

EXPLORING HYDROCHEMICAL BACKGROUNDS USING CUMULATIVE PROBABILITY APPROACH FOR FINDING GROUNDWATER SUITABILITY IN AN INDUSTRIAL AREA FROM PENINSULAR INDIA

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Abstract

Groundwater quality is continuously deteriorating due to increasing human activities and rapid growth of urbanization in an industrial belt of Peninsular India, where around 80 functioning tanneries discharge untreated effluents into open land and channels. Detecting and evaluating the effects of industry and human activities are keys to finding the hydrochemical backgrounds and the suitability of water for drinking purposes. Thus this article deals with the cumulative probability distribution of analytical hydrochemical data, which was adopted to estimate the backgrounds on groundwater quality as well as quantify its abnormality. Results show mainly two types of threshold values, which indicate that three processes are mainly active. First the estimated threshold values of TDS, Ca^{2+} , Mg^{2+} , Na^+ and K^+ ions are about 906, 182, 60, 160 and 5 mg/l, respectively, whereas 191, 280, 109 and 12 mg/l values are for Cl^- , HCO_3^- , SO_4^{2-} and NO_3^- ions. It indicates directly the background levels of these ions. Whereas the second threshold values infer the impact of anthropogenic activities. The impact of anthropogenic activities can be broadly divided into two types- (1) agriculture-cultivation & sewage emissions, and (2) industrial effluents. Further, the Water Quality Index (WQI) shows that there is no excellent groundwater type, and about 59% of the samples are of poor quality for drinking water. This information helps to demarcate the occurrence of pollutant and assign backgrounds for mass transport modelling, which will provide support for sustainable management of groundwater resources.

Keywords: Groundwater pollution; Cumulative probability; Water Quality Index (WQI); Drinking water; Industrial belt; Peninsular India.