

Monsoonal and spatial influence on zooplankton variation in a tropical bay, North Borneo, Malaysia

ABSTRACT

The tropical climate is seemingly stable with little variation in environmental factors throughout the year. However, a growing number of studies have reported monsoon-driven changes in zooplankton communities in tropical waters. This study examined the monsoonal and spatial variation in the zooplankton community in Sepanggar Bay, Malaysia. Samples were collected from 9 stations throughout the bay in June and October 2017, March and June 2018, coinciding with the southwest monsoon (SWM), northeast monsoon (NEM) and the intermonsoon periods (INTER). Significant seasonal difference was observed for the measured hydrographic parameters (chlorophyll-a, salinity, temperature) with highest values recorded during INTER for chlorophyll-a, NEM for salinity, and SWM 2 for temperature. Throughout the study, 110 zooplankton taxa were identified, and copepods dominated total zooplankton abundance by 70%. Zooplankton abundance increased from 17925 ± 8616 inds. m^{-3} during SWM 1 to peak at 47628 ± 55488 inds. m^{-3} during INTER and reached a minimum of $(16136 \pm 22334$ inds. m^{-3} during NEM. Zooplankton abundances were relatively higher at nearshore stations compared with offshore stations, but was not statistically significant. Four distinct assemblages were obtained from Hierarchical Cluster analysis (HCA), suggesting the influence of monsoon in shaping the zooplankton community. The dominant zooplankton shifted from copepods during SWM1, INTER, and NEM, to tintinnids during SWM 2. Canonical Correspondence Analysis (CCA) revealed temperature and salinity to be strongly associated with zooplankton community, indicating seasonal variations in these environmental factors driven by monsoon which influenced the zooplankton community structure in the bay. Distinct shifts in the zooplankton composition and abundance relative to the monsoon seasons provide new insights into the seasonal sensitivity of zooplankton in tropical coastal ecosystems.