

Groundwater Quality Assessment and Water Quality Indexing: Case Study Of Makueni County, Eastern Kenya

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Abstract

Makueni falls in South Eastern, semi-arid region of Kenya that is characterised by erratic rainfall and inadequate surface water from a few rivers. One of the options to supply both human and animal population is groundwater. Occurrence of groundwater in the basement complex terrain of this study area is controlled by secondary porosity developed through weathering, fracturing and cracking of the bed rocks. However, the quality of groundwater is more often than not found to be above the WHO limits. The objectives of this study were to analyse the geochemistry of the groundwater for major and minor elements and heavy metals, develop a water quality index (WQI) and then develop a water quality potential map for Makueni County. Groundwater samples from 61 boreholes spread across the county were analysed using the standard methods of water and wastewater while the index was developed through comparison of water quality parameters with respect to WHO standards to provide a single number that expresses the overall water quality. The water quality potential map on the other hand was developed using thematic layers selected for water quality potential map based on literature, geophysical investigations and data appropriately weighted in a modified DRASTIC model based overlay scheme. The results of the study showed that major anions and cations concentrations are beyond the limits recommended by WHO. Iron (Fe) was found to be more than 4.5 mg/L well beyond the allowable 0.3 mg/L. while electrical conductivity was found to be more than 1000 mg/L. The water quality index (WQI) for most of the areas of the County were greater than 180, which means that groundwater from most areas of Makueni is not potable. Keywords: Groundwater, DRASTIC modelling, WHO Standards, Water Quality Index (WQI) Water Quality Potential Map, Geochemistry, Makueni County.

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