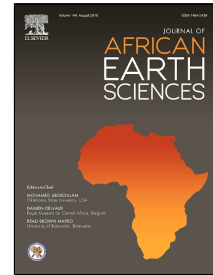


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## Groundwater Quality Assessment Using Water Quality Index and GIS Technique in Modjo River Basin, Central Ethiopia

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### Abstract

Groundwater is main sources of water supply in Modjo River Basin. In this study, 31 groundwater samples were collected and analyzed to determine suitability of groundwater for drinking and irrigation uses. Spatial variation map of major cations ( $\text{Ca}^{2+}$ ,  $\text{Mg}^{2+}$ ,  $\text{Na}^+ \cdot \text{K}^+$ ) and anions ( $\text{HCO}_3^-$ ,  $\text{NO}_3^-$ ,  $\text{SO}_4^{2-}$ ,  $\text{F}^-$ ,  $\text{Cl}^-$ ) were produced using IDW interpolation in GIS. Piper plot show that, Ca–Na– $\text{HCO}_3$ , Na–Ca– $\text{HCO}_3$  (mixed) and Na– $\text{HCO}_3$  water types are found in study area.  $\text{Ca}^{2+}$  and  $\text{Mg}^{2+}$  are dominant in highland aquifer whereas  $\text{Na}^+$  is dominant in rift valley aquifer.  $\text{HCO}_3^-$  is the dominant anion in all samples. Rock-water interaction and cation exchange along groundwater flow path are responsible for the current characteristics of hydrogeochemical facies. Water quality index using quality rating scale to evaluate the suitability of water for drinking purpose shows that 3.23 % and 93.54% of groundwater samples fall within excellent and good water quality, respectively. On the other hand 3.23 % of groundwater samples fall within poor water quality. From the computation of SAR values it was found that 97% of groundwater samples are in suitable class and the remaining 3% constituting doubtful class for irrigation use. RSC value shows that, 9.67% of groundwater samples fall in good categories for irrigation use. Whereas, 41.93% samples falls in doubtful and 48.38% samples falls in unsuitable categories for irrigation use. In general, geogenic process and anthropogenic activities such as urban sewages and fertilizers are factors governing groundwater chemistry of study area.

**Key words:** Water quality Index, Drinking water quality, GIS Interpolation, Ethiopia

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