

**COMPREHENSIVE GEOCHEMICAL ASSESSMENT OF GROUNDWATER IN
YAN OYA RIVER BASIN, SRI LANKA**

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The quality of drinking water is important as deteriorating water quality threatens human health. Yan Oya is the fifth-longest river in Sri Lanka, with a total length of 142 km, and its catchment covers 1,538 km². This catchment encompasses several major hotspots of Chronic Kidney Disease of unknown aetiology (CKDu), such as Padaviya, Kebitigollewa and Horowpothana. Since groundwater quality has received much attention as one of the main factors influencing the disease, we conducted a detailed geochemical investigation covering the entire Yan Oya drainage basin. A total of 90 groundwater samples were collected from both shallow dug wells (< 10 m) and deep tube wells (> 10 m), which are used for drinking purposes. The samples were analyzed for anions and cations using standard procedures. The major cations of groundwater ranged in the order Na > Ca > Mg > K while anions varied in the order HCO₃⁻ > Cl⁻ > SO₄²⁻ > F⁻ > NO₃⁻ > PO₄³⁻. Among the trace elements Sr, Ba, Fe, and Mn were relatively higher in groundwater while Al, Zn, Cd, Cu, Pb, Ni, Co, Cr, and As were below 0.01 µg L⁻¹. The fluoride concentration of water varied from 0.10 to 5.30 mg L⁻¹ with a mean value of 1.2 mg L⁻¹, while water hardness ranged from 25 to 1207 mg L⁻¹ with a mean value of 301 mg L⁻¹, both exceeding the WHO permissible limits for drinking water. Geochemical data indicated that the main groundwater type of the region is Ca²⁺-Mg²⁺-HCO₃⁻ facies. As indicated in Gibb's Plots, rock weathering and ion exchange processes control groundwater quality. In the cluster analysis, fluoride, hardness, and alkalinity were clustered together with a 88% similarity level, mainly in the lower segment of the catchment where CKDu prevalence is high.

Financial assistance from the National Science Foundation (NSF), Sri Lanka (Grant No. ICRP/NSF-NSFC/2019/BS/02), and the National Natural Science Foundation China (Grant No.41861144026) is acknowledged.

Keywords: CKDu, Dry zone, Groundwater facies, Hydrogeochemistry, Yan Oya