for both drinking and irrigational purposes.

Keywords: Groundwater Chemistry, Hydrogeochemistry, Groundwater Suitability, Trace Elements, Chittar Sub Basin, Thambaraparani Basin