

EVALUATION OF GROUNDWATER QUALITY INDEX FOR SUITABILITY FOR DRINKING AND IRRIGATION PURPOSES: A CASE STUDY IN BUKLERU WATERSHED REGION, TELANGANA

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Abstract

Groundwater types and water quality indices (WQI) from a semi-arid watershed in southern India including 35 communities are examined in this study. Cation concentrations ($\text{Na}^+ > \text{Ca}^{2+} > \text{Mg}^{2+} > \text{K}^+$) and anions ($\text{HCO}_3^- > \text{Cl}^- > \text{NO}_3^- > \text{SO}_4^{2-}$) follow a typical trend recorded from most of Peninsular India in both seasons. The groundwater is classified as sodium- bicarbonate-chloride ($\text{Na}^+ \text{-HCO}_3^- \text{-Cl}^-$) type. Pearson correlation study of key ions illustrates the influence of natural sources on groundwater composition across the watershed's settlements. Gibb's plot implies that the water composition in these settlements is the result of rock and water interaction during infiltration and aquifer storage. This region is experiencing a severe water shortage, particularly during the pre-monsoon season, which has resulted in drilling of deep bore wells for both domestic and agricultural purposes. All of the physical dimensions and chemical contents are quantitatively above the World Health Organization WHO (2011) and Bureau of Indian Standards BIS (2012) permitted limits, rendering it unfit for drinking, household and agricultural use. Regardless of the season, around 54% of groundwater samples are found to be unsuitable for irrigation ($\text{KR} > 1$). Groundwater from settlements near the local river (Bukleru river) is only suitable for irrigation ($\text{KR} < 1$) during post-monsoon season. The bulk of the measured indices indicates that groundwater in the Bukleru watershed is unfit for irrigation. In both seasons, the calculated WQI for the examined villages revealed predominantly (92%) poor water quality for drinking and cultivation.

Keywords: Semi-arid, Groundwater contamination, Water Quality Index, Bukleru watershed.