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Spatial variations of macrobenthic assemblage structure along paddy-based run-of-river irrigation system: A case study from Colombo, Sri Lanka

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In a paddy-based run-of-river irrigation system, quality of water varies spatially along the river, which influences the biodiversity present in an aquatic ecosystem. With the spatial variations, macrobenthic fauna living along a run-of-river system also vary. The major objective of this study was to analyze the spatial variation of macrobenthos along a run-of-river irrigation system. The selected study area is located in Uduwana near Homagama in Colombo District. The study paddy field is mainly irrigated using two natural streams which are named Kalu Ganga athu ela and Thel Ela and irrigated water is drained to a natural stream named Kunu Ela. Four sampling sites were taken judgmentally as covering different areas of the run-of-river irrigation system. A random sampling technique was employed, and two bottom sediment samples were collected using a Peterson grab sampler on monthly basis from each sampling site between September 2022 to February 2023 (Maha cultivation season). Sediments were wet sieved through 0.5 mm mesh and collected macrobenthos were identified using standard keys. Total abundance, species richness, species evenness, and species heterogeneity were determined separately for the four sites. The spatial variation of total abundance between the four sites was analyzed using one-way ANOVA in MINITAB version 17.0. Similarities of macrobenthos community assemblages were assessed using Bray-Curtis similarity clustering method using PRIMER. A total of 8 macrobenthic taxa (*Pila globosa*, *Lymnaea pinguis*, *Gyraulus saigonensis*, *Melanoides turberculata*, *Hirudo* sp., *Glyphidrilus* sp., *Paratelphusa* sp., and Chironomidae sp.) were observed from sampling sites. *Lymnaea pinguis* and Chironomidae sp. dominated in sediment samples and accounted for more than 70% of the total macrobenthic abundance. Sampling site 2 recorded the highest total abundance (N=350) and site 1 recorded the lowest total abundance (N=115) throughout the sampling period. The species richness of the macrobenthic communities was similar in sites 1, 3, and 4 (S=6) while the species richness was 5 in site 2. Since the benthic community was mainly dominated by *Lymnaea pinguis*, the lowest species heterogeneity (H') and species evenness (J) values were observed in sampling site 2 (H' = 0.11; J = 0.79). According to the results of ANOVA, the abundance of *Pila globosa*, *Lymnaea pinguis*, and *Gyraulus saigonensis* showed spatial variations. The cluster analysis separated site 2 from other sites, indicating that the macrobenthic taxa in site 2 are varied compared to the other three sites. Thus, the results revealed that there were spatial variations in the distribution pattern of macrobenthos along a paddy-based run-of-river irrigation system. It is recommended to extend the sampling period to include both Yala and Maha cultivation seasons with more sampling sites to get a better understanding of the spatial variations in the distribution patterns of macrobenthos along the paddy-based run-of-river irrigation system.

Keywords: *Lymnaea pinguis*, Macrobenthic, Paddy, Run-of-river, Water quality