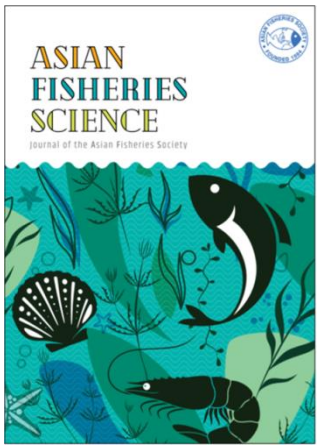

Dietary Guild Structure in Fish Assemblages and Trophic Position of Constituent Species in Brush Parks of a Tropical Estuary

MENAKE GAMMANPILA[1], U.S. AMARASINGHE[2,*], M.J.S. WIJEYARATNE[2]
[1]Regional Research Centre, National Aquatic Resources Research & Development Agency, Kadolkele, Negombo 11500, Sri Lanka
[2]Department of Zoology and Environmental Management, University of Kelaniya, Kelaniya 11600, Sri Lanka

*E-mail: zoousa@kln.ac.lk | Received: 30/12/2017; Accepted: 26/02/2019

ISSN: 0116-6514
E-ISSN: 2073-3720
https://doi.org/10.33997/j.afs.2019.32.01.002

Abstract

Trophic guild structure and dietary niche breadth in tropical fish communities are important to identify functional groups and to understand how trophic positions of constituent species help coexistence. Objective of the present study was to investigate whether the constituent species of fish assemblages in brush parks could be grouped into trophic guilds and how these species contribute to structure the fish community along trophic dimensions. Diets of 46 fish species caught in brush parks were analysed and the food items were categorised into 11 broad groups. Based on the composition of diets, fish were grouped into 8 trophic guilds. Levin's index of niche breadth indicated that the constituent species in the trophic guilds for which food was abundant, were generalists, whereas the trophic guilds of higher trophic levels were specialists. Within each trophic guild, constituent species showed different trophic indices indicating low inter-specific competition resulting in optimum food resource utilisation.

Keywords: artificial fish shelters; dietary habits; fish aggregation devices; fish community structure; trophic index

Introduction

Following the original definition of environmental guild (Root 1967), a trophic guild of biological communities can be defined as a group of species that exploit the same category of food resources in a similar way. Hence grouping of constituent species in a fish community is possible based on their functional role rather than taxonomy (Garrison and Link 2000; Ramirez-Luna et al. 2008). This is of particular importance because the members of any particular guild play more or less similar functional roles providing vital information on the flow of energy and biomass within food webs (Hawkins and MacMahon 1989) as well as on species interactions. Many tropical fish communities such as those inhabiting coral reefs (Longo et al. 2014; Palacios and Zapata 2014; Boaden and Kingsford 2015), seagrass beds (Livingston 1982) and floodplains (Jepsen et al. 1997; Whitley and Bollens 2014), and those that are attracted to artificial fish aggregation devices (FADs) (Deudero 2001) exhibit complex species interactions. Hence, simplification of these complex interactions based on the guild structure is recognized as an important approach for studying ecology of fish communities (Garrison and Link.2000; Coll et al. 2006).

Fish aggregating devices (FADs) are mostly artificial fish shelters to which many fish species are attracted and thereby supporting productive fisheries in many parts of the world (Dempster and Taquet 2004). Well documented FADs established as traditional fishing devices are brush parks in Negombo estuary, Sri Lanka (Amarasinghe et al. 2002), Acadjas in Benin, West Africa (Lalèyè 2000; Niyonkuru and Lalèyè 2010), Katha in Bangladesh (Uddin et al. 2015) and Samrah in Great Lake in Cambodia (Ho 1999; Lamberts 2001; Baran 2005; Mekong River Commission 2015). FADs produce higher fish yields per unit area compared to open water fisheries (Welcomme 2002). Fish assemblages in brush parks consist of species that are attracted to shelter or to feed on periphytic food materials (Van Dam et al. 2002). In addition, opportunistic predators are also attracted to brush parks (Malone et al. 2011). These fish assemblages are structured in trophic dimensions for efficient utilization of food resources. Gammanpila et al. (2017) have shown that ecomorphology of the fish species in the brush parks of a tropical estuary correlates with