

STUDY ON SPATIAL AND TEMPORAL VARIATION OF WATER QUALITY OF THE YAN OYA RIVER BASIN

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Yan Oya is the 5th longest river (142 km) in Sri Lanka, and it is the main surface water source in the areas of North Central Province (NCP). People reside in Padaviya and adjacent areas often suffer from drinking and irrigation water shortage. Therefore, a dam across the Yan Oya in Padaviya was constructed to make a reservoir to provide water for drinking and irrigation. The present study was focused on evaluation of water quality to find the spatial changes in surface water quality parameters of the entire Yan Oya river basin. Physico-chemical and microbiological parameters of surface water randomly collected from 40 sampling locations in the river basin were determined representing both dry and wet seasons. Temperature, turbidity, DO, pH, EC and TDS were measured *in-situ* while NO₃⁻, NO₂⁻, NH₃, total phosphate (TP), chemical oxygen demand (COD), total hardness (TH), fluoride, Na⁺, K⁺, Mg⁺² and Ca⁺² were measured using standard methods. Total coliform (TC) and faecal coliform (FC) counts were obtained by the membrane filtration method. The parameters, pH, DO, NO₃⁻, NO₂⁻, NH₃, TP, fluoride, Na⁺ and K⁺ varied from 6.6 to 8.8, 1.9 to 8.2 mg L⁻¹, 0.12 to 5.43 mg L⁻¹, < 0.001 mg L⁻¹, < 0.001 to 0.024 mg L⁻¹, 0.001 to 0.484 mg L⁻¹, 0.02 to 1.48 mg L⁻¹, 3.5 to 245.6 mg L⁻¹, and 21.2 to 185.6 mg L⁻¹, respectively, during both seasons. More importantly, the above values remained within acceptable levels given by the Sri Lanka Standards Institute (SLSI) for potable water. However, turbidity, EC, TDS, TH, COD, Mg⁺², and Ca⁺² concentrations were deviated from the SLSI standards. The TC count exceeded greater than 200 CFU/100 mL in wet season and 3 to > 200 CFU/100 mL in dry season where FC counts were 23 to > 200 CFU/100 mL in wet season and 0 to > 200 CFU/100 mL in dry season, respectively. Thus, it was found that the river basin was contaminated from TC and FC bacteria. Further, EC, TDS, Na⁺, and K⁺ concentrations showed increasing trend from head zone to meandering zone. In the transitional zone, high turbidity as 58.6 NTU in wet season and 31.7 NTU in dry season were recorded where COD was recorded as 94.4 mg L⁻¹ in wet season and 70.5 mg L⁻¹ in dry season. Spatial GIS maps showed decreasing trend of pH and DO values, while nutrients (NO₃⁻ and TP), TH, Mg⁺², Ca⁺² and fluoride concentrations showed increasing trend from head to meandering zone. However, clear cut temporal variation of water quality was found during both seasons, and the results suggest that the Yan Oya river be a good resource for drinking water. In can be concluded that a proper strategic plan is needed to protect water quality of the Yan Oya river basin from transitional to meandering zone in order to provide safe potable water to the people who suffer from drinking water crisis in the NCP.

Keywords: GIS mapping, Physico-chemical and microbial parameters, Surface water, Yan Oya