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RESEARCH PAPER

A comparative analysis on the effects of river discharge on trophic interactions in two tropical streams

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Discharge-mediated seasonal patterns of food web interactions were investigated in two streams in Sri Lanka; Eswathu Oya (a perennial wet-zone stream) and Yan Oya (a seasonal dry-zone stream). Based on volumetric proportions of diet composition, relative abundance of fish species and their daily food rations, the mean cumulative consumption of each prey taxon was estimated for each fish population. Food web diagrams were prepared using trophic index of fish, trophic class of prey and feeding interactions between fish and prey. Both streams showed seasonal patterns of discharge due to rainfall, but no significant effect was evident in the trophic index of most fish species. In both streams, cumulative consumption of prey taxa was highest during low discharge regime due to increased abundance of both prey taxa and consumers. In Eswathu Oya, diversity of prey taxa was higher during the low discharge regime, but in Yan Oya, high diversity occurred during the high discharge regime. Herbivorous and/or detritivorous fish species were rare in Eswathu Oya but dominant in Yan Oya. Complex food web structure in Yan Oya due to high fish species richness and high diversity of prey categories made it less sensitive to discharge extremes in contrast to relatively simple food web structure in Eswathu Oya. This study, therefore, highlights the importance of maintaining the quality of riparian environments for conservation of biodiversity.

KEYWORDS
feeding ecology, fish fauna, flow regime, trophic index, tropical streams

1 | INTRODUCTION

Future management of tropical fish stocks and aquatic ecosystems that support them will require better knowledge of food web ecology (Winemiller & Jepsen, 1998). This is particularly so because food webs explain the role of each biological component in the ecosystem providing a means to examine ecosystem processes. Food web approaches have been central to the description of ecological processes, such as community assembly, competition, and consumer regulation of ecosystem processes (Pimm, Lawton, & Cohen, 1991; Polis & Winemiller, 1996).

Fish assemblages in tropical streams experience extreme flow variations during floods and droughts (Winemiller & Jepsen, 1998). In temperate streams, such disturbances are often known to override biological interactions such as competition and predation (Grossman & Freeman, 1987). In contrast, most studies of tropical stream and river fish assemblages suggest that they are structured by biological interactions such as resource partitioning and competition (Lowe-McConnell, 1987; Moyle & Senanayake, 1984; Wikramanayake & Moyle, 1989). Effects of the flow/discharge regime on tropical stream organisms have also been studied (Coat, Monti, Bouchon, & Lepoint, 2009) but potential impacts on food webs have rarely been investigated. The study of Arunachalam, Nair, Vijverberg, and Kortmulder (1997) on food and habitat partitioning among fishes in pools of a South Indian stream is a noticeable exception.

In the tropical Asian region, land–water interactions are shown to be dominant processes underpinning stream ecology, and hydrological changes influence the extent of land–water interactions and aquatic

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