

A checklist of malacofauna from Pondicherry mangroves

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Abstract. The Pondicherry mangroves is located (Long: 11° 46'03" to 11° 53' 40" N; Lat: 79° 49'45" to 79° 48' 00" E) on the Bay of Bengal (Coramendal Coast) seaboard. A survey has been made during January 2009 to know the pattern of molluscan fauna in the mangroves located along the Ariankuppam estuary. During the present survey 14 species of molluscs were recorded. Nine species of gastropods namely *Cerithidea obtusa*, *C. cingulata*, *Cassidula nucleus*, *Melampus ceylonicus*, *Pythia plicata*, *Littoraria scabra*, *Telescopium telescopium*, *Assimineia nitida*, *Nerita crepidularia* and five species of bivalves - *Crassostrea madrasensis*, *Saccostrea cucullata*, *Perna viridis*, *Modiolus metcalfei*, *Meretrix meretrix* - were found.

Keywords: Mangrove, Malacofauna, mollusc, gastropods, bivalves, Pondicherry.

Rezumat. Mangrova Pondicherry este aşezată lângă Golful Bengal (Long: 11° 46'03" - 11° 53' 40" N; Lat: 79° 49'45" - 79° 48' 00" E). S-a realizat un studiu în luna ianuarie 2009 în vederea identificării compoziției faunei de moluște din mangrovele estuarului Ariankuppam. În prezentul studiu au fost relatate 14 specii de moluște. Nouă specii de gastropode, mai exact, *Cerithidea obtusa*, *C. cingulata*, *Cassidula nucleus*, *Melampus ceylonicus*, *Pythia plicata*, *Littoraria scabra*, *Telescopium telescopium*, *Assimineia nitida*, *Nerita crepidularia* și cinci specii de bivalve - *Crassostrea madrasensis*, *Saccostrea cucullata*, *Perna viridis*, *Modiolus metcalfei*, *Meretrix meretrix* - au fost identificate.

Cuvinte cheie: mangrove, malacofaună, moluște, gastropode, bivalve, Pondicherry.

Introduction. Mangroves are woody plants that exist at the interface between land and sea in tropical and subtropical latitudes. These plants grow at the intertidal zones of sheltered shores, estuaries, tidal creeks, backwaters, lagoons, marshes and mudflats (Kathiresan & Bingham 2001). The word 'mangroves' refers to individual plant species and the word 'mangal' refers to the forest community (Macnae 1968). The mangrove forests are sometimes called "tidal forests", "coastal lands", or "oceanic rain forests". Mangroves are of great ecological and economic significance and are one among the most productive ecosystems where the organic production is about 70 times more than that of reported for the tropical oceanic waters and six times more than that of the mean reported for marine flagellate blooms in neritic waters.

Mangroves are of great potential for fisheries. They serve as nursery, feeding and breeding grounds for many species of fishes, upon which many coastal communities depend for their livelihood (Odum & Heald 1972). The mangroves are of high economic value. The goods of mangroves include forestry (fodder, firewood, charcoal, timber, honey) and fishery products (fish, prawn, crab, molluscs, others).

Molluscs are second only to Arthropoda in numerical abundance. The number of species identified under Phylum Mollusca vary between 80,000 to 100,000. Molluscs have colonized all possible habitats from deep sea to high mountains. They are more abundant in the littoral zones of tropical seas. Gastropods and Bivalves constitute 98% of the total population of mollusca and they inhabit land, freshwater and marine environments. The other classes of Mollusca are exclusively marine. Many descriptive and general studies were made on the ecology and faunal distribution of mangrove swamps of Indo-West Pacific region (Macnae 1968), Malaysia (Brown 1971), West Indies (Coomans 1969), in the province of Pavia, Northern Italy and North Western Australian mangrove swamps (Wells 1983).

Description of the Study Area. The mangroves of Pondicherry (Long: 11° 46'03" to 11° 53' 40" N; Lat: 79° 49'45" to 79° 48' 00"E) are situated on the Bay of Bengal (Coramandal Coast) seaboard and encircled by three villages – Ariankuppam, Murungapakkam, Veerampattinam and two islets – Thengaithittu and Ashramthittu. The mangroves exist as fringing vegetation over 168 ha distributed along the sides of Ariankuppam estuary, which opens into the Bay of Bengal on the Coromandal coast (Department of Survey & Land Records, Government of Puducherry). The waterway is a tributary of river Gingee. The tidal amplitude averages 20-70 cm and differs according to the lunar period, reaching its maximum during northeast monsoon. The climate is characterized by 65-75% relative humidity and 28-30°C temperatures. The annual rainfall is 1200 mm (Khan et al 2008).

Method of Collection. For the quantitative analysis, the mangrove molluscs were collected by hand picking and the fouler organisms like mussels and oysters were collected by scrapping in transect of known area using a quadrat of 0.5m². Further the infauna were collected by digging the substratum as described by (Alfred 1997). The arboreal forms were collected from the stems, roots and other parts of the mangrove trees vertically at every 25 cm height by hand picking (Sasekumar 1974).

Molluscs in Mangrove Ecosystems. The studies on the faunal assemblage and ecology of the molluscan fauna of the extensive mangrove forests situated at the mouths of the river on the east coast of India are scanty. In general, nearly 100 species of molluscs were reported from the mangrove areas of Indian subcontinent (Dey 2006). Ganapathi & Rao (1959) published a report on the incidence of marine wood borers in the mangroves of the Godavari estuary. Radhakrishnan & Janakiram (1975) studied the mangrove molluscs of the Godavari and Krishna estuaries. Subba Rao & Mookherjee (1975) reported some molluscan forms associated with mangrove trees from Mahanadi estuary. Murthy & Balaparameswara Rao (1977) studied the ecology of some molluscs of the mangrove swamps of Machilipatnam. Subba Rao et al (1983) made an ecological survey of the malacofauna of Muriganga estuary, Sunderbans. A malacofaunal survey was made by Kasinathan & Shanmugam (1985) in the Pichavaram mangroves. Khan et al (2008) reported thirteen species of molluscs from Pondicherry mangroves.

Gastropods in Mangrove Ecosystems. The gastropod molluscs, represented by snails, whelks, cowries, limpets, sea hares and their allies, are among the commonest epifaunal species that exist in the mangrove ecosystems. The gastropods are suitably adapted to various macrohabitats of the mangrove ecosystems. Marine species are found in the bottoms as well as in water bodies, the pulmonate snail and several other groups have conquered mangrove lands with the elimination of the gills and conversion of the mantle cavity into lungs. The mangroves provide ideal conditions for higher productivity of gastropods which in turn, serve as food, particularly the veliger larvae for numerous other animals. Because of their predatory nature, the gastropods occupy a central role in maintaining the functioning and productivity of mangroves through "cleaning" root

systems from the encrusting fauna like barnacles. The snails also serve as intermediate host for many trematode parasites. Based on the structure of the molluscan assemblages, the pollution damage in mangrove forests can be assessed.

Thus gastropods have a significant ecological role to play in the mangrove ecosystems and very little is known on the gastropod biodiversity of mangroves. Hence it is essential to document the biodiversity of threatened ecosystems.

Bivalves in Mangrove Ecosystems. Mangroves are highly zoned, typically occupying the upper half of the eulittoral and dominating the supra littoral fringe. They grow best in the soft mud and these two aspects alone partially explain the lack of the data on mangrove bivalves; the bivalve are in general best adapted to lower tidal levels and to firmer deposits. *Lasaea rubra*, for example, is one of the few bivalves capable of colonizing the high inter tidal almost world wide (Morton 1960), although, as well as seen, the *Spartina* marsh associate *Geukensia demissa* has similar adaptations to a high zoned life (Lent 1969), as do deposits by a filter feeder enhance the very real problem of the gill clogging and sediment removal.

Thus, little is known of mangrove bivalves, especially those few species which appear to be endemic components of the mangrove forests. As will be seen, large number of bivalves have been recorded from the seaward fringe of the mangroves, and their status as true mangrove associates is dependable apart from the obvious difficulties of working in a mangrove forest, numerous authors (Warner 1969; Sasekumar 1974; Murty & Balaparameswara Rao 1977) ignored the bivalves in favor of the more active and therefore more conspicuous mangrove associates (the gastropod) (Robertson 1960; Brown 1971; Vermeiji 1974).

Coomans (1969) has drawn attention to the inherent interest in mangrove molluscs and Bouchet (1977) has provided data on West Africa mangrove molluscs, drawing on the data by Binder (1968) on Ivory coast mangrove and by Coomans (1969) on the Caribbean fauna to compare the molluscan fauna of various mangrove regions. However, even these authors emphasize the mangrove gastropods, although there are mangrove bivalves of some interest and occasionally, such as the mangrove oysters (especially *Crassostrea rhizophorae* in the Caribbean) of much wider economic potential.

Depending upon the availability of food these species are found on mud banks, mud flats, mangrove forest, sandy muddy area and swamps. Maximum number of species was recorded from mud banks and mud flats. The species common in this area were *A. nitida*, *T. telescopium*, *C. cingulata* and *M. pulchella*, *L. scabra*, *P. plicata*, *C. nucleus* were found occurring in the muddy substratum as well as on the stem and root system of mangroves along the various tidal marks. *N. crepidularia* and *C. obtusa* were attached on to the mangrove vegetation up to 1.5 meter height. Generally, oysters and mussels occur in the marine zones of the estuaries and the stilt roots of the mangrove *Rhizophora*. They were found attached to wooden jetties, bricks, dykes, mangrove stems, woodern pillars and even to the shells where an otherwise suitable substratum not available. They were also commonly found in all substratum of the study area.

Systematic List of Malacofauna Recorded in Pondicherry Mangroves

Phylum: Mollusca
Class: Gastropoda
Sub Class: Prosobranchia
Order: Archaeogastropoda
Family: Neritidae
Genus: *Nerita* (*Dostia*)
Species: *N. crepidularia* Lamarck
Order: Mesogastropoda
Family: Littorinidae
Genus: *Littoraria*

Species: *Littoraria (Littorinopsis) scabra* (Linnaeus, 1758)
 Family: Assimnidae
 Genus: *Assimineia*
 Species: *A. nitida* Nevill, 1880
 Family: Potamididae
 Genus: *Cerithidea*
 Telescopium
 Species: *C. cingulata* (Gmelin, 1791)
 C. obtusa (Lamarck, 1822)
 T. telescopium (Linnaeus, 1758)
 Subclass: Pulmonata
 Order: Bassomatophora
 Family : Ellobium
 Genus: *Cassidula*
 Species: *C. nucleus* (Gmelin, 1791)
 Genus: *Melampus*
 Species: *M. ceylonicus* Petit
 Genus: *Pythia*
 Species: *P. plicata* Gray
 Class: Pelecypoda (bivalvia)
 Order: Eulamellibranchiata
 Family: Veneridae
 Genus: *Meretrix*
 Species: *M. meretrix* (Linnaeus, 1758)
 Order: Mytiloidea
 Family: Mytilidae
 Genus: *Modiolus*
 Species: *M. metcalfei* (Hanley)
 Genus: *Perna*
 Species: *P. viridis* (Linne)
 Family: Ostreidae
 Genus: *Crassostrea*
 Species: *C. madrasensis* Preston
 Genus : *Saccostrea*
 Species: *S. cucculata* (Born, 1778)

Conclusion. During the present survey in Ariankuppam estuary 14 species of molluscs were recorded. The molluscs are found on mud banks, mud flats, mangrove forest, sandy muddy area and swamps. Maximum number of species was recorded from mud banks and mud flats.

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