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## Short Communication

# Diversity and Distribution of Hard Fouling Phylum Arthropoda and Mollusks in Various Substratums at The South-East Coast of Cuddalore, Tamilnadu, India

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**Abstract:** The study aimed to assess the diversity and distribution of marine macro fouling arthropoda and mollusks from the coastal and estuarine regions in the Coromandel Coast of Cuddalore, Tamil Nadu, India. The marine macro fouling species were assessed by a quadrate method in the natural and artificial substratum of seven locations. Around 5 species of macro fouling arthropoda and mollusks were only recorded from seven sites. All seven sites primarily dominated by *Striatobalanus amaryllis* is by group or alone. *The bivalve species of Pernaviridis* was witnessed seldom during the study period. According to the indices of Shannon weaver, Pielou's and Simpson, Periyapattu (site 3) intertidal zone had registered more than the other study regions. According to the indexes of Shannon weaver, Pielou's, and Simpson, Periyapattu (site 3) intertidal zone had registered more and low in MGR Thittu. *The present study concludes that the marine macro fouling frequency is locations-specific and required more exhaustive study to understand its ecological niche.*

**Key words:** Bivalves, Diversity index, Hard fouler, Lophotrochozoa, Mangroves

## Introduction

The accumulation of marine biotics on any immersed natural and artificial structures present in the marine environment is called marine biofouling (Pradhan *et al*., 2019). Marine biofouling was occurring in water submerged structures in three phases those are molding, micro-fouling, and macro-fouling (Abarzua and Jakubowski., 1995; Pradhan *et al*., 2019). The marine macro fouling organisms of macroalgae spores, barnacle larvae, bryozoans, mollusks, polychaete, tunicates, coelenterates, mussels, tubeworms, and seaweed are the climax stage in marine biofouling (Abarzua and Jakubowski., 1995; Olsen *et al*., 2009; Li *et al*., 2010; Lejars *et al*., 2012; Pradhan *et al*., 2019). The fouling organisms usually damage the natural and artificial structures in the liquid body, and it commences to increase economic loss (Pradhan *et al*., 2019). The diversity and distribution of macro fouler are scarcely recorded in the world, and there is no detailed diversity study from the Cuddalore coast. Hence, the present study is to intended to know the different climax organisms of fouling and to know the diversity and distribution of arthropoda and mollusks which accountable for the fouling phenomenon in the Cuddalore region.

## Materials and methods

### Study area

Present survey was carried out to record the marine macro biofouler diversity and distribution from the southeast coast of Cuddalore, Tamilnadu, India. Along the Coromandel coast

of Cuddalore, seven intertidal and estuary sites were chosen for this study. They are 1. Silver beach [11°44'16.31" N and 79°47'5.59" E] 2. Pachachyankuppam [11°41'32.59" N and 79°46'0.09" E], 3. Periyapattu [11°33'39.93" N and 79°45'31.20" E], 4.Vellar estuary [11°29'26.33" N and 79°45'59.19" E], 5. MudasalOdai [11°29'6.86"N and 79°46'28.57"E], 6. MGR thittu fish landing center [11°28'5.82"N and 79°46'48.34"E] and 7. MGR thittu near statue [11°27'53.39"N and 79°46'59.71"E] (Fig 2). Among the seven sites, Periyapattu is an intertidal zone, and others are estuary. Most of the study sites are fish landing centers with a large group of fishing communities (tndisctirc.in.ac).

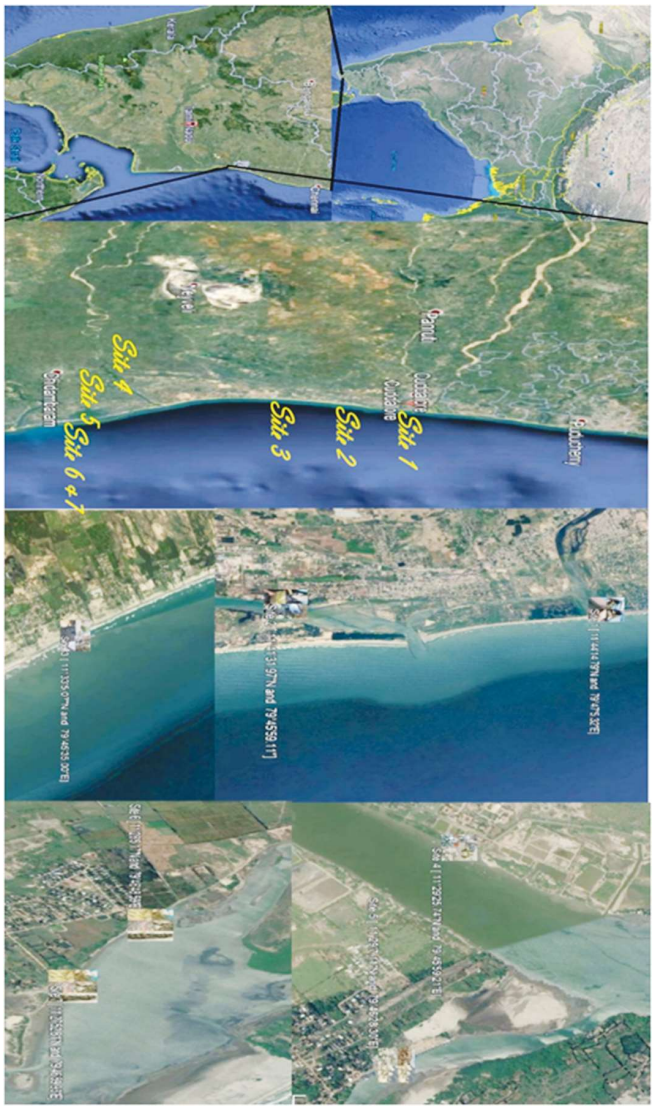



**Fig. 2.** The picture shows that the study area physical map and it is latitude and longitude.

## Assessment of Fouler

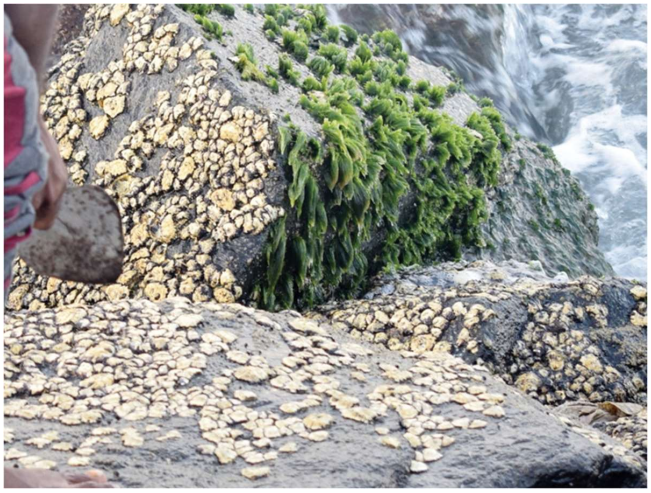
Macro marine biofouler were collected and assessed by the quadrate sampling method in 10 $cm^2$ from artificial and natural structures and substratum (Pati *et al*., 2011). The attachments were examined and evaluated from the surface of the artificial and natural substratum. The recorded fouling organisms were identified using the World Register of Marine Species (WoRMS, 2019). Raunkiaer's index; Shannon weaver index; Pielou's evenness index; Simpson index of statistical methods are applied to assess the diversity indices of the marine macro bio-fouler (Pati *et al*., 2011).

## Results

A total of five distinct marine macro fouling species belongs to 3 families were recorded during the study period in the study area. The bivalves (A - Phylum: Arthropoda) were obtained 19 % on large size fishing boat on site 2, and 0.9 % in boat 2 of site 1 was occupied very low. The bivalves (B - Phylum: Arthropoda) were occupied 42 % on the iron pipe of site 3 was high, and 18 % on the Palm wood at site 3 is low. *Striatobalanus amaryllis (C*- Phylum: *Mollusks)* occurred 13 % in the boat from site 5 is high, and 0.2 % on the rope of site 2 was occupied too low. *Perna indica (E*- Phylum*: Mollusks) was* owned, 46 % under wooden varieties from site 3 and 1 % in fiber boat from site 6. *Perna viridis (D*- Phylum*: Mollusks)* was owned 42 % in coconut species from Site 3, and each 10 % on cement weight from site 2. According to Raunkiaer's frequency law (Frequency class are shown - frequency of organisms recorded from the artificial and natural structures), 31 falls under E class, followed by 6 under C class; 5 under D class and 2 under B class. There were 8 falls under very abundant under followed by 13 in abundant, 12 are frequent, 7 in rare, and 4 occasionally fall in abundant classes. Shannon weaver index occupied very high in palm species 1.04, and 0.174 in boat 2 of site 1. According to the Pielou's evenness index of 0.750 occupied very high in coconut species of site 3 and 0.126 in boat 2 of site 1. Simpson index of 2.449 occupied very high in coconut species of site 3, and each 1 in the boat of site 5, plastic pipe of sites 6 and 7.

**Fig. 1.** The picture shows that the recorded foulers from the study areas in various natural and artificial structures at landing sites (Phylum - Arthropoda and Mollusks) *Bivalves1 or Unidentified 1 (A); Bivalves 2 or Unidentified 2 (B); Striatobalanus amaryllis (C); Perna viridis (D); Perna indica (E).*

*Bivalves1 or Unidentified* 1 (A) attached in rope at artificial material.



*Bivalves 2 or Unidentified* 1 (B) attached in rock at artificial material

*Perna viridis* (D) attached in fishing material

*Striatobalanus amaryllis* (C) attached in artificial PVC pipe placed in landing centre

## Discussions

Similarly, macro fouling studies were carried many places in the world, follows coral reef system from the Gulf of Mexico; sponges studies from the entire south-east coast of Tamil Nadu;

**Table 1.** The table shows the various indexes (Shannon weaver; Simpson Index and Pielou's evenness index) used to assess the diversity of recorded organisms.

| Name of the places | | H | E/J | D |
|---|---|---|---|---|
| Silver Beach | Site 1 - Boat 1 | 0.23 | 0.166 | 1.13 |
| Silver Beach | Site 1 - Boat 2 | 0.174 | 0.126 | 1.073 |
| Pachayankuppam | Site 2 - Rope | 0.59 | 0.426 | 1.67 |
| Pachayankuppam | Site 2 - Cement | 0.54 | 0.389 | 1.397 |
| Pachayankuppam | Site 2 - Cas.equ | 0.215 | 0.155 | 1.118 |
| Pachayankuppam | Site 2 - Launch | 0.686 | 0.495 | 1.975 |
| Periyapattu | Site 3 - Palm Tree | 1.04 | 0.75 | 2.449 |
| Periyapattu | Site 3 - Iron pipe | 1.007 | 0.726 | 2.293 |
| Periyapattu | Site 3 - Rock | 0.693 | 0.499 | 1.999 |
| MGR thittu fish landing centre | Site 6 - Boat | 0 | 0 | 1 |
| MGR thittu near statue | Site 7- Plastic barrier | 0.68 | 0.491 | 1.952 |
| MGR thittu near statue | Site 7- Plastic pipe | 0 | 0 | 1 |
| MGR thittu near statue | Site 7- Tyres | 0.655 | 0.472 | 1.861 |
| MGR thittu near statue | Site 7- fiber boat | 0.394 | 0.284 | 1.239 |
| Mudasal odai | Site 5 - Concrete Wall | 0.417 | 0.3 | 1.334 |
| Mudasal odai | Site 5 - Tyre | 0.467 | 0.336 | 1.411 |
| Mudasal odai | Site 5 - Boat | 0 | 0 | 1 |
| Vellar estuary | Site 4 - Mangrove plant | 0.648 | 0.467 | 1.839 |
| Vellar estuary | Site 4 - Rope | 0.564 | 0.407 | 1.605 |
| Vellar estuary | Site 4 - Concrete structure | 0.566 | 0.408 | 1.609 |

distribution of macro and micro fouler from Cuddalore; wood borers from Visakhapatnam; a succession of macro fouler from Kalpakam; rocky shore fouler from Port Blair, Andaman, and Nicobar Island; Mollusks study from Pulicat lake and settlement process from the Arabian sea (Winfield *et al*., 2007; Pati *et al*., 2011; Patro., 2012; Kripa *et al*., 2012; Mohan *et al*., 2013; Pati *et al*., 2013; Satpathy *et al*., 2014; Deepa *et al*., 2015; Pati *et al*., 2015; Nandhagopal *et al*., 2019; Prasanth and Sureshkumar, 2020). According to similar studies, there are 28 species belonging to 14 families of bio-foulers from Cuddalore; 33 species of Crustacean fouler belong to 27 families, 6 orders from the Gulf of Mexico; 18 species of soft foulers belongs to 13 genera, 10 families in artificial structures from the southeast coast of Tamil Nadu; 29 species of wood borer from Visakhapatnam; 51 species of arthropoda and mollusks from Port Blair, Andaman, and Nicobar and 25 species of fouler affecting pearl oyster from Arabian sea are only present (Winfield *et al*., 2007; Kripa *et al*., 2012; Pati *et al*., 2013; Deepa *et al*., 2015; Nandhagopal *et al*., 2019; Prasanth and Sureshkumar, 2020). Arthropoda and mollusks studies from Port Blair; Visakhapatnam; Kalpakkam; Arabian sea; the Andaman Sea and Gulf of Mexico are similar to the present observation (Winfield *et al*., 2007; Pati *et al*., 2011; Patro *et al*., 2012; Pati *et al*., 2013; Deepa *et al*., 2015; Pati *et al*., 2015; Nandhagopal *et al*., 2019).

## Conclusions

The present investigation uncovered that the adequate variety of fouling living beings is material explicit, and Balanus spp is Pioneer, and *Pernaviridis* is a peak in Succession. Shannon Index (H), Shannon Evenness (E), Pielou's evenness Index (J), and Raunkiaer's recurrence law are the helpful measurable instruments for mixed variety investigation of marine biofouler. The decent variety of the large scale marine faunal fouling living beings of Cuddalore shows that the beachfront territory of Cuddalore angler's concern. This examination will be valuable to know the thick and much of the time happening full-scale fouler.

## Acknowledgement

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