



International Journal of Fisheries and Aquatic Studies

ISSN: 2347-5129
IJFAS 2015; 2(4): 370-373
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www.fisheriesjournal.com
Received: 02-02-2015
Accepted: 15-03-2015

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Studies on habitat distribution and diversity of brachyuran crabs in Pondicherry mangrove environments, Southeast coast of India

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Abstract

Healthy mangrove forests provide a critical habitat for many species of Crabs in intertidal and estuarine areas are keys to healthy marine ecology. Mangroves are the most suitable feeding, breeding and nursery grounds for crabs and other crustaceans. In this study, the habitat distribution and diversity of Crabs in Pondicherry Mangrove environment was recorded from January 2014 - December 2014. In view of the significance of the mangrove habitat, in the present study we selected two different stations with two different habitat specifications as non-mangrove site and natural mangrove site. Totally 19 species of brachyuran crabs were recorded belonging to 13 genera and 8 families. Crabs belonging to family Portunidae (4 species) followed by Ocypodidae, Grapsidae, Calappidae (3 species), Sesarmidae, Macrobrachium (2 species), Varunidae and Gecarcinidae (1 species). The major outcome of this study maximum species diversity was found at natural mangrove site (Station-II) with 13 species, followed by least diversity was recorded at non-mangrove site (Station-I) with 9 species. The mangroves with vast network of leaves, roots and trunks offer a good niche for the brachyuran crabs.

Keywords: diversity, brachyuran crabs, habitat distribution, mangrove environment and Pondicherry

1. Introduction

Mangrove forests have declined significantly in Southeast Asia over the past four decades. The main reasons for mangrove loss and degradation have been population pressure, wood extraction, conversion to agriculture and salt production, tin mining, coastal industrialization and urbanization, and conversion to coastal aquaculture [14, 10]. Mangrove is the habitat of very rich faunal, which is comparable to tropical evergreen forest and coral reef ecosystems. Mangroves are extremely important to humans for a variety of reasons including aquaculture, agriculture, forestry, as a source of fire wood and other local use [6].

Crabs are the predominant animal groups of the mangrove ecosystem [11, 12] and are thought to play a significant ecological role in the structure and function of the mangrove [8]. They form important links between the primary detritus at the base of the food web and consumers of higher trophic levels [11, 12] and because of their large abundance and biomass (secondary production), the energy assimilated by the macrofauna plays a significant role in nutrient recycling. The burrowing activities of crabs improve soil aeration [23], allow seawater penetration and nutrient exchange [15] and alter the topography and textural properties of mangrove soils [25]. Crabs and any other animals that can modify the mangrove sediment have the potential to mediate mangrove vegetation structure and productivity.

Crustaceans are the important part of macro benthic fauna as especially the infra order brachyura. Brachyuran crabs comprise about 700 genera and 5000 to 10,000 species worldwide and due to their great abundance of biomass and community structure [13]. In Indian mangroves 138 brachyuran crabs species were reported [7]. Realizing the importance, a few numbers of works pertaining to habitat distribution and diversity of brachyuran crabs in mangroves of east and west coasts of India has been carried out [5, 2, 17, 1, 24, 20].

In view of this principal goal of the present investigation is too studied in distribution and diversity of brachyuran crabs in Pondicherry mangroves.

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2. Materials and Methods

2.1 Study area

Pondicherry mangroves, the study area lies within the boundaries of latitudes 11°46'03" to 11°53'40" North and longitudes 79°49'45" to 79°48'00" East. Mangrove exists as fringing vegetation over 168 ha distributed along the sides of Ariyankuppam estuary, it is seasonally bar-built and semi diurnal type that flows eastwards emptying in to the Bay of

Bengal at Veerappattinam on southeast coast of India, carrying wastes from adjacent agriculture lands and industries in addition to domestic municipal and distillery effluents [21]. Pondicherry mangroves are a productive region of east coast represents rich mangrove diversity and harbors a plethora of organisms. The present study was carried out in two different sites namely 1. Non - mangrove site 2. Mangrove site.

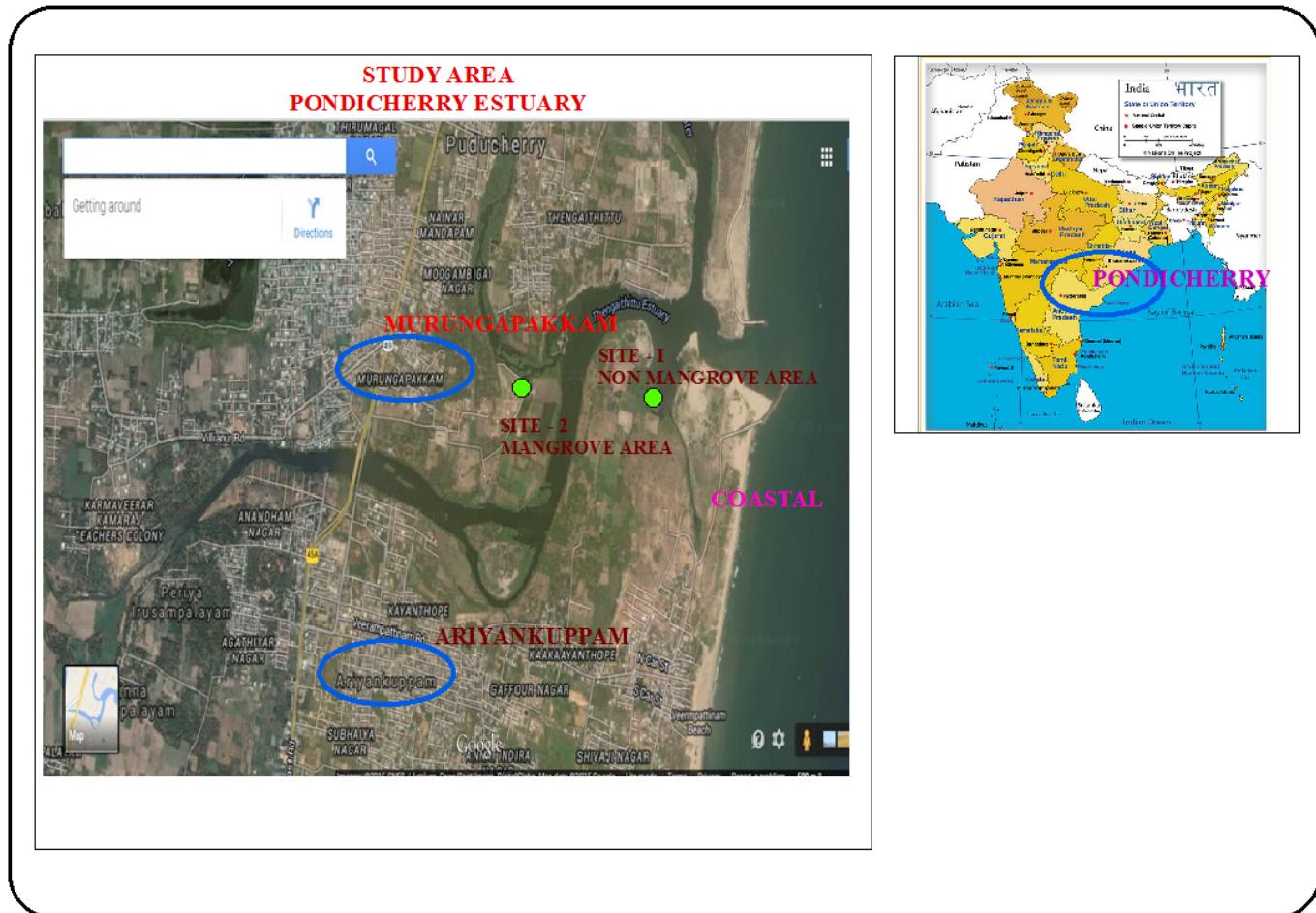


Fig 1: Showing the study sites in Pondicherry Mangrove environments

Natural mangrove habitat is observed at Murungapakkam area *Avicennia marina* is the dominant mangrove species observed in this region. The local people residing near the mangrove site use this region for different purposes like fisheries, mangrove seed collection, fodder for live stock, mudskipper and crab collection etc.

The two study sites were searched randomly for crab collection. Hand picking method was adopted for the collection of crab while for burrowing crabs, diluted formalin was poured in the burrow and when the crab comes out of burrow it was collected. All the collected specimens were preserved in 10% formalin for further identification purpose. The preserved specimens were identified up to the species level using different identification keys available in the published literature [3, 22, 26, 13].

3. Results

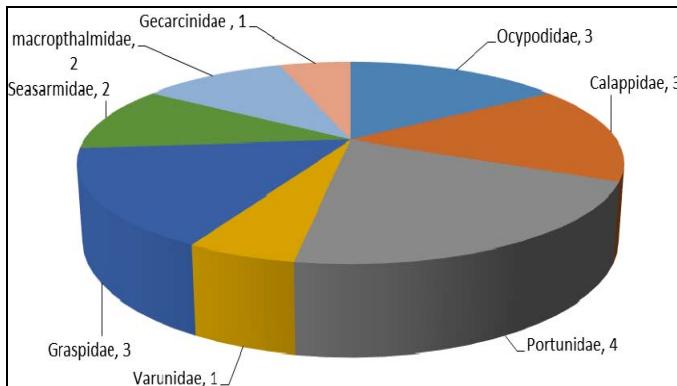
In the present study totally 19 species of brachyuran crabs belonging to 13 genera and 8 families were recorded. Crabs belonging to family Portunidae (4 species) followed by Ocypodidae, Grapsidae, Calappidae (3 species), Sesarmidae, Macrophthalmus (2 species), Varunidae and Gecarcinidae (1

species). In this study 08 species were recorded in the both study sites (*U. triangularis*, *U. annulipes*, *O. ceratophthalma*, *S. serrata*, *S. tranquebarica*, *M. messor*, *M. dilates* and *C. carnifex*) which make them the common species in this study areas. Family wise species distribution in mangrove site, maximum numbers of crabs were reported from families like ocypodidae (3 species), Calappidae (1 species), Portunidae (3 species), Varunidae (1 species), Grapsidae (3 species), Sesarmidae (2 species), Macrophthalmus (2 species) and Gecarcinidae (1 species) which are typically found in mangrove habitat. Totally 11 different species 8 genera belonging to 7 families were recorded from non mangrove site near neritic zone of Ariyankuppam estuary. In this study Moon crabs *Calappa clypeata* first time reported in our mangrove study sites.

Among the mangrove zone seasarmid crab distributions are dominant. The major outcome of the study was maximum species diversity was found at natural mangrove site with 16 species, followed by least diversity was recorded at non-mangrove site with 11 species. seasarmid crabs is the dominant representative among all and next to that *Uca* species takes place.

Table 1: List of Brachyuran crabs recorded in Pondicherry Mangrove

Species	Non Mangrove site	Mangrove site
Family: Ocypodidae		
<i>Uca triangularis</i>	+	+
<i>Uca annulipes</i>	+	+
<i>Ocypode ceratophthalma</i>	+	+
Family: Calappidae		
<i>Calappa lophos</i>	+	-
<i>Calappa bilineata</i>	+	-
<i>Matuta planipes</i>	-	+
Family: Portunidae		
<i>Scylla serrata</i>	+	+
<i>Scylla tranquebarica</i>	+	+
<i>Portunus pelagicus</i>	-	+
Family: Varunidae		
<i>Metaplas indica</i>	-	+
<i>Charybdis feriatus</i>	+	-
Family: Grapsidae		
<i>Grapsus intermedius</i>	-	+
<i>Grapsus albolineatus</i>	-	+
<i>Metapograpsus messor</i>	+	+
Family: Sesarmidae		
<i>Sesarma plicatum</i>	-	+
<i>Sesarma brockii</i>	-	+
Family: Macrophthalmus		
<i>Macrophthalmus dilates</i>	+	+
<i>Macrophthalmus depressus</i>	-	+
Family: Gecarcinidae		
<i>Cardisoma carnifex</i>	+	+
Total	11	16

**Fig 2:** Family wise distribution of Crabs in Pondicherry Mangroves

4. Discussion

This study gave a reference state of the species composition and zonation of the mangrove communities along the Pondicherry coast. Of all the benthic macro fauna inhabiting the mangrove swamps, brachyuran crabs are the most important taxa with regard to the species diversity and total biomass. Crabs depend on directly on mangroves for survival and are adapted to the special sediment condition, tidal fluctuations and varying salinities found in mangroves^[4]. In the previous study 22 species (1 callappid, 1 gecarcinid, 9 portunid, 7 ocypodid, and 4 grapsids) of brachyuran crabs were recorded from same study area which has an area of 168 ha only (Satheeshkumar, 2011). 13 species of brachyuran crab (4 species of grapsids and 9 species of ocypodids) in the arid zone mangroves of Gulf Kachchh recorded^[19]. Biodiversity studies on crabs in Pichavaram mangroves for the first time has shown that there are 46 species from the five different stations^[18]. 38 species of brachyuran crabs in both natural Pichavaram and artificially developed mangroves of Vellar

estuary which has an area of 1200 ha (18 species of grapsids and 7 species of ocypodids at Pichavaram mangroves; while 8 species of grapsids and 3 species of ocypodids at Vellar mangroves) reported by^[1]. Chakraborty *et al.*, (1994) reported 18 species of brachyuran crabs belonging to 11 genera 4 families from the intertidal belt of prentice in Sundarban mangroves.

Habitat distribution and diversity of crabs were based on the substratum, water level and floral distribution. Pondicherry mangroves were found to be sandy along its vertical, with transect, with patches of mangrove vegetation. Based on the distribution of plants Pondicherry mangroves was divided into *Rhizophora* zone and non mangrove zones. The crabs are distributed in different vegetative zones. Maximum number of crabs was distributed in *Avicennia* zone. *Sesarma plicatum* and *Sesarma brockii* were present along the high water of neap tides and found to be sheltered amidst *Avicennia marina*. This is attributed due to the presence of rich nutrients in the *Avicennia* leaves when compared to other mangrove leaves^[16]. 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 Pondicherry is rich in crab biodiversity, maximum number of crab species recorded from station-II mangrove site and minimum number of crabs were recorded from neritic zone in non mangrove site at station-I.

An effective conservation strategy for mangrove needs to be supported by a better understanding of the processes operating within mangrove ecosystems. Pondicherry 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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