**Seasonal Water Quality Assessment in Coastal Aquifers Using GIS: Pre-Monsoon and Post-Monsoon Perspectives**

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***ABSTRACT***

The assessment of groundwater quality in coastal areas is essential because of the excessive drafting of groundwater due to insufficient surface water supplies. This study was aimed to assess the groundwater quality in a coastal district of Maharashtra, India. Samples of groundwater were obtained from 37 observation wells situated in three major coastal Talukas of Sindhudurg district during the pre- and post-monsoon seasons. Samples were analyzed for chemical properties in the laboratory using the standard methods given by the Indian Standard 10500. The geographic information system-based spatial distribution maps of various water quality parameters viz. pH, Turbidity, Total Dissolved Solids, Hardness, Sodium, Potassium, Iron, Zinc, Chlorine, Calcium, Chloride, Nitrates etc. has been prepared using Inverse Distance Weighted (IDW) method in QGIS 3.22.1 Software. The maps of water quality index (WQI) have been used to classify water samples in study area, ranging from excellent to unfit for consumption. The analysis revealed that maximum no wells were contaminated with TDS, Chlorine, Calcium, and Hardness level in certain areas during the pre-monsoon season. Pre-monsoon and post-monsoon average TDS range values have been observed between 27 and 1827 mg/l & 26 to 1495 mg/l, respectively. The Spatio-temporal analysis using IDW method indicated that in the pre-monsoon season, a greater concentration of hardness was there in 25% of the study area, while in post-monsoon season, this was observed in 14% of area under study. In the pre-monsoon season, WQI values were higher across an expanse of nearly 190 km2, whereas in the post-monsoon season, this trend was observed over an area of 85 km2. The highest water quality index value was found in Vengurla Taluka. Ultimately, the study finds that human activity has a negative impact on the quality of groundwater, and that a good management plan is needed to protect Vengurla Taluka's groundwater resources.

**Keywords:** coastal area, GIS, groundwater quality, spatial interpolation, WQI.