

## CHARACTERIZATION OF GROUNDWATER IN NARSAMPET AREA OF WARANGAL DISTRICT, TELANGANA, INDIA

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### Abstract

Geochemical investigations have been carried out on the fluoride bearing groundwater of Narsampet and Chennaraopet areas of Warangal district, Telanganato assess the quality and characterize the groundwater. The area under investigation is composed of peninsular gneissic complex comprising garnet-biotite gneiss, grey granodiorite, porphyritic granite and intruded by dolerite, dolerite porphyry and aplite veins. 56 and 48 groundwater samples were collected from bore wells and open wells during pre-monsoon (July 2013 and June 2014) and 57 and 47 samples during post-monsoon season (January 2012 and November 2012). Groundwater samples were analyzed for pH, electrical conductivity (EC), total dissolved solids (TDS), total hardness (TH), calcium ( $\text{Ca}^{+2}$ ), magnesium ( $\text{Mg}^{+2}$ ), sodium ( $\text{Na}^+$ ), potassium ( $\text{K}^+$ ), carbonate ( $\text{CO}_3^{-2}$ ), bicarbonate ( $\text{HCO}_3^-$ ), chloride ( $\text{Cl}^-$ ), sulphate ( $\text{SO}_4^{-2}$ ), nitrate ( $\text{NO}_3^-$ ) and fluoride ( $\text{F}^-$ ) as per standard methods. Percent sodium, SAR and RSC are computed with analytical data. The quality of groundwater is assessed in terms of domestic and agriculture use based on major ion geochemistry. pH of the groundwater varies between 7.2 and 8.4, and electrical conductivity of groundwater from 92.3 to 9072  $\mu\text{S}/\text{cm}$  at 25° C (average 1703  $\mu\text{S}/\text{cm}$ ). The higher values of electrical conductance are indicative of high ionic concentrations in the groundwater. The fluoride concentration in groundwater varies from 0.3 to 8.0 mg/L with an average of 2.04 mg/L. Fluoride ion concentration is much above the permissible limit (1.5 mg/L) in most of the villages and nitrate is found to be more than 45mg/L making the groundwater unsuitable for drinking purpose in certain pockets of the study area.

The quality of groundwater is assessed and characterized by various methods to understand its geochemistry and suitability. The groundwater is of  $\text{Cl}^- + \text{SO}_4^{-2} > \text{HCO}_3^-$  and  $> \text{Cl}^-$  type. The data plotted in the Gibb's diagram reveals that rock-water interaction dominates the water chemistry of the groundwater during both seasons that fall under its influence for both the Gibb's ratios I-  $\text{Na} + \text{K} / (\text{Na} + \text{K} + \text{Ca})$  representing the cations and II-  $\text{Cl} / (\text{Cl} + \text{HCO}_3)$  representing the anions.

**Keywords:** Groundwater, geochemical characterization, major ions, fluoride, granitic terrain