

Floristic and macro faunal diversity of Pondicherry mangroves, South India

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Taxonomic diversity and significance of mangroves and mangrove associates, as an ecological group, is well known (Alongi 2002; Azariah & Govindasamy 1998; Blasco & Aizpuru 2002). Interacting with aquatic, inshore, upstream and terrestrial ecosystems, they support a diverse marine, freshwater and terrestrial flora and fauna (Macintosh & Ashton 2002) providing habitats for the distribution of diverse animals (Hogarth 2001). Mangroves provide numerous commercial products to local communities (Bandaranayake 2002). This study makes an inventory of the existing flora and macro fauna of Pondicherry mangroves.

Geographically, Pondicherry mangrove lie at latitude 11° 46'03" to 11° 53'40" North and longitude 79° 49'45" to 79°48'00" East and is 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°C-30°C

temperatures. The annual rainfall is 1200 mm.

In the present study, the entire inter tidal inundated area was demarcated and all the vegetation falling under the study area was sampled at flowering and/or fruit setting time. Sampling was done from January 2002 to December 2003. Taxonomy of mangrove vegetation, mangrove associates and fauna is based on identification manual (Kathiresan 2000). Through Mapinfo estimation total mangrove and mangrove associated vegetation area is identified. Harbour development activities and continuous dredging for easy transport of fishing and unloading vessels are the observed anthropogenic disturbances.

True mangroves

Seven true mangrove floral (Class: Dicotyledonae) species belonging to 3 families were recorded (Table 1). *Avicennia marina*, first reported by Blasco (1975) is the extensively growing true mangrove distributed throughout the inundated area. It forms very dense stand to the western and northern side of Thengaithittu, near the bridge and also at the small creek. Another prominent cover of *A.marina* is on the eastern part of Ashram islet at the creek and on the western part of Murungapakkam. Densely growing

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Table 1. True mangrove species of Pondicherry mangroves.

Order	Family	Species	Authority index
Labiales	Avicenniaceae	<i>Avicennia marina</i>	Forsk. Vierh
Myrtales	Rhizophoraceae	<i>Bruguiera cylindrica</i>	(L.) Bl
Myrtales	Rhizophoraceae	<i>Bruguiera gymnorrhiza</i>	(L.) Lamk
Myrtales	Rhizophoraceae	<i>Rhizophora apiculata</i>	Blume
Myrtales	Rhizophoraceae	<i>Rhizophora mucronata</i>	Poir
Personales	Acanthaceae	<i>Acanthus ebracteatus</i>	Vahl.
Personales	Acanthaceae	<i>Acanthus illicifolius</i>	L.

Bruguiera cylindrica spreads from the western end of Murungapakkam up to the eastern end of Ashram islet. However, *B. gymnorrhiza* is restricted as patches at the creek near the Ashram islet. *Acanthus ebracteatus* and *Acanthus illicifolius* are distributed as fragments in Murungapakkam, Ariankuppam and Thengaithittu. There are four patches of *Rhizophora mucronata* on the southern part of Thengaithittu and four patches of *R. mucronata* and *R. apiculata* near the mouth of the river.

Mangrove associates

Sixteen mangrove associate floral species belonging to 12 families (Table 2) are recorded with *Clerodendrum inerme* found in all the sites. *Calophyllum inophyllum*, *Pongamia pinnata*, *Thespesia populnea* and *Aleuropus logopoides* are present in all the inundated areas. *A. logopoides* is the only Monocotyledon under the class Graminales and all others belong to the class Dicotyledoneae. *Sesuvium portulacastrum*, *Suaeda*

maritima and *Suaeda monoica* envelop the eastern end of Thengaithittu and also the southern end of Ashram islet to a large extent.

Macro fauna

Pisces

Among the macro fauna, fishes (Class: Osteichthyes) are plentiful with 39 species belonging to 24 families under 7 orders. 77% of these fishes belong to the order Perciformes. The most abundant fish (Saravanan 2004) species are *Chanos chanos*, *Arius jella*, *Atule mate*, *Oreochromis mossambica*, *Terapon jarbua* and *Gerrus filamentosus*. Fishes such as mullet, milk fish and tilapia are caught at high reaches towards north of Murungapakkam and Thengaithittu. *G. filamentosus*, *Kathala axilaris*, *Caranx* sp. occur mostly near the mouth. Mangrove specific fishes- *Lutjanus argentimaculatus*, *Siganus canaliculatus*, *S. javus* (Kathiresan 2000) are caught near the areas where branches of *A. marina*

Table 2. Mangrove associate species of Pondicherry mangroves.

Order	Family	Species	Authority index
Graminales	Poaceae	<i>Aleuropus lagopoides</i>	(L.) Trin.
Apocynales	Asclepiadaceae	<i>Sarcolobus carinatus</i>	Wall.
Apocynales	Asclepiadaceae	<i>Wattakaka volbulis</i>	Stapf.
Caryophyllales	Aizoaceae	<i>Sesuvium portulacastrum</i>	L.
Chenopodiales	Chenopodiaceae	<i>Suaeda maritima</i>	(L.) dumort.
Chenopodiales	Chenopodiaceae	<i>Suaeda monoica</i>	Forsk. Ex. Gmel.
Chenopodiales	Chenopodiaceae	<i>Suaeda nudiflora</i>	(Willd.) Moq.
Leguminales	Caesalpinaceae	<i>Caesalpinia bondoc</i>	(L.) Roxb.
Leguminales	Fabaceae	<i>Derris scandens</i>	Benth.
Leguminales	Fabaceae	<i>Derris trifoliata</i>	Lour.
Leguminales	Leguminosae	<i>Pongamia pinnata</i>	(L.) Pierre.
Malvales	Malvaceae	<i>Thespesia populnea</i>	Solander ex Correa.
Pandanales	Pandanaceae	<i>Pandanus tectorius</i>	Kuntze
Solanales	Convolvulaceae	<i>Ipomoea pes-caprae</i>	(L.) Sweet.
Theales	Clusiaceae	<i>Calophyllum inophyllum</i>	L.
Verbanales	Verbenaceae	<i>Clerodendrum inerme</i>	Gaertn.

are submerged. *Ambasis commersoni*, *A. mate*, *C. chanos*, *Etroplus suratensis*, *Johnius carutta*, *Kathala axilaris*, *Lutjanus russelli*, *Monodactylus argenteus*, *Nibea maculata* and *Sillago sihama* are commercially important and seasonal.

Crustaceans

Among the 14 species of Crustaceans, 5 are penaeid prawns and 9 are brachyuran crabs. *Penaeus monodon* the target species is caught largely on the onset of monsoon. There is seasonal fluctuation in the population density of crabs and *Uca annulipes*, *Sesarma brockii* are largely caught during monsoon. *Scylla serrata* are mostly caught in shallow waters. Both the *Portunus* sps. are observed mostly near the mouth region.

Molluscs

Nine species of Gastropods and 4 species of bivalves are found. *Crassostrea madrasensis* forms large beds in Veerampattinam and Thengaithittu but occurs in patches at Ariankuppam. *Meretrix casta* and *Perna viridis* are mostly available at Veerampattinam. *P. viridis* also occurs in the crevices of the rocks, heaped at the mouth region and to the east of Ashram islet, where it is found attached mostly to *C. madrasensis*. *Neritina violacea* is found during monsoon at the mud and sand flats near the mouth of the estuary.

Aves

Avifauna though could be spotted in all seasons, their number is limited to 14 species belonging to 10 families under 4 orders. Sand pipers are very common, especially *Tringa stagnatilis*. *Anastomus oscitans*, *Phalacrocorax niger* and *Himantopus himantopus*, *Nycticorax nycticorax* and *Podiceps ruficollis* are spotted occasionally. Birds of the family Ardeidae are seen to roost on the branches of *Avicennia* and *Rhizophora* sps. These birds get disturbed by either the fishermen fishing near to bird flocking area or by the mollusc collectors.

Present ecological status of Pondicherry mangroves is compared with nearby mangrove forests at Pichavaram, Muthupet, Point Calimer and Ennore creek. In Pichavaram mangroves, 60 km from the present study site, Kathiresan (2000) reported 13 species of true mangrove vegetation and 73 species of associate vegetation. Balu *et al.* (1998) reported 8 true mangroves, 10 mangrove

associates from Muthupet and 9 true mangroves, 13 mangrove associates from Point Calimere which are about 190 km and 175 km south of Pondicherry mangroves, respectively. Ennore creek, 155 km north to this study site has *A. marina* as the predominant species. Kathiresan & Rajendiran (2002) reported 102 and 86 species of fin fishes from Pichavaram mangroves and Vellar estuary, respectively. They recorded 72 fin fishes at Ariankuppam estuary of Pondicherry region, while in the present study only 39 species were found. There is an observed loss of 46% of fish species when compared to the previous report (Kathiresan & Rajendiran 2002). Most of the Pondicherry mangrove dwelling fishes being visitors from nearby neritic waters, their frequency in this mangrove gets disturbed or their entry into the mangrove might experience frequent obstruction due to frequent harbour and dredging activities especially at Murungapakkam and Ariankuppam locations and are the major cause for the loss in both diversity and quantity of fishes. From the reported eight penaeid prawn species as abundant in Pichavaram mangroves (Kathiresan & Bingham 2001) 62.5% are found in Pondicherry mangroves. However, in spite of the dredging and other harbour activities undertaken (Saravanan 2004), this emerging ecosystem with its integral capacity to support and sustain a number of organisms offers suitable niches for the diversity of fauna and hence its development and management is essential to support biodiversity and bioresources.

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