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## PROCEEDINGS



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## SPATIAL VARIATION OF HYDRO-CHEMICAL PARAMETERS IN A TANK CASCADE SYSTEM IN HAMBANTOTA DISTRICT

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### **Abstract:**

Tank Cascade System (TCS) is an efficient water conveying system used in the dry zone of Sri Lanka commencing from the B.C. period. Pollutants and sediments accumulate in lower levels of the TCS because of the interconnectivity behavior of these systems. These pollutants and sediments create several harmful effects on agricultural production, human health and the environment. The aim of this study therefore, was to investigate the spatial variation of some hydro-chemical parameters in selected tanks of Udukiriwila TCS at Weeraketiya in the Hambantota District. Water samples were collected only from the tanks of TCS in the upper and lower levels viz. Karuwalagahadeniya, Iththademaliya, Gamachchi and Udukiriwila. The pH, Electrical Conductivity (EC), Total Dissolved Solids (TDS), salinity,  $\text{NO}_3^- - \text{N}$ ,  $\text{NH}_4^+ - \text{N}$ , phosphate, sodium, potassium, calcium, total alkalinity, magnesium, sulphate and chloride concentrations were measured using standard analytical methods. Sodium Adsorption Ratio (SAR) and sodium percentage were also calculated. The concentrations of each parameter found in the upper and lower levels of the TCS were compared in order to detect any significant variations, using two paired t-test through Minitab 17. The spatial variation for each parameter was mapped using the Arc GIS 10.1. Sodium Adsorption Ratio (SAR) and Sodium percentage were calculated and the Water Quality Index (WQI) for each tank was calculated using the guidelines of the Canadian Council of Minister of the Environment (CCME). Further, a piper diagram was used to determine the prominent anions and the cations in each tank. Results revealed an increasing trend from the upper level to the lower level of the TCS in EC, TDS, sodium, potassium, calcium, total alkalinity, total hardness, chloride, and sulphate concentrations. However, a significant difference ( $P < 0.05$ ) between the upper and lower parts was detected only for EC, TDS, and chloride concentrations. Although Iththademaliya tank is in the upper level of TCS, it showed the highest concentrations of  $\text{NO}_3^- - \text{N}$  and Phosphate. Among all other tanks in this TCS, Iththademaliya tank has the highest ratio for tank usable capacity to its serving extent where a significant amount of N and P fertilizer can leach into this tank and contaminate its water. However, all the parameters tested except K concentration were within the permissible level of the Food and Agriculture Organization (FAO) guidelines for irrigation water. Selected tanks had an excellent quality of water based on the SAR and sodium percentage. According to the CCME WQI, all selected tanks had good quality irrigation water based on FAO guidelines. The piper diagram indicated that the chloride and the calcium ion are the prominent anion and cation in all selected tanks, respectively.

**Keywords:** *Tank cascade system, hydro-chemical parameters, spatial variation, water quality*

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