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Influences of environmental parameters and phytoplankton productivity on benthic invertebrates in a tropical oligotrophic lake, northern Malaysia

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Abstract

Studies that associate environmental parameters with aquatic organisms in man-made lakes remain limited by accessibility and interest particularly in many Asian countries. With missed opportunities to monitor environmental transitions at Lake Kenyir, our knowledge of lake transition is restricted to the non-mixing shallow waters only. Triplicate monthly benthic invertebrate samples were collected concurrently with various environmental parameters at three locations (zones A–C) of Kenyir Lake, Malaysia. Our results affirmed that the northeast part of Lake Kenyir is oligotrophic. Abundance of phytoplankton, total suspended solids, phosphate, nitrite and nitrate drive the abundance of various groups of benthic invertebrates. All of these extrinsic variables (except phosphate) negatively influenced the density of Trichoptera and positively influenced ($P<0.05$) the densities of Polychaeta, Oligochaeta, Bivalvia, Gastropod, Isopoda and Copepod in all zones. Phosphate negatively influenced the density of Trichoptera and positively influenced ($P<0.05$) the densities of Oligochaeta, Bivalvia and Copepod. Its influences on the Polychaeta, Gastropod and Isopoda densities were zone-specific. Overall, seasons equally influenced the relationships between extrinsic and response variables in all zones. The results of this study are useful to evaluate the lake's environmental quality, in conservation and in similar projects involving environmental handling, monitoring and recovery.

Author Keywords

Detrended Correspondence Analysis; Ecology; Extrinsic factors; Intrinsic variables; Man-made lake; PERMANOVA; Plankton; Trichoptera; Water quality

Index Keywords

benthos, environmental monitoring, gastropod, nitrate, nitrite, phosphate, phytoplankton, polychaete; Kenyir Lake, Malaysia, Terengganu, West Malaysia;
Bivalvia, Copepoda, Gastropoda, Invertebrata, Isopoda, Polychaeta, Trichoptera, Varanidae;
animal, ecosystem, environmental monitoring, human, invertebrate, lake, Malaysia, phytoplankton, season;
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