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**PJBS**

ISSN 1028-8880

**Pakistan  
Journal of Biological Sciences**

**ANSI***net*

Asian Network for Scientific Information  
308 Lasani Town, Sargodha Road, Faisalabad - Pakistan

## Observation on the Damage of Shell and Fin-Fish Larvae During Collection of Shrimp Fry (*Penaeus monodon*) in the Estuaries of Bhola District, Bangladesh

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### Abstract

The study was carried out in the Meghna river-estuaries of Bhola district from January, 1996 to December, 1997 with a view of quantify the extent of damage of shell and fin-fish larvae during collection of *P. monodon* larvae as target species. Study revealed that during collection of each *Penaeus monodon* (Fab.) post larva (PL), about 26 and 17 larvae of other shrimp, 16 and 7 fin-fishes and 90 and 39 macrozooplankters respectively were ruthlessly destroyed during the consequent years. During the study period, about 1.10 and 0.89 million man days/years, respectively were found to involve in shrimp fry collection. It was also recorded that about 11.0 and 8.2 million of *P. monodon* PLs respectively were harvested in 1996 and 1997 from the study area. The study indicates that indiscriminate killing of shell and fin-fishes and other valuable aquatic organisms during collection of *P. monodon* PL by shrimp seed collectors is causing threat to aquatic biodiversity conservation and ecology of coastal waters.

### Introduction

Still the wild post larvae of *Penaeus monodon* are the major source of shrimp farming in the coastal region of Bangladesh. The most common culturable species at the adjacent areas of the Sundarbans are *P. monodon*, *P. indicus*, *Merapenaeus monoceros* and *Macrobrachium rosenbergii* etc (Naskar and Chakraborty, 1984) while in the coastal region of Bangladesh, *P. monodon* which is locally known as "bagda chingri" is the most important cultureable species. Extensive fishing of *P. monodon* PL is being done due to horizontal expansion of its culture area and insufficient production of hatchery seeds. High demand, low investment but high return have been stimulated thousand of non-educated unemployed various aged poor people to involve in shrimp fry collection. Push net, drag net and set bag net are mostly used in shrimp fry collection where after every haul the whole catch along with debris is taken in bowls made of plastic, aluminum or clay by splashing water on the net. The *P. monodon* PLs are sorted out quickly from the catch by the collectors themselves or their family members and the rest comprising of other shrimp seeds, fin-fishes and macrozooplanktons are carelessly thrown on the dry shore along the coastal land. Though some authors (Funegaard, 1986; Hossain, 1984; Ahmed, 1981) conducted investigation on the abundance of post larvae and juveniles of penaeid shrimps, but no estimation done on the colossal loss caused to other shrimps, fin-fishes and other macrozooplanktons while catching *P. monodon* PLs. In this regard, in Bangladesh first information on the quantum of damage done to zooplanktons during shrimp seed collection in the estuarine waters of Chakaria Sundarbans, Satkhira and Khepupara was reported by Mahmood (1990). Considering the circumstances, this year-round study was undertaken to assess and to quantify the damage caused to different shrimp species and fin-fish larvae and other macrozooplankters while collecting *P. monodon* PLs in the

Meghna river-estuaries of Bhola district which is a potential shrimp seed (*P. monodon*) resource ground of the country.

### Materials and Methods

**Field's activities:** For the collection of the samples, the lower part of Meghna river-estuaries under Bhola district were selected (Fig. 1). Samples were drawn from three different selected spots of the estuaries from January, 1996 to December, 1997. Spot S<sub>1</sub> was selected adjacent to the Batua launch ghat, 9.0 km away from Charfashion thane head quarter. Spot S<sub>3</sub> was 3.0 km downstream from spot S<sub>2</sub> and spot S<sub>2</sub> was 2.0 km upstream from spot S<sub>1</sub>. Monthly sampling was done by a fine meshed size (1.0 mm) made of nylon net with bamboo split frame (1.6 m × 0.6 m). The net was manually operated in shallow water against current and the hauling time was about 10.0 minutes. Sampling was done twice at day during low and high tides. Samples were immediately stored in plastic pots after each hauling and preserved with 5 percent buffered formalin solution. Salinity of water was recorded with the help of a hand refractometer (mode, Atago, S/Mill, 0-100 percent and temperature of water was measured by an alcohol thermometer.

**Laboratory analysis:** Samples were brought into laboratory and analysis was performed within two weeks from the data of collection. Penaeid shrimp larvae were identified upto species level following Muthu (1978) and Motoh and Buri (1980). Macrozooplankters including other shrimp and fin-fishes were identified as major taxonomic groups following George (1969) and Fischer and Whitehead (1974).

### Results and Discussion

**Hydrographic conditions:** Average monthly values of water temperature and salinity are depicted in Fig. 2. Water temperature were found to vary between 20.5 and 33.4°C

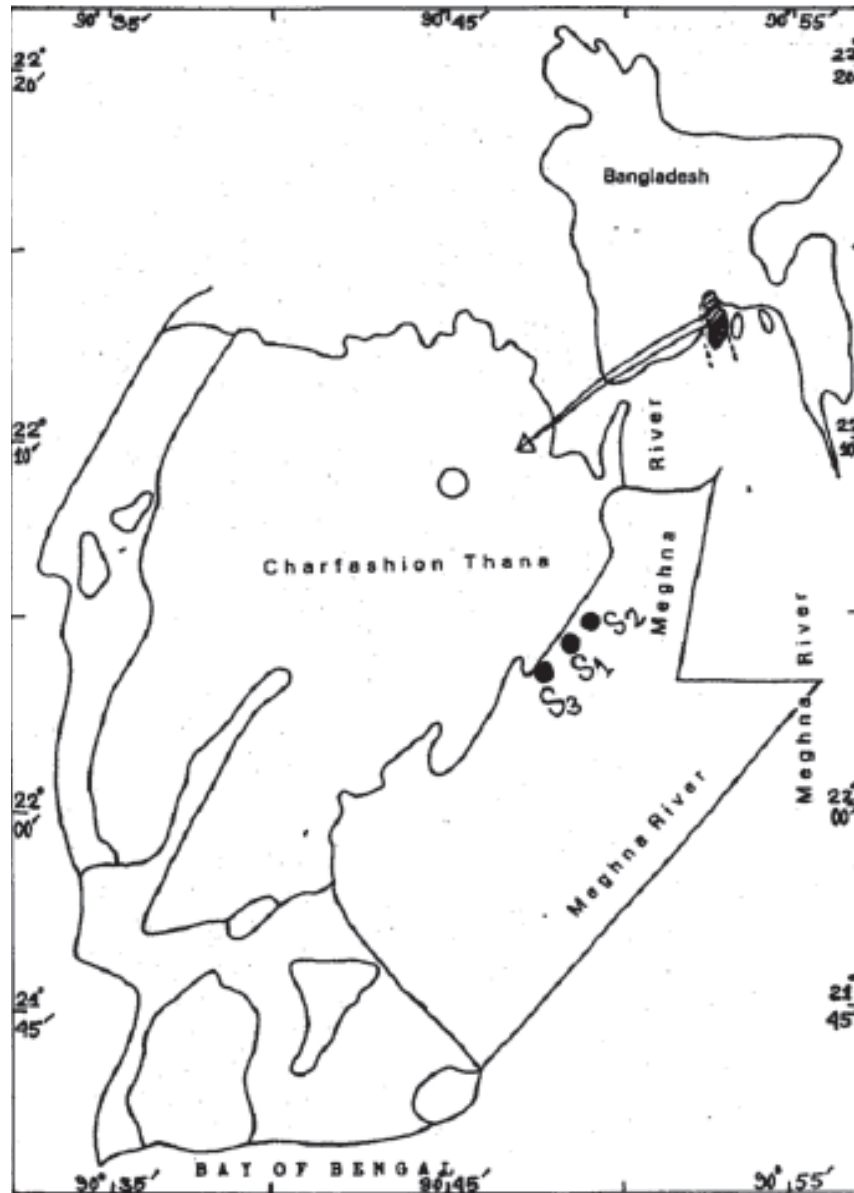


Fig. 1: Location at different sampling spots in the estuaries of Bhola district, Bangladesh

in the lower part of Mehra river. Highest temperature (33.4°C) was recorded on July, 1997 and the lowest (20.5°C) on December, 1996. Salinity varied from 0 to 15 ppt in the river probably due to monsoon effect, river runoff and land drainage. However, salinity was found to increase gradually during oust monsoon.

**Distribution of different individual taxa:** Monthly distribution (individual/unit effort) of *P. monodon* PL, larvae of other shrimp, fin-fishes and macrozooplankters in the river of Bhola district in 1996 and 1997 has been presented in Table 1. Data reveals that during freshwater regime in the river *P. monsoon* PL was absent from the month of August to December in 1997 but 4 *P. monodon* PLs were found on

October, 1996. On the other hand, abundance of other shrimp larvae were observed to increase during the month of May through September and maximum was recorded in June and July respectively in 1996 and 1997. There was no uniformity in distribution of both fin-fish larvae and other zooplankters was observed, their abundance were found to fluctuate from one month to another. Fin-fishes and zooplankters were comparatively more abundant in post monsoon period than the other part of the year which is in agreement with finding of Rahman *et al.* (1997) in the Barguna area (district of Barisal division) where the authors identified low salinity and temperature as the possible vital factors those influence the larval distribution of different aquatic organisms greatly.

Islam *et al.*: *Penaeus monodon*, indiscriminate, killing fin-fish, post larvae.

Table 1: Monthly distribution (Individual/unit effort) of *Penaeus monodon*, other shrimp seeds, fin-fishes and other macrozooplankton in the lower part of ivleghna river of Bhola region, 1996 and 1997

Major groups	Month												Yearly total	%
	J	F	M	A	M	J	J	A	S	O	N	D		
<b>Meghna river. 1998</b>														
<i>P. monodon</i>	-	1	-	1	-	-	-	-	-	4	-	-	6	0.75
Other shrimp	9	21	10	8	20	43	20	12	5	2	2	3	155	19.28
Fin fishes	5	3	2	11	10	7	2	4	6	22	10	17	99	12.31
Other macrozoo plankton	18	19	26	191	13	19	11	27	7	16	166	31	544	67.66
Total number	33	44	38	211	43	69	33	43	18	44	178	51	804	100.00
<b>Meghna river, 1997</b>														
<i>P. monodon</i>	2	6	2	2	1	-	-	-	-	-	-	-	14	1.53
Other shrimp	12	7	3	4	15	20	88	24	30	11	5	25	244	26.61
Fin fishes	3	4	5	9	7	5	6	25	12	10	8	11	105	11.45
Other macrozoo plankton	20	17	19	52	61	11	75	132	89	30	21	27	554	60.41
Total number	37	34	29	67	84	36	170	181	131	51	34	63	917	100.00

Operating a drag net (1.60 m x 0.6 m) for about 10 minutes as a unit effort

Table 2: Average catch composition (%) of *P. monodon*, other shrimp spp., fin-fishes and other macrozooplankton in Meghna river-estuaries of Bhola

Major taxa	Yearly average catch (%)	No. of other species destroyed for each <i>P. monodon</i> PL collection
<b>Meghna river, 1996</b>		
<i>P. monodon</i>	0.75	-
Other shrimp	19.28	26
Fin fishes	12.31	16
Other macro-zooplankton	67.66	90
Total Number	100.00	132
<b>Meghna river, 1997</b>		
<i>P. monodon</i>	1.53	-
Other shrimp	26.61	17
Fin fishes	11.45	7
Other macro-zooplankton	60.41	39
Total Number	100.00	63

**Composition and dominant taxa:** *P. monodon* PL was found to contribute a very small fraction to the total catch composition, such as 0.75 and 1.53 percent respectively in 1996 and 1997. Other shrimp spp., fin-fishes and other macrozooplankters showed more or less similar pattern in distribution in 1996 and 1997. Other macrozooplankters (*Aectes* sp., Mysids, Isopods, Copepod, Alima and Crab larvae etc) occupied the highest rank (67.66%) in 1996 followed by 1997 followed by 1997 (60.41%), Other shrimps (*P. indicus*, *Metapenaeus monoceros*,

*M. brevicornis*, *Palaemon styliferus*, *Macrobrachium rosenbergii*, *M. rudi* and other palaemonid species) exhibited 26.6 percent in 1997 and 19.28 percent in 1996. Fin-fishes (*Liza parasia*, *L. rade*, *Rhinomugil corsule*, *Lates calcarifer*, *Setipia phasa*, *Miser ilisha*, *Pangasius pangasius* and *Glossogobius* spp. etc) occupied only 12.31 and 11.45 percent respectively in 1996 and 1997.

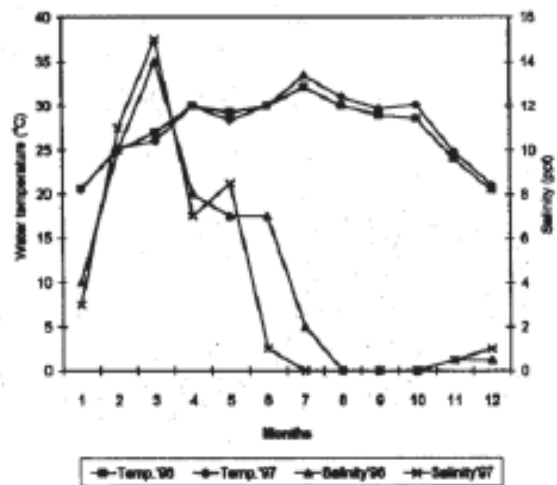


Fig. 2: Water temperature and salinity in the Meghna river of Bhola district under two successive years

**Abundance and massive destruction:** The relative abundance and extent of damage caused to macrozooplankter, other shrimp and fin-fishes as a result of

**Islam et al.: *Penaeus monodon*, indiscriminate, killing fin-fish, post larvae.**

indiscriminate exploitation of *P. monodon* PL are shown in Table 2. It was observed that on an average in the total catch composition, monodon PL occupied 0.75 and 1.53 percent other shrimp 19.28 and 26.61 percent fin-fishes 12.31 and 11.45 percent and, macrozooplankton 67.66 and 60.41 percent respectively in 1996 and 1997. Data revealed that for collecting a single species of *P. monodon* PLs, the seed collectors mercilessly destroy about 26 and 17 other shrimp larvae, 16 and 7 fin-fishes and, 90 and 39 other macrozooplanktons respectively in 1996 and 1997. Mahmood (1990) reported that for catching a single *P. monodon* seed, 14 other shrimp spp., 21 fin-fishes and 1631 zooplanktons were destroyed in the Chakaria Sundarbans, Satkhira and Khepupara estuaries. The variations in the zooplankton population with the present observation might be due to difference in mesh size of the collection net where the author used a rectangular nylon net with smaller mesh size (0.5 mm). The mesh size of the net used in the present study was 1.0 mm which is similar to that used by the traditional shrimp seed collectors of the Country. Thus, escapement smaller zooplanktons through large mesh (1.0 mm) of net is possible. The massive destruction of valuable different aquatic organisms was also reported by BOBP (1992) and Khan *et al.* (1988). Observation on the number of seed collectors/km, length of the river, number of boat and hour of involvement reveals that 1.10 and 0.89 million man days/year respectively are engaged in shrimp seed collection activities in Shale district in 1996 and 1997. Variable information on the same aspect due to the variation in place and season/time was referred by several authors. Funegaard (1986) reported that 20,000-25,000 people were involved in shrimp seed collecting in Satkhira district while according to Chowdhury (1990) about 75,000 fry collectors were obtained only in Satkhira district. Funegaard (1986) stated that about 2000 shrimp fry/net/day were collected by catchers of Satkhira district in 1982 which was found to decline at 200 fry/net/day in 1986 (Alam, 1990). Therefore, the findings of the above studies and the present study reveal that there has been a trend of gradual reduction in the abundance of shell and fin-fish larvae and, other zooplanktons in the coastal waters of Bangladesh which might be due to over fishing of *P. monodon* PLs and indiscriminate killing of zooplanktons and other valuable organisms that obstruct the general recruitment to the natural stock. These situations might have a negative impact on river-estuaries ecology. So, to conserve the ecological balance, aquatic biodiversity and natural productivity of waters, appropriate measures should be taken urgently to train up the fry catchers so that during *P. monodon* PL collection other valuable different aquatic animal larvae caught in the net are released back to the water without any damage.

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