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DRINKING SUITABILITY OF GROUNDWATER IN DEDURU OYA RIVER BASIN BASED ON WATER QUALITY INDEX (WQI)

E.G.N.D. Iddamalgoda[1*], R. Chandrajith[1] and S. Senarathne[2]

[1]Department of Geology, Faculty of Science, University of Peradeniya, Sri Lanka
[2]Friedrich-Alexander-Universität Erlangen-Nürnberg (FAU), Department Geographie und Geowissenschaften, Erlangen, GeoZentrum Nordbayern, Schlossgarten, Germany
[*]naveen.iddamalgoda@sci.pdn.ac.lk

The deterioration of groundwater quality is a major problem worldwide. The Water Quality Index (WQI) is a method that combines individual water quality parameters into an overall quality rating for human consumption. The WQI comprehensively assesses groundwater quality and helps identify critical areas requiring immediate attention. This study assessed groundwater quality in the Deduru Oya River basin (DOB) using the WQI. The DOB is an important water resource in Sri Lanka, primarily meeting domestic and agricultural needs. Thirty (30) groundwater samples from deep (11) and shallow (19) wells in DOB were analysed for key physicochemical parameters, including pH, electrical conductivity (EC), major anions, cations, and trace elements. The WQI was calculated using the weighted arithmetic method based on the WHO guidelines for drinking water quality, considering 14 parameters (pH, EC, alkalinity, total hardness, SO_4^{2-}, Cl^-, F^-, Na^+, K^+, Ca^{2+}, Mg^{2+}, Mn, Fe, Zn). Lower WQI values indicate better water quality. The results showed WQI values ranging from 3.72 to 1518, with 53.3% of samples falling within the excellent (0-25) to good (25-50) quality range, while 40% were considered unfit for consumption (> 100). About 3.3% of the samples were poor (51-75) and very poor quality (76-100). Elevated EC values caused extreme WQI, such as 1518. Most excellent to good-quality water was found in the upper part of the basin. The areas in the lower catchment had higher WQI values, indicating poorer water quality, likely due to agricultural runoff and industrial discharges. The lower catchment is often affected by the cumulative effects of water use and pollution from upstream. The results highlight the need for targeted groundwater management strategies to reduce contamination and ensure safe drinking water for the local population. Future studies can explore temporal variations to better understand groundwater quality dynamics in the region.

Keywords: Deduru Oya River basin, Drinking water, Groundwater contamination, Groundwater quality, Water Quality Index