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Ichthyofauna on a Tropical Mudflat: Implications of Spatial and Temporal Variability in Assemblage Structure and Abundance

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Abstract Often seen as nonvegetated unutilized wastelands, mudflats pose the least resistance to land claim for coastal development. Here, we studied the large Klang mudflat (Straits of Malacca) from September 2011 to September 2014 to determine the fish species that utilize it and the abiotic factors that influence species composition and abundance, to evaluate the ecological role of the mudflat in support of coastal fisheries. The spatial and temporal assemblage of fish species and their abundance was examined at two sites, during two monsoon seasons, and under the effect of period (wet/dry), moon phase (full/new moon), and diel cycle (day/night). Fish were sampled during ebb tide by a stationary large barrier net that enclosed a calculable area of sampling. A total of 119 species belonging to 46 families of mainly small-sized and juvenile fish made regular ingressions into the mudflat throughout the year. Fish abundance varied spatially and temporally, suggesting site preference and variability in juvenile recruitment. Higher fish abundance due to recruitment occurred during the northeast monsoon season (NEM), as compared to the southwest monsoon. Fish composition but not total fish abundance during the NEM differed between wet/dry periods and diel cycles. Ariidae and Sciaenidae were dominant families during the wet period, whereas Engraulidae dominated during the dry period. Predatory fish species (e.g., *Lagocephalus lunaris*, *Otolithes ruber*, and *Hexanematichthys sagor*) were recorded during the daytime, whereas planktivorous and detrivorous species (e.g., *Ambassis gymnocephalus* and *Liza subviridis*) were more abundant during the night.

Keywords Mudflat · Fish assemblage · Abundance · Biomass · Environmental variables · Canonical analysis

Introduction

Intertidal mudflats being a regular feature of calm, shallow coastal waters are prime targets for land reclamation. Often seen as nonvegetated unutilized wastelands, tropical mudflats among all the common coastal biotopes (e.g., mangroves) pose the least resistance to land claim for coastal development. Since the early 1980s, East Asian countries especially the small nations have increasingly reclaimed land from the sea for development in order to support their increasing populations (Kao et al. 1998). The problem is that there is almost no or very little scientific information regarding the significance of tropical mudflats (to humans) to garner support for their protection in the tropics. Mudflats are generally characterized as covering a considerable part of the total estuarine area that harbors high productivity (Elliot and Dewailly 1995). They frequently occur as part of the natural transition of habitat between the sublittoral zone and mangroves. Although structurally much less complex than mangroves or other vegetated estuarine systems, the mudflat contains a high abundance and diversity of fauna, including infauna, epifauna, as well as fauna that periodically enter it during high tide (Laegdsgaard and Johnson 2001; Chong et al. 2012b). The importance of coastal

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