

FAUNAL DIVERSITY IN PRAWNS AND CRABS IN DIGHA AND ADJACENT COAST IN WEST BENGAL WITH NOTES ON THE RELATIONSHIP OF THEIR ABUNDANCE WITH PHYSICO-CHEMICAL PARAMETERS¹

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¹Accepted May 02, 2007

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Studies on the diversity of prawns and crabs in Digha and its adjacent coast in West Bengal, which are rich in fauna, were carried out from April 2000-December 2005. Twenty-four species of prawns, two species of lobsters, twenty three species of brachyuran crabs and fourteen species of anomuran crabs were recorded. Attempts were also made to determine the relationship of the abundance of some species with the physico-chemical parameters.

Key words: prawns, crabs, diversity, Digha coast, abundance, physico-chemical parameters

INTRODUCTION

Chandrasekhara Rao and Misra (1986) made a preliminary investigation on the distribution and ecology of the intertidal fauna of Digha Beach located in West Bengal. They studied the composition, density and distribution of the meiofauna and macrofauna of this beach during 1979-1980. This paper aims at giving a detailed account of the diversity in prawns and crabs found on Digha beach, based on studies conducted from April 2000 to December 2005. Attempts have also been made to correlate the abundance of these animals with some physico-chemical parameters.

A variety of prawns and one species of lobster belonging to the genus *Panulirus* dominate Digha and the adjacent coast. The important species of prawn include *Penaeus monodon*, *Penaeus indicus*, *Penaeus merguensis*, *Penaeus semisulcatus*, *Metapenaeus monoceros*, *Metapenaeus brevicornis* and *Macrobrachium rosenbergii*.

Crabs constitute one of the most dominant macrobenthic faunal components in the ecosystem; they play several significant roles. The feeding activities of detritivore crabs, particularly of the genera *Uca*, *Macrophthalmus*, *Dotilla*, *Sesarma*, and *Metaplax* help in the degradation of plant matter to detritus particles, and they are themselves preyed upon by a number of predators such as fish, reptiles, birds and mammals. The crabs also have a positive effect on the brackish water zone of mangrove ecosystem, due to their burrowing activities, the aeration of soil increases. Another important role of crabs in mangrove environments is the production of millions of meroplankton which serve as potential source of food for a wide variety of planktophagous organisms, including a rich fish population.

MATERIAL AND METHODS

The present study is based on monthly collection of samples from April 2000 to December 2005 in Digha and the adjacent coast. Digha is situated close to the mouth of the Ganga at 21° 36' N and 87° 30' E. Samples were collected using shrimp seed collection nets (shoot nets) from the following locations: 1) Paschim Gadadharpur, about 6 km west of Digha, 2) Udaipur, about 5 km west of Digha, 3) Ongaria Ghat, about 3 km west from Digha, 4) Jatanala Ghat, about 3 km west of Digha and 5) New Digha, about 2 km west of Digha. The prawns and crabs were counted from the beach collections and Drag net hauls. Buried crabs were collected from sand flats during low tide. Specimens were collected using a square metallic frame of 25 x 25 cm, which was 5 cm deep. The quadrant was pushed into the sediment and the enclosed deposit dug out. This process was repeated at the same spot to get another 5 cm layer of sediment below the top 5 cm of deposit.

RESULTS

Coastal West Bengal has a rich crustacean fauna in inshore (including estuaries and mangroves) and offshore waters. Around Digha, 26 species of prawns and 37 species of crabs were recorded (Tables 1 and 2). The prawns belong to three families, Penaeidae, Palaemonidae and Sergestidae. The penaeids form the bulk of the crustacean catch, contributing more than 50% of the total production. In the last two decades, crabs have emerged as an important commodity of export. Apart from prawns and crabs, there is a great demand for lobsters, especially in the international market.

Prawns constitute a large group of crustaceans varying in size from microscopic to about 35 cm long. Nearly 2,500

species are known (FAO 1984). The body is almost always laterally compressed, the rostrum usually compressed and toothed, and the abdomen longer than the carapace. The antennules in most species bear a small scale or spine, the stylocerite, at their base, and the antennal scales of the second pair of feelers, the antennae, are generally large and plate-like. The pereopods or legs are usually slender, but in some species a single leg or a pair of legs may be stout, and some pereopods (the chelipeds) end in pincers or chelae. The pleopods are well developed and usually present on all the five anterior abdominal segments.

Prawns are widely distributed, occurring in marine, brackish and freshwater bodies from the equator to the polar regions. Many are pelagic, but the majority are by far benthic, living on a large variety of bottoms such as rock, mud, peat, sand, fragments of shells or mixtures of these materials. Twenty-four species of prawns and two species of lobsters were recorded from the Digha coast (Table 1). These species

Table 1: List of Prawn and Lobster species recorded from Digha Coast

Prawns

Family: Penaeidae

Metapenaeus affinis (Milne-Edwards)

Metapenaeus brevicornis (Milne-Edwards)

Metapenaeus dobsoni (Miers)

Metapenaeus lysianassa (de Man)

Metapenaeus monoceros (Fabricius)

Parapaenaeopsis sculptilis (Heller)

Parapaenaeopsis stylifera (Milne-Edwards)

Penaeus indicus (Milne-Edwards)

Penaeus japonicus (Bate)

Penaeus merguensis (de Man)

Penaeus monodon (Fabricius)

Penaeus penicillatus (Alcock)

Penaeus semisulcatus (de Man)

Family: Sergestidae

Acetes erythrina (Nobili)

Acetes indicus (Milne-Edwards)

Family: Palaemonidae

Exopalaemon styliferus (Milne-Edwards)

Macrobrachium equidens (Dana)

Macrobrachium javanicum (Heller)

Macrobrachium lamarrei (Milne-Edwards)

Macrobrachium malcomsonii (Milne-Edwards)

Macrobrachium rosenbergii (de Man)

Macrobrachium rude (Heller)

Family: Hippolytidae

Hippolysmata (Exhippolysmata) ensirostris (Kemp)

Alpheus malabaricus Fabricius

Lobsters

Family: Palinuridae

Panulirus ornatus (Fabricius)

Thenus orientalis (Lund)

Table 2: List of Crab species recorded from Digha coast

Brachyuran Crabs (True Crabs)

Family: Leucosiidae

Philyra syndactyla (Ortmann)

Family: Calappidae

Matuta lunaris (Hilgendorf)

Matuta planipes (Fabricius)

Calappa lophos (Herbst)

Family: Majidae

Doclea canalifera (Stimpson)

Doclea ovis (Fabricius)

Family: Parthenopidae

Parthenope (Platylambrus) prensor (Herbst)

Family: Xanthidae

Galene bispinosa (Herbst)

Family: Ocypodidae

Ocypode macrocera (Milne-Edwards)

Uca (Deltuca) rosea (Tweedie)

Uca dussumieri (Milne-Edwards)

Uca lactea (de Hann)

Uca triangularis (Milne-Edwards)

Dotilla blanfordi Alcock

Family: Portunidae

Scylla serrata (Forsk.)

Portunus (Portunus) pelagicus (Linnaeus)

Portunus (Portunus) sanguinolentus (Herbst)

Charybdis (Charybdis) rostrata (Milne-Edwards)

Charybdis (Charybdis) affinis (Dana)

Charybdis (Charybdis) natator (Herbst)

Charybdis (Charybdis) feriatus (Linnaeus)

Family: Grapsidae

Varuna litterata (Fabricius)

Metaplex dentipes (Heller)

Anomuran Crabs (Hermit Crabs)

Family: Diogenidae

Clibanarius clibanarius (Herbst)

Clibanarius infraspinus (Helgendorf)

Clibanarius padavensis (de Man)

Clibanarius olivaceus (Henderson)

Diogenes custos (Fabricius)

Diogenes affinis (Henderson)

Diogenes planimanus (Henderson)

Diogenes avarus (Heller)

Diogenes costatus (Henderson)

Diogenes investigatoris (Alcock)

Diogenes diogenes (Herbst)

Diogenes miles (Hersbt)

Diogenes rectimanus (Miers)

Family: Coenobitidae

Coenobita cavipes (Stimpson)

are abundant from June to August, with the peak in July. Coastal aquaculture of prawns and other crustaceans is commonly practiced in the region. The demand for prawns in the world market is rapidly increasing. India has rich crustacean resources which are exploited for export.

Lobsters

Lobsters include a variety of crustaceans ranging in size from a few centimeters to more than 60 cm. They are more or less elongate animals with cylindrical and flattened bodies, and a prominent tail or abdomen consisting of six movable segments and a terminal fan.

DISCUSSION

The mean monthly values of the physico-chemical parameters recorded in the study area from April 2000 to

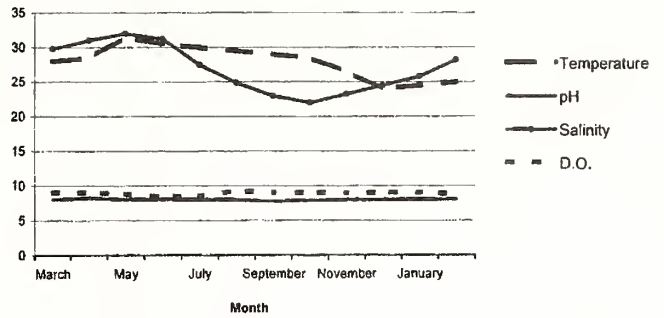


Fig. 1: Average temperature, pH, salinity, dissolved oxygen (D.O.), recorded from the study area during the study period (April 2000-December 2005)

December 2005 are given in Fig. 1. The monthly abundance of four prawn and crab species during 2001 and 2004 are given in Fig. 2 and Fig. 3 respectively. The density and diversity of macrofauna on Digha Beach is rich, due to the

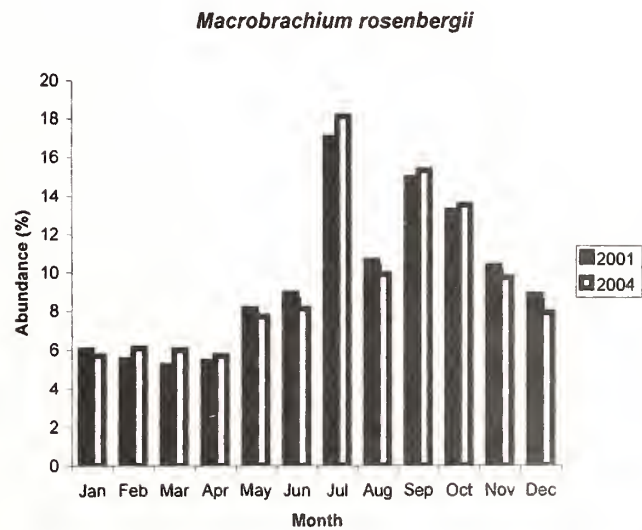
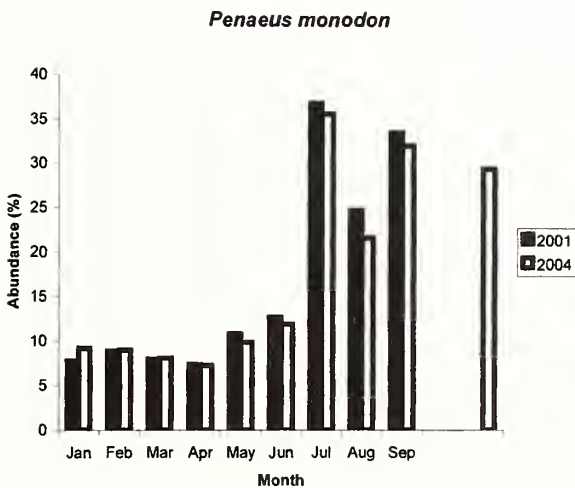
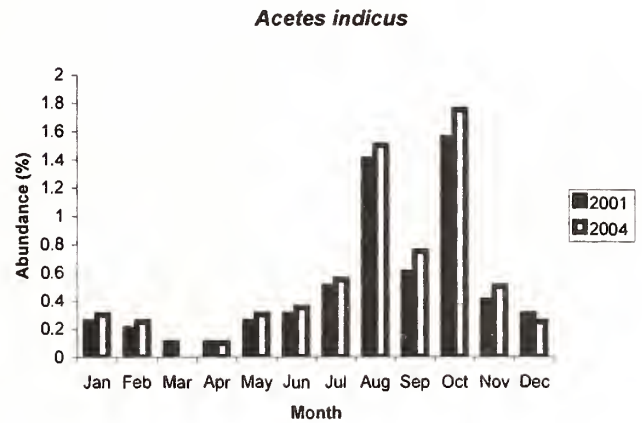
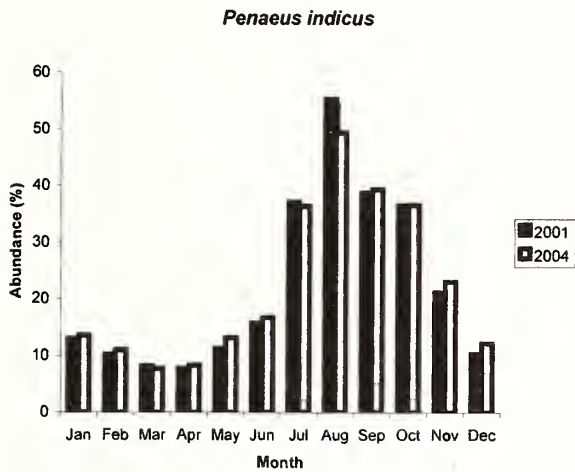


Fig. 2: Comparative chart showing monthly abundance of four prawn species recorded from the study area during 2001 and 2004

relatively sheltered sand flat rich in organic detritus. Due to the fine nature of the substratum, the majority of the species colonising the beach are deposit and filter feeders (Chandrasekhara Rao and Misra 1986). The abundant occurrence of *Donax-Odostomia* populations in the middle of the beach is probably related to the abundant supply of detritus on the beach. Fine intertidal deposits are also known to support rich populations of microorganisms forming food for bivalves. The patchy distribution of macrofauna on the beach seems to be due to the environmental preferences and tolerances of the component species (McIntyre 1969). The macrofauna shows some submergence in the beach towards higher tidal levels, apparently seeking optimum conditions of water saturation in the habitat.

Due to fluctuations in the biotic and abiotic factors of the environment, seasonal changes in population density of macrofauna are known to occur from season to season and from year to year. Interestingly, the maximum counts of *Uca lactea* in the present study were obtained during summer probably related with higher temperatures and salinity. *Uca lactea* counts were also higher from October to December due to an undisturbed substratum. *Scylla serrata*, one of the important commercial species, has the maximum count in the summer. The species is known to prefer low salinity, hence further studies are needed to understand its abundance during the periods of high salinity in summer months. It was found to occur in burrows during the daytime. The depth of the burrows varied from 1.0 to 1.5 m from the surface and the

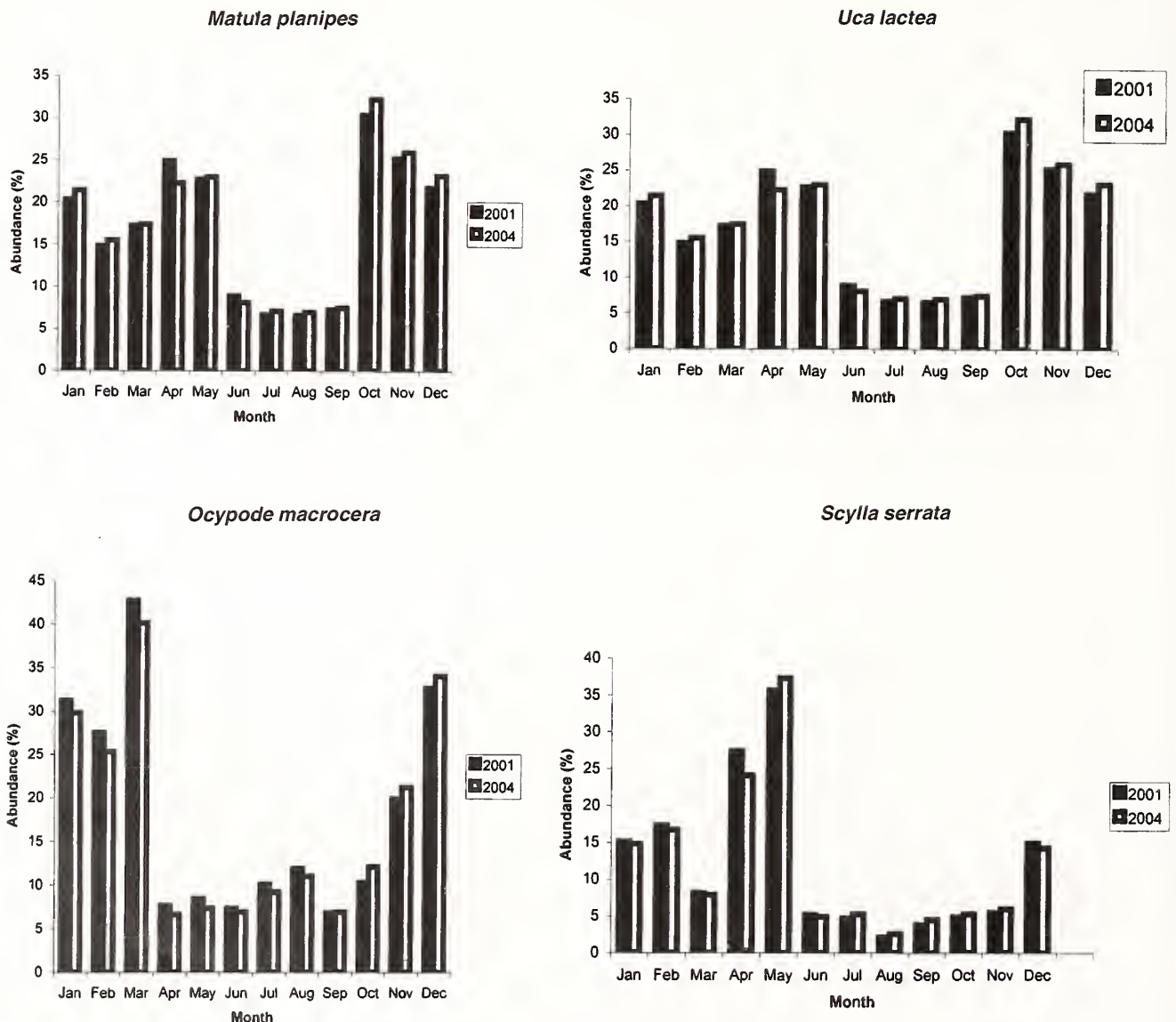


Fig. 3: Comparative chart showing monthly abundance of four crab species recorded from the study area during 2001 and 2004

diameter at the mouth from 8 to 16 cm. During low tide the burrows are flooded with sea water. Dev Roy and Das (2000) reported that the species also inhabits the muddy banks of creeks, channels and mangroves. Another crab species, *Varuna litterata*, had the maximum count during monsoon. The Red Crab *Ocypode macrocera* is found throughout the year with the peak in December-March, and the Two-spined Crab *Matuta planipes* is found in the postmonsoon period. The crab *Charybdis rostrata* occurs in this area throughout the year and dominates all the other species in number, with the peak in the late monsoon period.

As stated twenty-four species of prawns and two species of lobsters were recorded from the Digha coast. These species occur in abundance from June to August, with the peak in July. For meeting the increasing demand of prawn seeds for prawn culture farms, the coastal population is greatly involved in wild harvesting of prawn seeds, in particular seeds of

Penaeus monodon. From November to February, netting of prawn seeds is done intensively. This wild harvest undoubtedly destroys seeds of other species of prawn and various finfishes.

The results of the present study agree with the findings of Brady (1943), who showed that the distribution of fauna varied with seasons, occurring in different tidal levels during different seasons. The seasonal dynamics exhibited by the *Donax-Odostomia* populations on Digha Beach apparently follow a similar pattern.

ACKNOWLEDGEMENTS

The authors are grateful to Dr. J.R.B. Alfred, former Director, Zoological Survey of India (ZSI), Kolkata, Dr. Ramakrishna, Director-in-Charge, ZSI for facilities and to Dr. R.A. Khan, Additional Director, ZSI for encouragement.

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