

## A study on damage caused to crustacean and finfish larvae during collection of *Penaeus monodon* (Fab.) postlarvae in the estuaries of Barguna, Bangladesh

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### Abstract

A year round investigation in the estuaries of Barguna district revealed that for each *Penaeus monodon* postlarvae (PL), about 37 larvae of other shrimp species, 12 finfishes and 10 macrozooplankters are destroyed during the process of shrimp seed collection. Although abundance of *P. monodon* PL was not recorded throughout the year, a significant number of other shrimp spp., fin fishes including macrozooplankters are being damaged by the shrimp seed collectors. This indiscriminate destruction of aquatic organisms during *P. monodon* PL collection is serious threat to aquatic biodiversity.

**Key words :** *P. monodon* PL, Finfish larvae, Colossal loss

### Introduction

Shrimp exports contribute a very positive impact on the national economy of Bangladesh. Recent expansion of farming areas and the trend of selective stocking of *P. monodon* postlarvae (PL) by farmers has resulted in tremendous demand of seed (PL) of this species. The high demand of *P. monodon* PL has stimulated a large number of people in shrimp seed collection along the coastal belt. Shrimp seed are extensively collected by push net and fixed bag nets, and the seed collectors transfer their catches to earthen bowls, which are carried to the river bank. *P. monodon* PL locally known as "Bagda pona" are then sorted out and the rest are discarded along the dry shore, result in large wastage of both penaeid larvae and other commercially important aquatic organisms.

Some previous investigations gave some information on zooplankton with special reference to penaeid postlarvae (Zafar and Mahmood 1994, Hossain 1984) in estuaries of this country. The first information on colossal loss to zooplankton during shrimp seed collection in the estuarine waters of Chakaria

Sundarban, Satkhira and Khepupara are given by Mahmood (1990). The present year-round study was carried out in two river-estuaries of Barguna with the objectives of identification of seasonal and spatial pattern in crustacean and fin fish larval distribution, although, the main objective was to assess the quantum of damage caused to shell and finfish larvae while collecting *P. monodon* seed.

## Materials and methods

### *Field methods*

Samples were drawn from two major rivers viz. Baleshawr and Bishkhali of Barguna coastal district during December'92 through November'93. Three stations were selected in each river.

Sample were drawn at fortnightly intervals. A rectangular drag net made of nylon netting (mesh size 1 mm) and bamboo spilt structure(1.6x0.6m) was used for sampling. The net was operated in shallow waters of the river against current for about 10 minutes. Two samples were collected at day time during low and high tides. Immediately after collection samples were preserved in 5% buffered formalin solution. Salinity of water was recorded weekly by direct reading refractometer. Water temperature was measured weekly by a alcohol thermometer.

### *Laboratory analysis*

In the laboratory *P. monodon* PL were identified and separated following Muthu (1978) and Motoh and Buri (1980), and other shrimp and fin fishes larvae including zooplankters were identified into major taxonomic group following Davis (1985), Fischer and Withead (1974) and George (1969).

## Results and discussion

### *Hydrographic conditions*

Average monthly water temperature and salinity values have been shown in Fig. 1. Water temperature ranged between 20.4 to 30.8<sup>0</sup>C in both the rivers. During the period between July and December salinity attained '0' in both rivers. This lowest salinity may be due to monsoon effects, during other part of the year (January-June) salinity ranged between 1 to 6 ppt with highest in May. Abundance of *P. monodon* PL were probably related with presence of salinity, during '0' salinity period almost no *P. monodon* PL was recorded. Average salinity was lower than the rivers of Patuakhali and Bagerhat districts (FRI 1996).

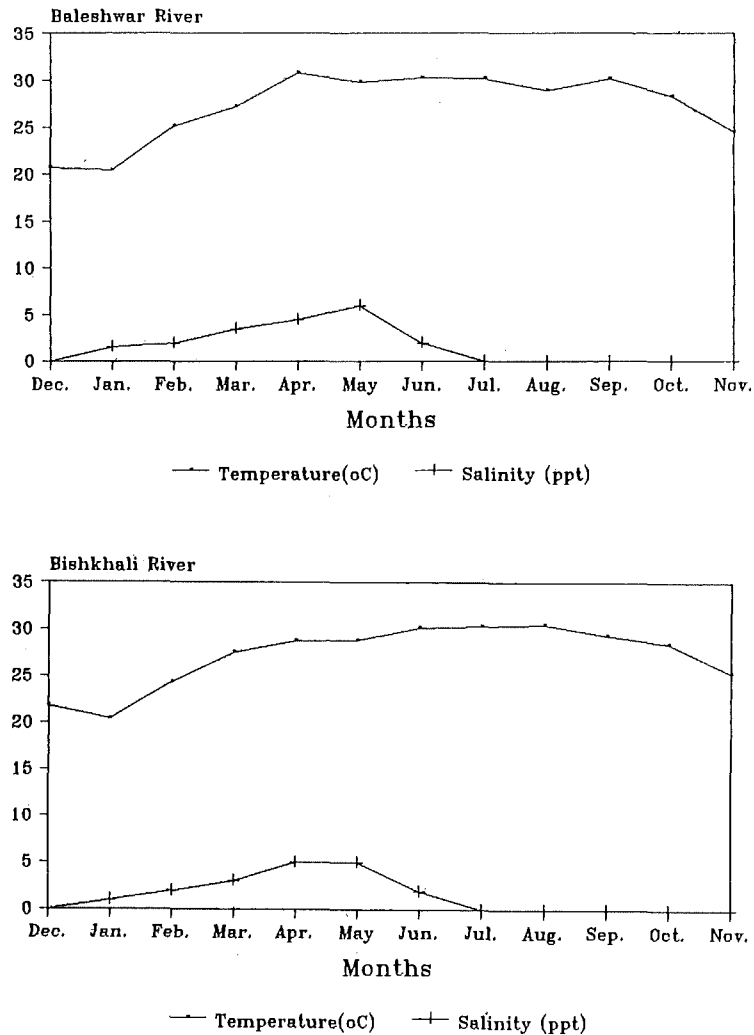


Fig. 2. Monthly distribution of water temperature and salinity in two rivers of Barguna district during study period.

### **Distribution of individual taxa**

Monthly quantitative distribution (individuals/unit effort) of *P. monodon* postlarvae, larvae of other shrimps, finfishes and macrozooplankters in two rivers of Barguna district have shown in Table 1. No *P. monodon* PL was found during the months of July to October when there was no salinity in river. On the other hand, abundance of other shrimp spp. increased during the months of August through January, and the maximum was recorded in October. There was a sudden decrease of other shrimps in November, but the finfish larvae occurred in abundance during this month. There was no uniform pattern in distribution of both finfish larvae and macrozooplankters, their abundance fluctuated from one month to another. Finfish larvae and zooplankters were more abundant in post monsoon period than other time of the year.

**Table 1.** Monthly distribution (Individual/unit effort)<sup>1</sup> of different taxa in the two major rivers of Barguna

Major taxa	Months												Yearly Total	%
	Dec.	Jan.	Feb.	Mar.	Apr.	May.	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.		
<b>A. BALESHWAR RIVER</b>														
<i>Penaeus monodon</i>	1	2	3	3	2	2	1	0	0	0	1	1	6	1.75
Other shrimp spp.	100	42	27	35	22	14	34	19	37	46	155	35	566	61.99
Finfish	16	4	4	16	11	9	7	11	5	7	30	80	200	1.91
Macrozooplankter	9	5	16	20	13	19	12	8	11	7	7	4	131	14.35
Total number	126	53	50	4	48	44	54	39	3	60	192	120	913	100.00
<b>B. BISHKHALI RIVER</b>														
<i>Penaeus monodon</i>	1	2	3	2	3	2	1	0	0	0	0	1	15	1.60
Other shrimp spp.	95	6	36	1	14	21	5	26	35	85	17	0	591	63.21
Finfish	10	7	8	15	12	9	6	18	13	11	20	37	166	17.76
Macrozooplankter	8	6	14	19	26	36	9	7	15	1	2	10	163	17.43
Total number	114	71	61	67	55	68	51	51	63	107	139	88	935	100.00

<sup>1</sup> Operating a drag net (1.6 X 0.6m) for about 10 minutes as a unit effort

**Composition and dominant taxa**

*P. monodon* PL contributed a small fraction to the total catch composition, 1.75% in Baleshawr and 1.60% in Bishkhali river. Other shrimp spp., finfishes and macrozooplankters showed more or less similar pattern in distribution in the two rivers. Other shrimp species included *P. indicus*, *Metapenaeus monoceros*, *M. brevicornis*, *Macrobrachium* spp. Finfishes included *Lates calcarifer*, *Setipina phasa*, *Glossogobius* spp., *Liza* spp. and other macrozooplankters were Isopods, Copepod, *Acetes* sp., Mysids, Alima, and crab larvae etc. Abundance of shrimp PL other than *P. monodon* reflected majority (63.21%) in Bishkhali river followed by Baleshawr river (62%). Finfishes occupied 21.91% and 17.76% in Baleshawr and Bishkhali river respectively. Other zooplankton population occupied only 17.43% in Bishkhali and 14.35% in Baleshawr river.

**Relative abundance and colossal loss**

Due to high demand of *P. monodon* PL, the number of shrimp fry collectors increased to a great extent in the coastal region of this country. All suitable sites for shrimp fry collection along the coastal rivers are exploited by them using fine meshed nylon nets. This causes a great loss to other aquatic organisms at the early stage of their life cycle. The present attempt to quantify the damage as a result of such exploitation, revealed that on an average the catch composition (%) of *P. monodon* PL were only 1.67%, other shrimps 62.60%, finfishes 19.84% and macrozooplankters 15.89% (Table 2). This observation revealed that for collecting single *P. monodon* PL, 37 other shrimps, 12 finfishes and 10 macrozooplankters are being destroyed by shrimp fry collectors. Mahmood (1990) reported from Chakaria Sundarban, Satkhira and Khepupara estuaries that for fishing single *P. monodon* PL, 14 other shrimp PLs., 21 finfishes and 1631 zooplanktons were killed. The variations in zooplankton population with the present observation might be due to difference in mesh size of the collection net. The microzooplankters could not be collected for this study due to large mesh size (1 mm) of the gear used.

**Table 2.** Average catch composition of *P. monodon*, other shrimp spp., finfishes and macrozooplankters from rivers of Barguna

Major Taxa	Yearly average catch (%)	Number of other species destroyed for each <i>P. monodon</i> PL collection
<i>P. monodon</i>	1.67	-
Other shrimp spp.	62.60	37
Finfishes	19.84	12
Macrozooplankters	15.89	10
Total	100.00	59

An estimate was made on the *P. monodon* PL, harvested from rivers of Barguna district revealed that about 1.3 billion *P. monodon* PL were collected during the year 1993, resulted damage of large number of other crustaceans and finfishes during shrimp fry collection. According to Funegaard (1986), about 2000 shrimp fry/net/day were collected by the collectors of Satkhira district in 1982 which were reduced to 200 fry/net/day in 1986- reflected the adverse effect of indiscriminate shrimp fry collection in the coastal region of this country. Immediate steps should be taken to stop this practice to conserve the aquatic biodiversity.

## References

- Davis, C. C., 1985. The Marine and Freshwater Plankton. Michigan State University Press. 16 pp.
- Fischer, W. and P. J. P. Witchead (eds.), 1974. FAO species identification sheets for fishery purposes. Eastern Indian ocean fishing area 57 and western central pacific area 71. Rome, FAO, Pag-Var., Vol.I-IV.
- FRI (Fisheries Research Institute), 1996. *Survey and assessment of shrimp fry resources in Bangladesh- Annual report. In: Research Progress Report (1993-96)*. FRI, Mymensingh. (unpublished)
- Funegaard, P., 1986. Shrimp seed any to sell? Come to Satkhira, Bangladesh. *Bay of Bengal News*, **22**: 2-6.
- George, M.J., 1969. Prawn Fisheries of India-II. Systematic taxonomic consideration and general distribution. *Bull. Cent. Mar. Fish. Res. Inst.*, **14**: 5-48.
- Hossain, M. A., 1984. Studies on zooplankton communities of the Mathamuhuri river estuary with special reference to shrimp larvae during south west monsoon. *M.Sc. dissertation*. Inst. of Mar. Sci., University of Chittagong, Bangladesh. 38 pp.
- Mahmood, N., 1990. An assessment on the quantum of damage caused to the zooplankton while fishing bagda shrimp *Penaeus monodon* fry in Bangladesh estuaries. *Proc. Seventh Zool. Conf. Bangladesh*: pp. 87-94.
- Motoh, H. and P. Buri, 1980. Identification of the postlarvae *Penaeus* (Crustacea, Decapoda, Penaeidae) appearing along shore water. Aquaculture Dept. SEAFDEC, Trigbaun, Iliolio, Philippines, *Res. Rep.* **4**(2): 15-19.
- Muthu, M. S., 1978. *Larval development : Specific identity of penaeid postlarvae found in brackishwater areas in coastal aquaculture. In: Marine Prawn Culture, Part-1 : Larval development of Indian penaeid prawns* (ed. KNK Kartha). *CMFRI Bulletin*, **28**: 86-90.
- Zafar, M. and N. Mahmood, 1994. Occurrence and abundance of penaeid postlarvae of the genera *Penaeus*, *Metapenaeus* and *Parapenaeopsis* in the estuarine waters of Satkhira, Bangladesh. *Chittagong University Studies, Part-II: Science*, **18**(1): 39-45.