Preliminary Study on Zooplankton Composition and Effects of Physicochemical Parameters on Zooplankton Diversity in the Bay Near Dondra Lighthouse, Southern Sri Lanka

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Zooplankton play a key role in marine food webs and are sensitive indicators of environmental change. In this context, a preliminary assessment of zooplankton assemblages was conducted in the bay near Dondra Lighthouse (5°55′30″ N, 80°35′42″ E), Southern Sri Lanka, to evaluate spatial variation in abundance, taxonomic composition, diversity, and associated environmental conditions. Samples were collected from eight stations using a HYDRO-BIOS KIEL plankton net (100 µm mesh; 30 cm mouth diameter) through horizontal surface tows of approximately 50 m at about 2 knots. Samples were preserved in 5% formalin and analysed following volumetric subsampling and microscopic identification. Water quality parameters including temperature, salinity, pH, dissolved oxygen, turbidity, conductivity, total dissolved solids, nitrate, phosphate, and biochemical oxygen demand (BOD_5) were measured, with mean values of 28.24 °C, 32.99 ppt, 6.64 mgL^{-1}, 7.65 mgL^{-1}, 5.66 NTU, 50.19 $mScm^{-1}$, 32.86 ppt, 0.38 mgL^{-1}, 0.10 mgL^{-1}, and 3.43 mgL^{-1}, respectively. A total of 24 zooplankton families belonging to 18 taxonomic orders were identified. Copepoda (57.53%) dominated the assemblage, followed by Thecostraca (16.58%), Gastropoda (11.36%), and Appendicularia (7.21%). Zooplankton abundance ranged from 1132 to 9186 $ind.m^{-3}$ (mean 5249.38 $ind.m^{-3}$), with higher densities at offshore and mid-bay stations than nearshore locations. Diversity indices indicated spatial heterogeneity, with Shannon–Wiener values ranging from 1.90 to 2.51, and higher diversity observed at offshore stations. Spearman's rank correlation analysis revealed significant relationships between environmental variables and zooplankton abundance and diversity. Zooplankton abundance showed strong positive correlations with BOD_5 ($\rho = 0.929$, $p = 0.001$) and nitrate ($\rho = 0.790$, $p = 0.020$), while Shannon–Wiener diversity showed a positive correlation with phosphate ($\rho = 0.810$, $p = 0.015$), indicating the influence of nutrient availability and organic load on community structure. These findings provide baseline ecological information for future monitoring and understanding of spatial variability in zooplankton communities in Sri Lanka's tropical coastal ecosystems.

Keywords: *Marine food webs, Zooplankton assemblages, Diversity indices, Spatial heterogeneity, Tropical coastal ecosystem*