



Structural variability and composition of fish communities in the northern continental shelf of the Bay of Bengal, Bangladesh

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ABSTRACT

The structural variability and composition of fish communities in the northern continental shelf of the Bay of Bengal, Bangladesh were assessed from monsoon 2014 to pre-monsoon 2015. A total of 73 species from 43 orders, comprising 61 species of finfishes and 12 species of shellfishes were identified from estuarine set beg net (ESBN) fisheries. Of these, 60 were commonly found throughout the study period and 9 species were dominant with higher contribution to the total communities. Community parameters and abundance were higher in monsoon and lower in winter. Multivariate analysis revealed a clear variation in structure and composition of fish communities. RELATE (coefficient of correlation between the fisheries communities and environmental parameters) and BEST (Biota-environment best matching) analyses signify that these structural variations are driven by both single (transparency) and multi-stressors (salinity, transparency, phosphate-phosphorus $\text{PO}_4\text{-P}$, nitrite-nitrogen $\text{NO}_2\text{-N}$ either individually or in combination with associated factors). Community parameters showed significant correlation with salinity, transparency and $\text{PO}_4\text{-P}$ which indicated that fisheries community structure is shaped by environmental conditions in coastal habitat.

Keywords: Bay of Bengal, Community composition, Environmental parameters, Estuarine set beg net fishery, Multivariate analysis

Introduction

The northern continental shelf of the Bay of Bengal (BoB) is blessed with diversified faunal and floral communities due to its strategic location of the deltaic areas of Ganga-Barmaphotra-Megna rivers (Kamal, 2000; Islam, 2005; Hossain *et al.*, 2007; Abu Hena and Khan, 2009). Studies reported that throughout the Bangladesh coast, the estuarine and marine channels are enriched with fisheries diversity (Kamal, 2000; Islam, 2005; Hossain *et al.*, 2007; Abu Hena and Khan, 2009; Chowdhury *et al.*, 2011; Rashed-Un-Nabi *et al.*, 2011; Hossain *et al.*, 2012). These marine and estuarine fish communities showed seasonal and spatial variations in their abundance and these variations are influenced by monsoonal activities and fluctuations of hydrological parameters of the bay (Rashed-Un-Nabi *et al.*, 2011; Hossain *et al.*, 2012). Abiotic factors like salinity, temperature, dissolved oxygen and water nutrients have strong interaction to shape the global and regional diversity and composition of fish (Blaber and Blaber, 1980; Peterson and Ross,

1991; Cyrus and Blaber, 1987; Thiel *et al.*, 1995; Marshall and Elliott, 1998; Whitfield, 1999; Hyndes *et al.*, 1999; Griffiths, 2001; Castillo-Rivera *et al.*, 2002; Martino and Able, 2003; Moyle, 2004; Jaureguizar *et al.*, 2003, 2004; Harrison and Whitfield, 2006; Chowdhury *et al.*, 2011; Hossain *et al.*, 2012). Recent climate changes and anthropogenic stresses may also have significant effects on aquatic habitats including fisheries diversity (Kuo *et al.*, 1999; Bonecker *et al.*, 2009; Lo *et al.*, 2010).

Fisheries population dynamics in coastal habitats are compacting in both temporal and spatial spectra because of intra-annual environmental variations. The tidal cycle of the day can affect the interactions of fisheries communities with environmental condition which can also change behavioural activities among them *i.e.*, predator-prey relationship (Bonecker *et al.*, 2009; Ooi and Chong, 2011). Moreover, the complex and dynamic habitat structure of open channels are more suitable for most euryhaline fishes, because post-larval/juvenile stages of most fish/shellfish prefer this ecological condition for performing

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