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FISH FAUNAL BIODIVERSITY IN A MANGROVE STAND OF SOUTH ANDAMANS

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A study was undertaken in Sipighat, South Andaman during 1992-94 to evaluate the significance of mangrove ecology in recruitment of finfishes and crustaceans. The hydrographical parameters of mangrove waterways, as well as the litter fall and litter decomposition were studied over a period of two years. The phytoplankton and zooplankton composition were also studied. Exploratory catches by the help of cast net, dragnet and modified shooting net revealed the presence of a number of brackishwater and marine species, marine shrimps, freshwater prawn and crabs. Mud lobster *Thalassima anomola* were also found to build mound in mangrove area. The seed of grey mullets, *viz.*, *Liza tade* and *Mugil cephalus* were abundant in these mangrove areas and they were found to immigrate into low-lying areas along the tidal influx during high tides. The seed was available throughout the year with two or three peak seasons especially during December-January and August-September. The collected finfishes are grouped under 39 families and the crustaceans under 7 families.

INTRODUCTION

It is well known that mangrove waterways being highly fluctuating environment with respect to hydrographical parameters provides an ideal nursery ground for numerous species of finfishes and shellfishes. Such environments are rich in organic matter, derived mainly from decomposition of litter fall which are brought through the drainage into the sea. It is also rich in inorganic nutrients which are flushed from terrestrial land masses to the sea enroute mangrove waterways. The present study was undertaken to record the fish faunal biodiversity in mangrove stands of South Andaman. Study was undertaken to assess the litter fall, litter decomposition as well as hydrographical parameters in order to understand the nutrient cycle as well as fluctuating environment of mangrove.

MATERIAL AND METHODS

Samples were collected with the help of cast net, dragnet and modified shooting net for exploring the composition of fish catches in mangrove waterways. The floral compositions of mangrove area was recorded by collection of the leaves, buds, flowers

and fruits of mangrove trees, and further were identified with the help of a botanist. Traps were utilized for year round collection of mangrove litter and decomposition of the leaf was studied by litter bag techniques. Hydrographical parameters *viz.*, salinity, dissolved oxygen, pH and alkalinity were analysed following APHA (1998). Soil samples collected from mangrove areas were analysed for their calcium and sulphide contents as well as for their redox potential. The organic carbon and pH of the soil were also analysed.

RESULTS AND DISCUSSION

Exploratory catch analysis revealed the presence of a large number of finfish and shellfish species, *viz.*, *Liza tade, Mugil cephalus, Valamugil* sp., *Lates calcarifer, Siganus javus, S. vermiculatus, Sillago sihama, Lutjanus* sp., *Caranx* sp., *Gerrus* sp., *Leiognthus* sp., *Scatophagus argus, Tilapia* sp., *Megalops cyprinoides, Elops saurus, Lutjanus kashmira, Pomadasys* sp., *Stolephorous* sp., *Toxetes* sp., *Saurida* sp., *m Epeniphelus* sp., *Anguilla bicolor, Tetradon* sp., *Butis butis. Platycebhalus* sp., Engraulids, Gobids etc. Amongst shellfishes shrimp/prawn species *viz.*, *Penaeus merguiensis, P. monodon, Metapenaeus* sp., *Acetes* sp., *Macrobranchium* sp. and crabs *Scylla serrata, Cardisoma carnifex, Thalamia* sp., *Portunus pelagicus* etc. were recorded. Mud lobster *Thalassima anomola* were also found to build mound in mangrove area. Important bivalves like *Perna viridis, Anadora* sp. and *Sacostrea* sp. were also available.

The seed of grey mullets, *viz.*, *Liza tade* and *Mugil cephalus* were abundant in these mangrove areas and they were found to immigrate into low-lying areas along the tidal influx during high tides, as also reported by Soundararajan and Dorairaj (1987). The seed was available throughout the year with two or three peak seasons, especially during December-January and August-September. The abundance of seed of *Chanos chanos* was comparatively low. Mainly cast net and occasionally gillnet were operated for the collection of finfishes and crustaceans. The finfishes collected from Sipighat area are grouped under 39 families and the crustaceans under 7 families. The commercially important amongst them are listed in Table 1.

From the perspective of the total mangrove areas of Andaman & Nicober islands a total of 239 species distributed among 59 families were recorded by Rajan and Dam Roy (2003). According to them the most important ones are Gobiidae (26 species), Clupeidae (15 species), Carangidae (14 species), Serranidae (13 species) and Lutjanidae (13 species). Ten families contained 116 species, more than 48% of the total. The remaining 49 families had a low diversity with 123 species, more than 51%. Seventeen families were represented by a single species (Table 2).

Table 1. Commercially important finfishes and crustaceans recorded at Sipighat mangrove waterways

Name of the fishes/ crustaceans	Family belonging to	Abundances
Finfishes		
Megalops cyprinoides	Megalopidae	Fairly available as seed and adults
Elops machnata	Elopidae	Fairly available as seed and adults
Stolephorous sp.	Engrualidae	Fairly available
Lates calcarifer	Centropomidae	Sparcely available
Sillago sihama	Sillaginidae	Fairly available
Lutjanus sp.	Lutjanidae	Fairly available
Caranx sp.	Carangidae	Available in plenty
Liza tade	Mugilidae	Available in plenty
Mugil cephalus	Mugilidae	Fairly available
Valamugil sehali	Mugilidae	Sparcely available
Leiognathus sp.	Leiognathidae	Available plenty
Siganus sp.	Siganidae	Fairly available
Crustaceans		
Penaeus merguiensis	Penaeidae	Available in plenty
Penaeus monodon	Penaeidae	Sparcely available
Metapenaeus sp.	Penaeidae	Available in large quantity
Scylla serrata	Portunidae	Available in fairly large quantity

Table 2. Distribution of fish fauna in the mangrove of the Andaman and Nicobar Islands

Family	Genera	Species	% of total species richness
Gobiidae	18	26	10.8
Clupeidae	8	15	6.2
Carangidae	8	14	5.8
Serranidae	3	13	5.4
Lutjanidae	1	13	5.4
Lethrinidae	2	7	2.9
Apogonidae	4	7	2.9
Leiognathidae	3	7	2.9
Mugilidae	3	7	2.9
Tetraodontidae	2	7	2.9

Many of the important families (Gobiidae, Apogonidae, Carangidae, Serranidae, Lethrinidae, Clupeidae, Mugilidae) are common to most Indo-Pacific mangroves. Freshwater species (Anguillidae, Eleotrididae and Gobiidae) were also recorded from Andaman and Nicobar Islands from where nearly 18 species of freshwater fishes were already known.

Many species of fishes move into mangroves at a particular stage in their life cycle, usually as juveniles. The success of fisheries in many tropical regions may be closely linked to the health of the mangrove swamps, which serve as important nursery grounds for species such as snappers, jacks, groupers and mullets. Commercial fishing in mangrove is often carried out using hook and line, cast nets, barrier nets and bamboo traps. The catch consists mainly of snappers (Lutjanidae), herrings and sardines (Clueidae), anchovies (Engraulididae), groupers (Serranidae), jacks (Carangidae), ponyfishes (Leiognathidae), grunts (Haemulidae), emperors (Lethrinidae), goatfishes (mullidae), mullets (Mugilidae) and rabbitfishes (Siganidae). Out of recorded 239 species, 162 species (67.78%) were commercially important and 77 species (32.22%) were of non-commercial value.

The study of hydrographical parameters at four selected stations in the mangrove area indicated that the average air and water temperature at these selected sites ranged between 29.5 to 31.6 °C and 29.6 to 31.1°C, respectively. Mean value of other parameters such as pH, salinity and dissolved oxygen ranged between 7.13 to 7.80, 18.38 to 27.72‰ and 5 to 7.0 mg/l, respectively. The range of mean value of carbon dioxide and alkalinity at various stations were 15-18 mg/l and 122-141 mg $CaCO_3$/l, respectively. Nutrient analysis indicated that the average value of NO_2-N and PO_4-P at various stations ranged between 1.07 to 1.15µg-at/1 and 0.25 to 0.52 µg-at/1, respectively. The data presented is in agreement with the report of Dorairaj and Soundararajan (1987), Das and Dev Roy (1989) and Rajagopalan *et al.* (1986). Plankton is dominated by centric diatoms, dinoflagellates, radiolarians, tintinids, copepod, crustacean larvae (nuaplius, zeoa and protozoea), lucifer, fish egg, chaetognath, oikopleura, polycheate etc. (Dam Roy, 1999).

Study on litter fall was conducted during October 1993 to July 1994 below a mangrove stand of *Rhizophora apiculata* and *Bruguiera gymnorhiza* of Sipighat mangrove area. Altogether 881.5 g of mangrove litter was collected from 1 square meter area. An effort was made to correlate litter fall with other climatological factors. There was no significant correlation between litter fall and parameters like air temperature, wind speed, rainfall and number of rainy days. The minimum litter fall was obtained in the month of October 1993 (41.1 g/m^2/month). A total litter of 88.5 g was collected for a period of 10 months. The data regarding litter fall and other climatological factor is given in Table 4 Between the month of November 1993 and March 1994 i.e. during the dry period, 509.6 g of litter was collected in 1 square meter area, i.e. 57.81% of the total litter fall was recorded during the period.

Saifullah *et al.* (1989) reported an estimated average litter fall of 2.16 g dry weight/m^2/day in a mangrove stand of Red Sea coast in Saudi-Arabia, which is comparable to our present study where litter fall worked out to be 2.90 g dry wt/m^2/day. Extrapolation of data of the present study to another two months estimated the annual

litter fall to be 1058 g/m^2/yr, which is higher than the earlier work of Duke *et al.* (1981) in North-east Australia, where mean value for 3 species of Rhyzophora was reported as 960 g/m^2/yr.

Experiments conducted in December 1993 on litter decomposition wherein mangrove leaves were placed below soil, the loss of organic matter was higher in the 1st week (28.3 mg/g/day). Subsequently, from the initial to 2nd week, 3rd week and 4th week the rate of loss of organic matter has slowed down to 5.14, 9.58 and 6.51 mg/g/day, respectively. In another experiment where the leaves were kept on the mangrove soil, the loss of organic matter from initial to 2nd week was 11.64 mg/g/day. No data was available from initial to 3rd week but from initial to 4th week the loss of organic matter was 6.59 mg/g/day. In both these experiments it was observed that in the first 7 days, the loss of organic matter was highest and subsequently the rate of loss of organic matter slowed down. This observations has been in agreement with the studies conducted by Boonruang (1978) and Fell and Master (1980).

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