

Evaluation of the Diversity of Benthos and its Relationship to Water and Sediment Quality in Headwater Streams: Case Study Bambarakanda Stream, Sri Lanka

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Sediment properties and benthos diversity can be used to evaluate the quality of aquatic systems. Bambarakanda is one of the most popular destinations with tourism interest in Sri Lanka that consists of a unique headwater region. Hence, the anthropogenic activities are being prominent but hardly any proper studies have been carried out in this area. As such, aiming to fulfill the baseline data gap, we investigated the status of the headwater region of Bambarakanda using benthos diversity, sediment properties together with the water quality. Five sampling sites were selected in a 3 km stretch along the stream. Sites were visited once in every month for a three-month period consecutively from January to March 2021. Physicochemical parameters of water (temperature, pH, conductivity, salinity, water velocity, dissolved oxygen (DO), biological oxygen demand (BOD), total suspended solids (TDS), total solids (TS), channel width, phosphate concentration, nitrate concentration, total hardness, total coliform, oxygen redox potential (ORP) and sediment properties (pH, nitrate, phosphate, conductivity, organic matter (OM), particle size) were measured. Benthos samples were collected at each site using the Surber sampler. Benthos diversity was assessed by calculating Shannon-Weiner Diversity Index (H), while water quality was assessed using the Water Quality Index (WQI) and EPT (Ephemeroptera, Plecoptera, and Trichoptera) index. There were significant differences in sediment quality ($p \leq 0.05$) in terms of particle size, while WQI was similar among study sites. According to the WQI, water quality of the stream was 'good' in quality. The coefficient of gradient (Cc) and uniformity coefficient (Cu) indicate that the substrate in site-2 was well-graded, and the others were uniformly graded ($p < 0.05$). There were significant differences in physicochemical parameters of water and sediments among the study sites ($p < 0.05$). Nevertheless, there was not any significant correlation between WQI and H ($R^2 = 0.0003$, $p > 0.05$). Nine taxonomic orders of benthic organisms belong to seven families were identified during the study period. Family *Glossomatidae* was the most predominant order. Family *Leptoceridae* and family *Helicopsyidae* were also significantly dominant in the area. The diversity index (H) was relatively greater (ranges from 1.37 to 1.60), indicating that this area is still rich in benthic diversity. According to EPT index (> 27) and their corresponding water quality ratings, the water can be categories as 'Excellent'. Physicochemical parameters of water, sediment quality, and nutrient content at the Bambarakanda area were optimum for the rich diversity of benthos. The results indicate that this aquatic ecosystem was healthy yet, amid increasing anthropogenic pressure.

Keywords: Benthos Diversity, Water Quality, Sediment Quality