

DELINEATION OF GROUNDWATER QUALITY FOR DRINKING AND IRRIGATION PURPOSES: A CASE STUDY OF BORI NALA WATERSHED, DISTRICT AURANGABAD, MAHARASHTRA, INDIA

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Abstract

Groundwater quality and its suitability for irrigation and domestic purposes were examined using various physico-chemical parameters such as pH, electrical conductivity, total dissolved solids, total hardness, calcium, magnesium, sodium, potassium, bicarbonate, sulfate, and chloride. These parameters were used to assess the suitability of groundwater for domestic purposes by comparing with the WHO and ISI standards. Sodium Adsorption Ratio (SAR), Sodium Percent (Na%), Kelly is Ratio (KR), Residual Sodium Carbonate (RSC), Residual Sodium Bicarbonate (RSBC), Magnesium Hazard (MH), Corrosivity Ratio (CR) and Permeability Index (PI) were used for irrigation suitability assessment. Sample analysis reveals that the groundwater is entirely fit for drinking except for a few samples (4%) in which the parameters exceed permissible limits of WHO and ISI standards. Based on total hardness and TDS, the majority of groundwater samples are found to be suitable for drinking purpose. A majority of the samples belong to the $\text{Ca}^{2+}\text{-Mg}^{2+}\text{-Cl-SO}_4^{2-}$ type. Based on the Gibb's diagram, rock-water interaction dominance is the main contributors for changing the water quality in the study area. According to SAR, a majority of the samples are good for irrigational purposes except for one. RSC, RSBC, KR, Na% and CR values suggest that all the water samples are suitable for irrigational purposes. Reducing the over exploitation of groundwater, construction and proper maintenance of rainwater harvesting structures for recharge are helpful in preserving and improve the groundwater quality in the study region.

Keywords: Groundwater quality, Hydrochemical facies, SAR, Permeability index, Gibb's ratio, Wilcox diagram.