

ASSESSMENT OF GROUNDWATER QUALITY FOR IRRIGATION IN RANPATHWILA CASCADE IN ANURADHAPURA DISTRICT OF SRI LANKA

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The tank cascade system (TCS) in Sri Lanka conserves water through indigenous methods which not only sustains agriculture during dry seasons but also enhances the ecological resilience and aesthetic value of the landscape. Given the increasing reliance on groundwater for agriculture, assessing groundwater quality in TCSs is essential. High salt levels or contaminants in irrigation water can reduce crop yield, degrade soil health, and impact food security. This study evaluated the groundwater quality for irrigation purposes in *Ranpathwila* TCS. Twenty agro-wells were selected ensuring a homogeneous distribution within the study area. Water samples were collected monthly over two months starting in July 2024. The pH, electrical conductivity (EC), and total dissolved solids (TDS) were measured. Moreover, available phosphorus, nitrate nitrogen, ammonium nitrogen, magnesium, sodium, potassium, calcium, cadmium, copper, zinc, arsenic, and lead concentrations were determined using standard methods at the Soil and Water Sciences laboratory of the Rajarata University of Sri Lanka. Sodium adsorption ratio (SAR), sodium percentage (Na%), magnesium adsorption ratio (MAR), total hardness (TH), and Kelly's ratio (KR) were estimated. The SAR varied from 2.34 to 26.83 in the research period and in August, most areas belonged to severe water quality. Based on sodium percentage, most of the locations were doubtful for irrigation in July and in August, most of the locations had the sodium percentage unsuitable for irrigation. According to the total hardness of the water, the area belongs to moderate-to-hard and very hard water classes, while MAR values are in a suitable range. The assessment based on the analytic hierarchy process and geographical information system indicated that groundwater in the study area is moderately suitable for irrigation purposes during the dry season.

Keywords: Kelly's ratio, Magnesium adsorption ratio, Sodium adsorption ratio, Tank cascade system