

Trophic Relationship Of Littoral Oligochaetes, And Demersal Fish: Prey – Predator Hypothesis

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ABSTRACT: The littoral benthic organism in tropical ecosystem has different prey-predator relationship than in the case of temperate lake ecosystem. “The hypothesis suggested in this communication is more predator more food species.” The oligochaetes form the principle food chain of shore birds and demersal fish. When birds and demersal fish increase in large number during post monsoon cold period there is phenomenal increase of oligochaetes population which is adapted to breeding and food habit. It is suggested that while multiplication predator population of littoral organisms, it is not certain that food species chain would remain the same and thus desired result of water quality may not be the same as recorded in temperate lake. It is concluded that the ‘niche’ concept proposed for temperate lake is not applicable to tropical shallow lakes, as suggested by Belsare (1982, 1994). [Nature and Science 2010;8(11):71-74]. (ISSN: 1545-0740).

Keywords: littoral benthic organism; tropical ecosystem; predator; oligochaete; bird; fish

INTRODUCTION

The present communication reports our observation on Oligochaete population in littoral zone of a shallow tropical lake, the Sirpur Lake of Indore, with reference of their predator such as shore birds and demersal fish of which the oligochaetes are the preferred food species in their food web. They occupy the same ‘niche’, but the seasonal fluctuation in their population seems to be more related to their prey – predator relationship as reported by some authors (Belsare 1982, Fittku 1994). Macrobenthic fauna of Indian lakes tried to relate their population to organic matter (Verma et. al. 1984), physico-chemical conditions (Malhotra et. al. 1990) or seasonal variation in energy content of benthic macro invertebrates (Gupta & Pant 1983). But no other author considered shorebirds, which in fact break the close cycle of food chain in water body except that a passing remark made by Belsare as early as in 1982 that water fowls forms an important link of regulating biomass in tropical lake and rejected the ‘niche’ concept which was based on temperate lakes. Later on, Fittkau (1994) made observations on unique system of ‘terre firme’ forests and mountain streams in central Brazil where he found that ‘niche concept’ can not be applied to abundance of flora and fauna in tropical region. The present report supports the prey-

predator relationship in littoral zone of tropical water body.

MATERIAL AND METHOD

The oligochaetes were collected with the help of mushroom shaped scooping bottom samples which collected 10 cm X 10 cm X 10 cm mud sample. It was caste ten times and dragged by attached rope. The collected samples were brought to the laboratory for further investigation. The collect samples were dissolved in one liter of water and was sieved. The organisms collected over the sieve were transfer to a bottle containing water. After preliminary identification of organism in living condition, they were preserved in 5% formalin. A number of quantitative estimates were made using a sample of constant volume (200 ml). The total number of oligochaetes was qualified by standard displacement method. Such samplings are analysis was made regularly every fortnight through out the year.

The shorebirds were identified and their populations estimated with the help of binocular (X50) during early morning hours and at disk every fortnight.

The demersal fishes were collected by cast or scope net and were brought to the laboratory for identification and further quantitative analysis. For quantification the fish catch per square meter of the area of littoral zone was calculated.

For identification of shorebirds, an artificial key prepared by Belsare (1997) was used. The demersal fish were identified with the help of key describe by Srivastava (1968).

OBSERVATIONS

The oligochaetes identified from littoral region of Sirpul lake are *Tubifex tubifex*, *Limnodrilus hoffmeisteri*, *Branchiodrills hartensis*, *Dero dorsalis*, and *stylaria fissularis*, *Telmatodrilus multispinosus*. The representative species of shorebirds are *Blackwinged stilt (Himantopus himantopus)*, *Pintail snipe (Gallinaga stonura)*, *Common Sandpipe (Aclitus hyoleuces)*, *Black-tailed Godwit (Limosa limosa)*, *Red-wattled Lapwing (Vanellus indicus)*, *Whiskered Tern (Chlidonias hybrida)*, *White-winged Black-tern (C. leucoptera)*, *Little Tern (Sterna albifrons)*, *Bar-tailed Godwit (Limosa lapponica)* and *Indian skimmer (Rynchops albicollis)*.

The demersal fish species found are *puntius ticto*, *P. sarana*, *Rasbora daniconius*, *Daino malabericus*, *Nemachilus sp.*, *Mastocembaalus armatus*, *Heteropneustes fossilis*, *Clarias batrachus*, *channa punctatus*, *mystus bleekeri*, *Gadersia chapra* and finger lings of major corps. The gut contents of fish were examined and it was observed that *Heteropneustes fossilis*, *Clarias betraclus*, finger lings of major corps, *mastcembalus armatus* feed mainly on oligochaetes.

SEASONAL CHANGES:

The seasonal changes in oligochaetes species, shorebirds and demersal fish are summarized in Figure 1, and Figure 2. It is seen that the maximum concentration of oligochaetes was noted during December (Figure 1). The population of shorebirds and demersal fish also increased during this period. The oligochaetes diversity suddenly declined in February (Figure 1). When shorebirds population reached its peak. In March and April, oligochaetes population started increasing when migratory shorebirds disappeared, but residential species, still remained at their peak level. The demersal fish like *Heteropneustes fossilis*, *Mastocembaalus armatus* and fingerlings of major carps, which feed on oligochaetes exhibit maximum peak of their population.

DISCUSSION

The maximum concentration of oligochaetes during cold period (December & January) is in conformity with the observations of Oomachan and Belsare (1986) on oligochaetes of the lower lake Bhopal. The shore birds and demersal fish which feed on oligochaetes are also abundant during this period. There is slight decrease in population of oligochaetes in February which may be due to heavy predation by birds and fish, but they start increasing in number during March, April and May, when the residential shorebirds and demersal fish are abundant. Therefore, it is suggested that their trophic relationship is based on availability of food. The shorebirds bring allochthonous organic matter in littoral region which is recycled by oligochaetes rapidly and thus, their number is also increased. Due to their remarkable adaptability to organic waste and breeding condition, Fittkau's (1997) observations on 'Terre firme' forests and streams of Central Brazil supports this prey-predator relationship i.e. more prey species to more predators in tropical ecosystems (Table 1).

Table 1. Fishes

Se. No.	NAME OF DEMERSAL FISH FAUNA	SUMMER	MONSOON	POST MONSOON
1	Heteropneustes fossils	+++	++	+++
2	Clarias batrachus	+++	+	+++
3	Rasbora drmiconius	+	++	+++
4	Danio Melabaricus	+	++	+++
5	Puntius sarana	++	+	+++
6	Puntius ticto	++	+	+++
7	Major carp fingerlings	+	-	+++
8	Channa stariatus	+++	+	++
9	Gadusia chapra	-	+	+++
10	Mastacembalus armatus	+	-	++

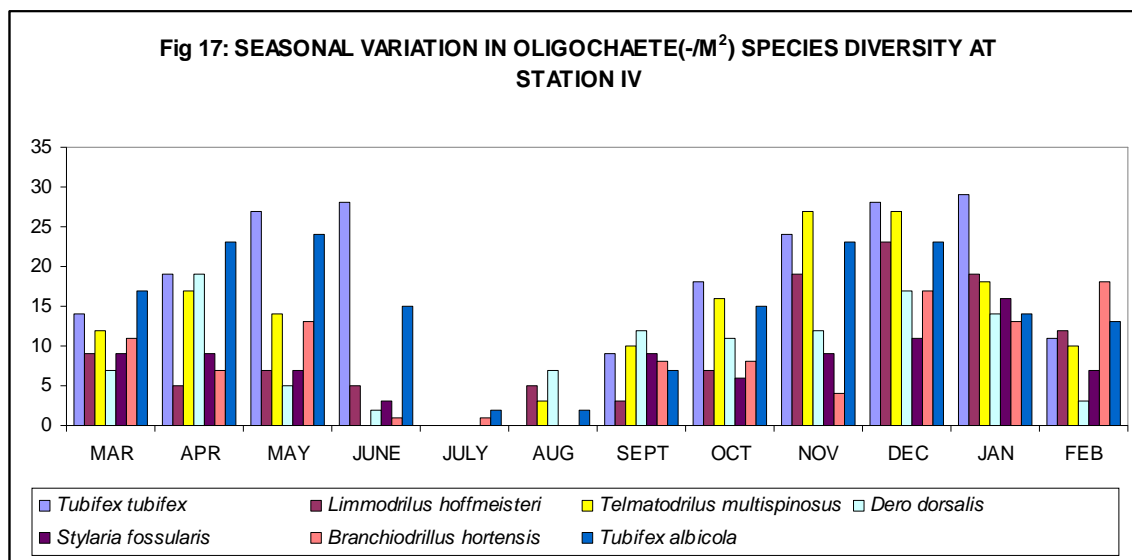


Figure 1. Seasonal variation in Oligochaetes (-/m²) species diversity of Sirpur lake

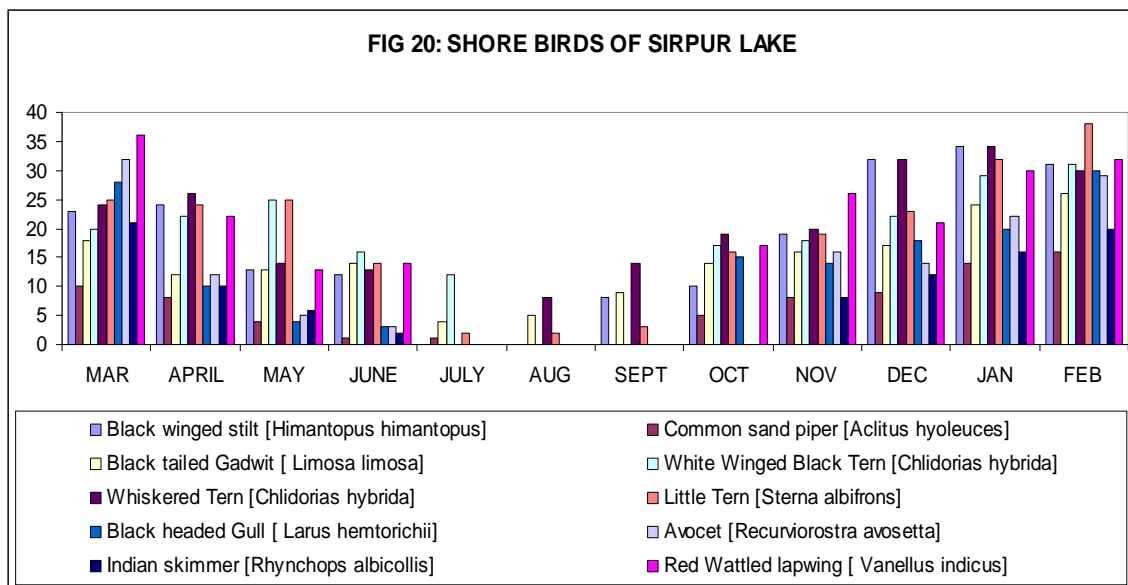


Figure 2. Seasonal variation in shore Birds species diversity of Sirpur lake

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