

**SOME ASPECTS OF TROPHIC ECOLOGY
OF FISH ASSEMBLAGES IN THREE
RESERVOIRS OF SRI LANKA**

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ABSTRACT

Lowland lakes and reservoirs in the tropics are very productive and support profitable fisheries especially in Africa and Asia. In Sri Lankan reservoirs, there are over 30 fish species which are well-represented by small sized cyprinids but the commercial fisheries are almost entirely based on two species of exotic cichlids, *Oreochromis mossambicus* and *O. niloticus*, accounting for over 90% of the landings by weight. Due to high abundance, these fish species might play a significant role in the trophic dynamics of reservoir ecosystems. Therefore a holistic approach is necessary to understand the population and community level interactions among the size structured fish assemblages in the Sri Lankan reservoirs.

Present study was carried out in three reservoirs of Sri Lanka (79° 30' - 81° 35' E, 5° 55' - 9° 50' N). viz Minneriya (8° 02' N; 80° 53'E), Udawalawe (6° 27' N; 80° 50' E) and Victoria (7° 13' 7° N; 80° 47'E) to investigate trophic ecology of fish assemblages.

Thirty three experimental fishing trials were carried out in the three reservoirs, on a bimonthly basis from August 1998 to August 2000 to collect fish samples for the present study, among which, 12 were diel surveys. Morphological measurements were taken over the entire size range for each species. Stomach/gut contents of each size category of fish were determined. Diel feeding patterns were also investigated from the samples obtained from diel surveys.

Fish assemblages of the three reservoirs consumed a wide variety of food resources ranging from detritus, insects, insect larvae, copepods,

cladocerans, phytoplankton, macrophytes and fish. Nevertheless the values of standardized dietary breadths indicate that many of the species feed on few food items indicating that they are not generalists. Ecomorphological correlates in dietary habits indicate the ability of constituent species to co-exist in the fish assemblages.

Food consumption per biomass in fish populations, expressed as Q/B ratio, is considerably high in small-sized cyprinid species such as *Amblypharyngodon melettinus* (range 21.8-37.5 yr⁻¹) and *Puntius filamentosus* (19.1-26.3 yr⁻¹) whose daily rations were in the ranges of 0.05-0.28 g/day and 0.27-3.22 g/day respectively. These values are considerably high compared to Q/B ratio of *Oreochromis niloticus* (range 31.8-36.2 yr⁻¹), which is a much larger species with high daily ration (range 2.73-3.73 g/day). As such, from the fisheries point of view it can be argued that leaving of small-sized cyprinid species unexploited in reservoirs leads to incomplete utilization of reservoir productivity.

Furthermore, segregation of food resource use along temporal dimensions among constituent species in the assemblages on three reservoirs might have contributed to their colonization success. As ontogenetic patterns of feeding habits allows different size classes of fish to be treated as different ecological units, ontogenetic variation in niche occupation should not be ignored in trophic ecology. However fish species, which are predominantly phytoplanktivorous / detritivorous such as *O. mossambicus*, *O. niloticus* and *A. melettinus* and zooplanktivores such as *Hemirhamphus limbatus* in the three reservoirs do not exhibit ontogenetic variations in feeding habits. Their

feeding habits remain unchanged during the periods of receding water level (REWL) and rising water level (RIWL) in the reservoirs. As food is not limiting for phytoplanktivorous / detritivorous fish species in reservoirs, intra-specific competition may be relaxed. On the other hand, zooplanktivores such as *H. limbatus* show restricted distribution possibly due to food limitation. Fish species such as *P. filamentosus*, which feed on a wide range of food items, exhibit ontogenetic dietary variations. With the fluctuations in water level in reservoirs, food availability for these fish species changes so that the ontogenetic patterns of dietary habits also vary. This evidence also explains why the indigenous, small-sized fish species can co-exist in reservoir ecosystems.

Herbivores or omnivorous fishes dominate each assemblage during the seasons of RIWL and REWL in the three reservoirs. Species with high dietary similarity, between RIWL and REWL, which can be treated as specialists, do not face the problem of food limitations due to excessive availability of food. Obviously trophic generalists who change feeding habits between the seasons depending on the availability can also successively colonize reservoirs. All these aspects of trophic ecology of fish assemblages in three Sri Lankan reservoirs lead to the fact that the exploitation of presently unexploited small sized, indigenous fish species does not pose any adverse effect on the reservoir ecosystems.