

Diversity of Brachyuran Crabs in the Mangrove Environment of Tamil Nadu

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Abstract: Crabs are among the most predominant species in many mangrove forests. There are 33 crab species distributed in the mangroves of Tamil Nadu. Crabs belonging to the family Grapsidae and Ocypodidae are dominant forms. Distribution and zonation of crabs are based on the substratum, water level and floral distribution. The species components were dissimilar among the stations survey. The present study has carried out to evaluate the brachyuran crab diversity in eight different stations from mangrove regions Southeast coast of Tamil Nadu. In the present study high population density was noticed in Pichavaram which has the dense mangrove and low population density was observed in Punnaikayal mangroves. The mangrove environment of Pichavaram and Vellar shows the maximum crab diversity. So these two regions were taken for species composition and zonation study.

Key words: Mangroves • Brachyuran Crabs • Biodiversity • Species Composition • Zonation

INTRODUCTION

The mangrove macro benthos, those species that live in mangrove mud or depend on mangroves for all or part of their life-cycle encompasses a number of phyla. Crustaceans are the most crucial groups of tropical benthic communities. Crabs are among the most predominant species in many mangrove forests. Among the brachyurans, the grapsids, ocypodids and xanthids are dominant. Brachyurans are most important group for mangrove ecosystem because they make 80% faunal biomass [1] and their density can reach up to 80-90 individuals per m² [2]. The crabs depend directly on mangrove areas for survival, by feeding on leaves and litter. Biodiversity study of crabs in the Pichavaram mangroves has shown that there are 46 species of crabs from the five different stations [3]. However, no comparative study was attempted the diversity and zonation of crabs. In continuation of that this present study has carried out to evaluate the brachyuran crab diversity species composition and zonation from mangrove regions of Tamil Nadu.

MATERIALS AND METHODS

Study Sites: Selection of study area along the mangrove environment along the Tamil Nadu coast of India and it was examined thoroughly for the presence of Brachyuran

crabs. An extensive survey was undertaken. Field study was carried out in eight mangrove regions are namely Pichavaram, Vellar, Pazhayar, Muthupet, Manakudi, Gulf of Mannar (Manoli Island), Ennore creek and Punnaikayal mangrove regions of Tamil Nadu. The study was undertaken in both creek and fringe mangroves in eight sampling sites varying in microclimatic niche. The two regions which show the maximum crab diversity namely Pichavaram (Lat. 11°26'N; Long. 79°48'E) and Vellar (Lat. 11°29'N; Long. 79°46'E) were taken for further study on species composition and zonation.

Sampling Methods: The species present on the substratum and on the vegetation area were recorded in quadrant each measuring 1 m². Crab burrow density was recorded in 5 randomly placed one square meter quadrates as per Jones [4]. The collected specimens were immediately photographed for noteworthy characters and identified tentatively in the field. After identification, all the specimens were released unharmed in their particular habitat. The identification was confirmed based on photographs, drawings and character description and comparing them with the illustrative keys [5]. For further confirmation of species, all the details of the specimens were compared with the information available on Marine Species Identification Portal website (www.species-identification.org.com) and National Institute of Oceanography web site on Marine Fauna Information [6].

RESULTS

Station Wise Distribution of Crabs in Tamil Nadu:

In sampling sites diversity among the eight stations of mangrove environment brachyuran crabs was recorded maximum from Pichavaram followed by Vellar. The distributions of crabs in the eight different stations observed are given (Fig. 1) Muthupet and Gulf of Mannar shows average amount of crabs. The minimum diversity was noted in Ennore creek, Manakudi and Punikayal mangroves.

Species Composition in Pichavaram and Vellar:

The major two stations Pichavaram and Vellar were taken for species composition. In Pichavaram number of crab species recorded was maximum at station Khan Sahib Canal (V) (35) and minimum number (14) at station Chinnavaikal (I) (Fig. 2). The most dominant species are *Sesarma* and *Uca*. *Sesarma brockii*, *S. plicatum*, *Neoepisesarma tetragonum*, *Metapograpsus messor*, *Pseudograpsus intermedius*, *Macrothalamus depressus*, *Uca triangularis* and *U. annulipes* were commonly found in all five stations of Pichavaram. But *Plagusia depressa*, *Grapsus tenuicrustatus* and *N. medrui* were observed only in the core mangrove region and *Portunus*, *Podopthalmus*, *Ocypods*, *Dotilla*, *Dromia*, *Leptodius* and species only in the Neritic zone in the present study. The distribution of crabs' station wise was given in Fig. 2.

Chinnavaikal (I)> Periyakadavu (II)> Alasi odai (III)> Kanakeluthi canal (IV)>Khan Sahib Canal (V).

In Vellar, the maximum recorded number of crab species was at mangrove (17) and the minimum number in Neritic [5]. The most dominant species are *S. brockii*, *U. triangularis*, *U. annulipes*, *N. medrui*, *Neoepisesarma tetragonum*. But *Thalamita crenata*, *S.serrata*, *Portunus pelagicus* were observed only in the oyster zone and *Ocypode macrocera*, *U. annulipes*, *U. triangularis* and *N. medrui* were found in the Neritic zone. The distributions of crabs were given in the following order.

Mangrove> Oyster > Neritic

Zonation of Crabs in the Pichavaram and Vellar:

The zonations of crabs were studied in Pichavaram and Vellar regions. Each zone exhibited in characteristic species diversity. Zonations of crabs were based on the floral and faunal association. In Pichavaram higher number of crab species was observed in the Neritic zone (36) and core mangrove zone (29). Very less number of species was noticed in the freshwater zone (14).

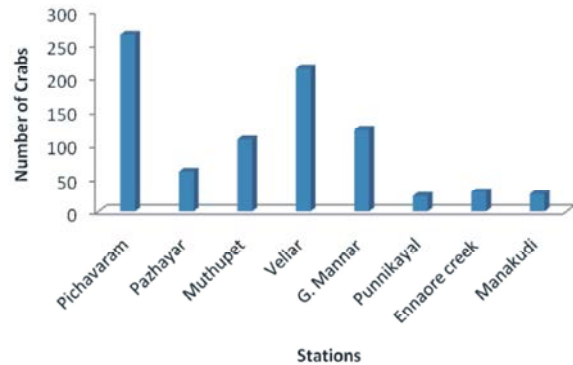


Fig. 1: Station wise distribution of crabs in Tamil Nadu

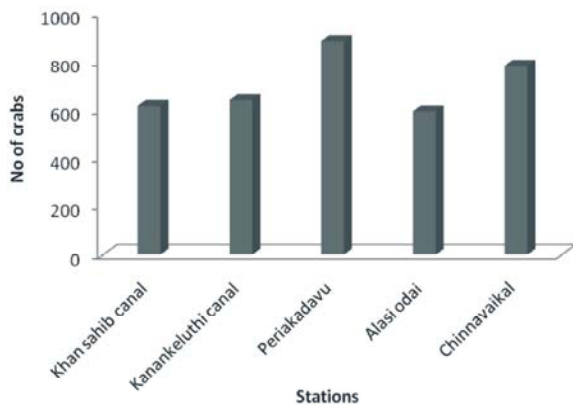


Fig. 2: Species composition of crabs in Pichavaram

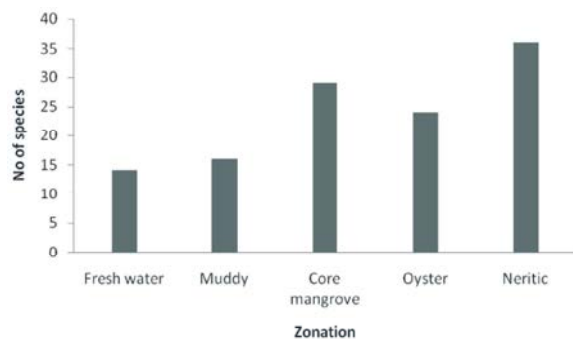


Fig. 3: Zonation of crabs based on the environment in Pichavaram

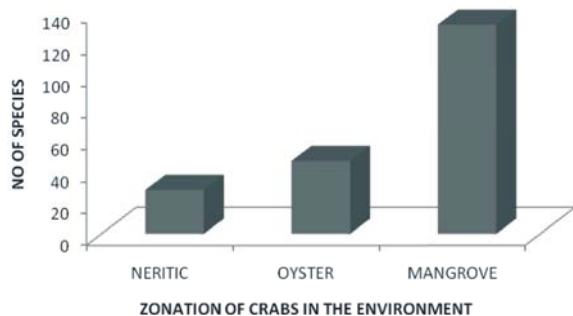


Fig. 4: Zonation of crabs based on the environment in Vellar

Among all the zones, Sesarmid crabs are dominant (Fig. 3). In Vellar higher number of crab species was observed in the mangrove region. Very less number of crabs was found in the Neritic zone. *Uca* species is the dominant representative among all and next to that Sesarmid group takes place. (Fig. 4)

DISCUSSION

This study gave a reference state of the species composition and zonation of the mangrove communities along the south east coast of Tamil Nadu. Of all benthic macro fauna inhabiting the mangrove swamps, brachyuran crabs are the most important taxa with regard to species diversity and total biomass. Crabs depend directly on mangrove for survival and are adapted to the special sediment conditions, tidal fluctuations and varying salinities found in mangroves [7]. Chakraborty *et al.* [8] reported eighteen species of brachyuran crabs belonging to 11 genera and 4 families from the intertidal belt of prentice in Sunderban mangroves. Next to Sunderban mangroves Pichavaram has the largest mangrove region. Biodiversity studies on crabs in the Pichavaram mangroves for the first time has shown that there are 46 species from the five different stations. Among the crab species *Sesarma* and *Uca* species were dominant in almost all the stations. Grapsid crabs were the most dominant species. Neritic and *Avicennia* Zones showed more number of crab species and less number of species was noted in slightly salinity zone [9]. Ravichandran *et al.* [10] reported the studies on zonation and distribution of crabs in Pichavaram mangrove swamp. Twenty three species of crabs were recorded from the mangrove. The species richness of crabs was higher in creek mangrove vegetation than in fringe mangrove types. Each zone exhibited in characteristic species diversity. In Vellar estuary the biodiversity of crabs was studied by Ravichandran *et al.* [11]. Seventeen species of crabs were recorded from the estuary of which high species composition and species diversity were noticed in third station. Further, the rich detritus and rich nutrient contents of the mangrove environment promises high population density and species composition.

Gulf of Kutch is very rich in floral and faunal diversity and comprises different types of communities and habitats like very unique coral reefs, mangroves, sandy shores, rocky shores and mudflats. Since the Gulf habitat is diverse and distinct, eight different stations (16 sample sites) were sampled. The selection of the sample site was done on the basis of habitat type which

included mangrove mudflats, open mudflats and rocky shores. A total of 19 species belonging to 8 families and 15 genera were recorded. Open mud flats were most preferred by the crabs followed by the mangrove mud flats and rocky shore Trivedi *et al.* [12]. Andaman and Nicobar Islands located in the Bay of Bengal are endowed with a rich biodiversity in the various ecosystems especially in marine environments. In spite of several available studies on the distribution of intertidal brachyuran crabs there are no conclusive models explaining population density and diversity as a function of key environmental factors which generate potentiality. Kumaralingam *et al.* [13] reported that 218 specimens of brachyuran's crabs belonging 51 species, 20 genera, 5 families under the order decapoda in the class malacostraca were recorded from Ritchieo's Archipelago. Highest similarity was observed in Havelock Island and South Button Island and moderately observed in Wilson Island and Neil Island. In the present study, station wise distributions of brachyuran crabs among the eight stations high population density was noticed in Pichavaram which has the dense mangrove and low population density was observed in Punnaikayal. Habitat structural complexity influences the density and diversity of marine organisms and contributes to zonation. In Pichavaram maximum number of crab species was observed in the Neritic zone and very less number of species in freshwater zone. The leaves of *Avicennia marina* contain rich nutrients and more palatable compared to other mangrove leaves [14-16]. Three different families are commonly found in all eight regions are Ocypodidae, Grapsidae, Portunidae.

CONCLUSION

The present investigation was made to understand that among all benthic macro fauna inhabiting the mangrove swamps, brachyuran crabs are the most important taxa. In this study Pichavaram is rich in crab diversity, number of crab species recorded was maximum at station Khan Sahib Canal (V) (35) and minimum number [14] at station Chinnavaikal (I). In Vellar higher number of crab species was observed in the mangrove region (17) and very less in the Neritic zone [5]. The crab's species which found in all the eight regions are *Sesarma brockii*, *Neopisesarma tetragonum*, *Grapsus strigosus*, *Ocypode macrocera*, *Uca annulipes*, *Uca triangularis* and *Scylla serrata*. An effective conservation strategy for mangrove needs to be supported by a better understanding of the processes operating within mangrove ecosystems. Tamil Nadu mangrove regions are valuable for research

and the maintenance of the undisturbed area should be a primary objective for the management, since it represents a more constant crab diversity and highest abundance and sustains the protection of rare species.

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