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Molluscan Diversity along the Selected Beaches of Kerala Coast, India

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ABSTRACT: Molluscs form a major group of organisms that makes up an integral part of ecosystems. The present study documented a survey of molluscan fauna from selected beaches in Kerala and recorded a total of 48 species classified under two classes (Gastropoda and Bivalvia). The species diversity was dominated by the Gastropoda (38) followed by the Bivalvia (9) and most of the Gastropods belonged to the order Neogastropoda. The highest molluscan diversity was observed in Kovalam. The study was conducted from July 2019 to February 2020.

Keywords: Molluscs, Gastropoda, Bivalvia, Diversity, Kerala.

INTRODUCTION

In terms of the number of species described globally, Mollusca is the second-largest phylum in the animal kingdom after Arthropoda and is one of the most significant and biodiverse marine invertebrate groups (Bouchet and Strong, 2010). Of the 82,000 recognized species of molluscs that have been documented so far, 53,000 are from the marine environment, and each year an average of 580 new species, including 350 marine forms, are discovered (Bouchet, 2006). There is no consensus among various authors on the total number of marine molluscs from India. In a report on the coastal marine biodiversity of India, Venkataraman and Wafar (2005) consider 3,370 marine molluscs in India, while Tripathy and Mukhopadhyay (2015) report 2,300 species. As such, there is no well-defined and updated checklist on marine molluscs in India. The hotspots of marine molluscan biodiversity in India are the Andaman and Nicobar Islands (more than 1,000 species), the Gulf of Mannar (around 428 species) and Lakshadweep (around 424 species) (Venkataraman and Wafar, 2005), all representing important coral reef ecosystems of India. Marine molluscs can be found in a variety of settings, including mangrove swamps, sandy beaches, coral reef ecosystems, rocky coastlines, and seagrass beds. However, India's stony intertidal zones and coral reef regions are rich in molluscan species diversity and abundance. According to Boominathan *et al*. (2008), molluscs are utilized for a variety of purposes, including food, ornaments, poultry feed, and as a source of lime. Mollusca is classified into seven classes, of which five are represented in India.

The significance of molluscs in the coastal economy of India is often neglected. Another significant area to be taken into consideration is the deep-sea molluscs off the Indian coast. It's also common to undervalue the role that gastropods, clams, oysters, and mussels play in preserving the social fabric and natural environment of our coastal towns. It is important to maintain a healthy molluscan population and to have the knowledge necessary to protect these structural and functional resources. The main threat to molluscs is the loss and degradation of suitable habitats Cuttelod *et al.* (2011). The present study is designed to know the diversity of molluscs in the Southern and Northern regions of the Kerala coast.

MATERIALS AND METHODS

Sampling Area

Samples were collected from the Southern and Northern regions of Kerala (Fig. 1). Overall, four sites were preferred for the study. Vizhinjam beach (8º 22' 34.77" N & 76º 59'42.93" E), Perumathura Beach (8º 38'4.36" N & 76º 47' 7.52" E), Varkala (8º 44'10.37" N & 76º 42'10.48" E) and Muzhappilangad beach (11º 47'35.27" N & 75º 26'38.98" E). The study was conducted from July 2019 to February 2020. Sampling was done during 3 seasons; monsoon, post-monsoon, and pre-monsoon. Shells were hand-picked from the beaches. Collected shells were washed, photographed, and stored in zip-lock polythene covers and transported to the laboratory for further identification and analysis. The collected specimens were morphologically identified using Huber (2010) and Coan and Scott (2012).

Fig. 1. Map showing different sampling sites of the study area.

RESULTS AND DISCUSSION

The survey of the molluscan fauna from the selected sites of Kerala recorded the presence of 48 species belonging to 2 classes (Gastropoda and Bivalvia). The highest species diversity was observed in class Gastropoda (39 species), followed by Bivalvia (9 species) (Fig. 2). Gastropods collected were represented by eight orders and 24 families. Similarly, class Bivalvia fell under 5 orders and 7 families. The highest molluscan diversity was observed in Kovalam with 26 species (20 species of Gastropods and 6 species of Bivalves). The list of molluscan fauna including their Class, order, and family, recorded in the present investigation is given in Table 1. The Kerala coast had similar molluscan diversity, as reported by (Anis, 2008; George and Revathy, 2021; Sary *et al.*, 2014; Kripa, 2005; Anu *et al.*, 2017; Ravinesh, 2021). Neogastropoda was the main order among the Gastropoda. This outcome matched that of Latha *et al.* (2010).

Table 1: Distribution of the Molluscan community at different sites of the study area.

Sr. No.	Taxa	Sampling Stations			
		Vizhinjam Site 1	Kovalam Site 2	Perumathura Site 3	Muzhappilangad Site 4
Phylum Class Order	Mollusca Gastropoda Neogastropoda				
Family	Muricidae				
1	*Haustellum haustellum*	+	-	-	-
2	*Tengula granulata*	+	-	-	-
3	*Rapana rapiformis*	+	-	-	-
4	*Rapana bulbosa*	+	+	-	+
5	*Purpura bufo*	+	+	+	+
6	*Indothais lacera*	-	-	+	+
7	*Murex tribulus*	+	+	+	+
8	*Murex trapa*	+	+	+	+
9	*Murex ternispina*	+	+	+	+
Family	Volutidae				
10	*Harpulina lapponica loroisi*	+	-	-	-
Family	Nassariidae				
11	*Nassarius crematus*	-	-	+	-
Family	Fasciolariidae				
12	*Fusinus colus*	+	+	+	-
Family	Turridae				
13	*Unedogemmula indica*	+	-	+	+
Family	Olividae				
14	*Oliva flammeacolor*	+	-	-	-
15	*Agaronia nebulosa*	-	-	+	-
Family	Nassariidae				
16	*Bullia melanoides*	-	+	+	-
Family	Babyloniidae				
17	*Babylonia spirata*	-	+	+	-
18	*Babylonia areolata*	+	+	+	+
19	*Babyloniaspinosa*	+	+	+	-
20	*Babyloniazeylanica*	+	+	+	+
21	*Babyloniafeicheni*	-	+	+	-

Family	Terebridae				
22	*Terebra areolata*	+	+	+	+
Family	Conidae				
23	*Conus tessulatus*	+	-	-	+
24	*Conus generalis*	-	+	+	+
25	*Conus radiatus*	+	+	-	-
Order	Lepetellida				
Family	Fissurellidae				
26	*Clypidina notate*	+	-	-	-
Order	Lydoneritida				
Family	Neritidae				
27	*Nerita plicata*	+	-	-	-
Order	Littorinimorpha				
Family	Rostellariidae				
28	*Tibia curta*	-	-	+	+
Family	Cassidae				
29	*Phalium glaucum*	-	-	-	+
Family	Bursidae				
30	*Bursa spinosa*	+	+	+	-
Family	Naticidae				
31	*Sinum* sp.	-	+	-	-
Family	Cymatiidae				
32	*Gyrineum natator*	-	-	+	-
Family	Ficidae				
33	*Ficus gracilis*	-	+	-	-
Family	Cypraeidae				
34	*Naria ocellata*	-	+	-	-
Order	*Neotaenioglossa*				
Family	Turritellidae				
35	*Turritella communis*	+	+	-	-
Order	*Seguenziida*				
Family	Chilodontaidae				
36	*Euchelus asper*	-	-	+	-
Order	Trochida				
Family	Trochidae				
37	*Trochus radiates*	-	-	+	+
Order	Not Assigned				
Family	Nacellidae				
38	*Cellana radiata*	+	-	-	-
Family	Architectonicidae				
39	*Architectonia* sp.	-	-	+	-
Class Order	**Bivalvia** Cardida				
Family	Donacidae				
40	*Donax scortum*	+	+	+	+
Order	Mytilida				
Family	Mytilidae				
41	*Perna perna*	+	+	-	-
42	*Perna viridis*	-	-	+	-
Order	Ostreida				
Family	Ostreidae				
43	*Saccostrea cuculata*	-	+	-	-
44	*Crassostrea madrasensis*	-	-	-	+
Order	Venerida				
Family	Veneridae				
45	*Meretrix aurora*	-	+	-	-
Order	Pectinida				

Family	Veneridae				
46	*Callista erycina*	-	+	-	-
Family	Anomiidae				
47	*Anomia* sp.	-	-	-	+
Family	Spondylidae				
48	*Spondylus*	-	+	-	-

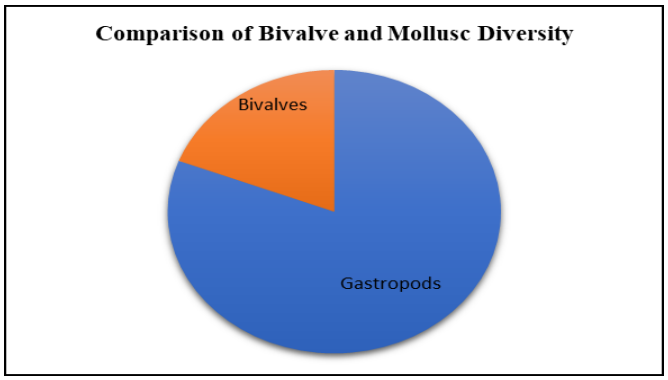


Fig. 2

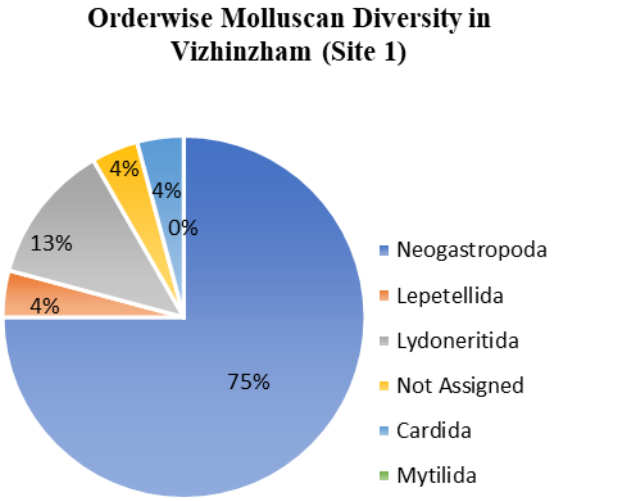
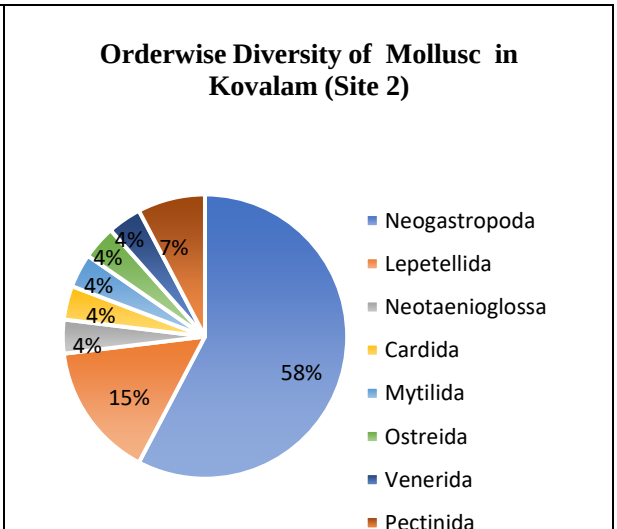


Fig. 3



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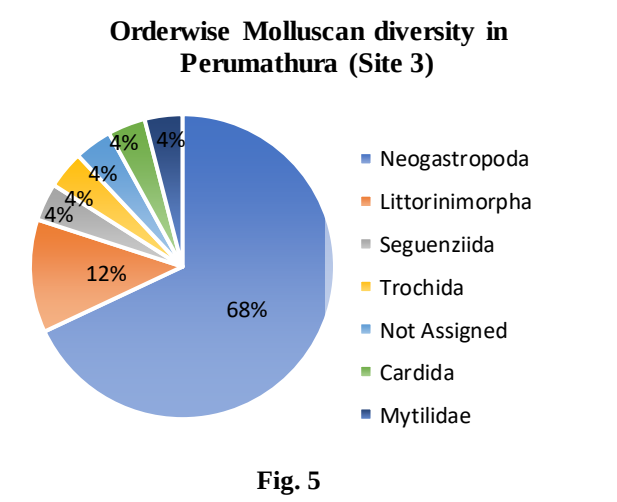

Fig. 5

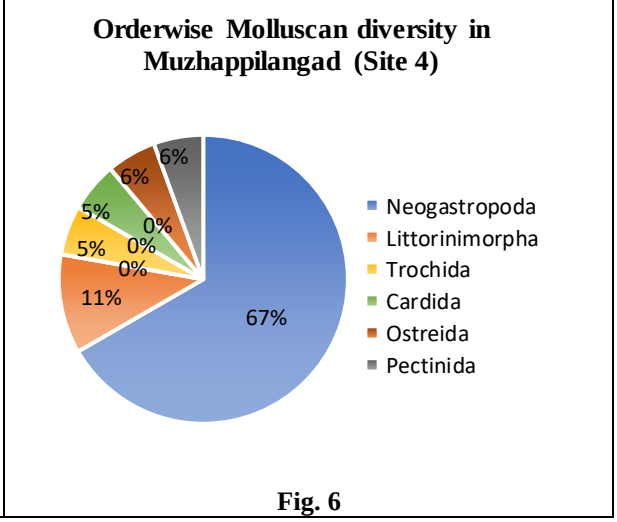

Fig. 6

Some Neogastropoda species, including *H. haustellum*, *T. granulata*, *H. lapponica loroisi*, *R. rapiformis*, *O. hammaecolor*, *C. notate* and *N. plicata* was observed from site 1 only. Similarly, the gastropod species *N. cremates*, *A. nebulosa*, *G. natator*, *E. asper*, *Architectonia* sp. were observed only from Site 3. There were only thirteen species in the bivalve, which was less diverse. The most prevalent of them, the *Donax scortum*, was discovered at all of the investigated sites. Also, the species *Phalium glacum*, *Crassostrea madrasensis* and *Anomia* sp. were found only in site 4. Along the Kerala Coast, numerous researches on the variety of molluscan species were conducted, and it was found that gastropods dominated over bivalves.

The order wise diversity of molluscs from Site 1 (Fig. 3) showed a higher diversity of 75% for Neogastropoda followed by Lydoneritida with 13% diversity and Cardida, Lepetellida, with 4%. Species with 4% diversity with the order not assigned was also collected. Molluscs identified from Site 2 (Fig. 4) showed a greater diversity for Order Neogastropoda with 58% diversity followed by Lepetellida with 15% and Pectinida with 8%. Venerida, Ostreida, Cardida Mytilida and Neotaenioglossa shared 4% diversity. Neogastropod diversity of Site 3 (Fig. 5) also dominated with Neogastropod with 68% followed by Littorinimorpha with 12% and Trochida, Cardida, Mytilidae, Seguenzida with 4%. Muzhuppilangad beach (Fig. 6) showed 67% order wise diversity for Neogastropoda, 11% for Littinomorpha, 6% for Ostreida, 6% for Pectinida, 5% for Cardida and Trochida. In all the four sites Neogastropoda dominated.

It has been discovered that molluscan shells are essential for a variety of commercial uses, including poultry food, drugs, industrial raw materials, fisheries, handicrafts, and interior decoration. The commercially significant gastropods are heavily fished in India's varied marine habitats, and their population is currently dropping alarmingly. Therefore, research is necessary to create a true image of the population status of diverse species in order to conserve gastropod species (Apte, 1998). Some of the gastropods found in the current study, like *Tibia curta*, *Ficus gracilis* and *Babylonia spirata*, are significant commercial. The results were comparable to those of the Manoj *et al.* study from 2021.

CONCLUSIONS

For the implementation of sustainable usage of gastropod resources and for the adoption of appropriate conservation measures, a complete understanding of the diversity of gastropod molluscs found in the coastal system is a prerequisite. For endangered species, conservation and stock-enhancement techniques must also be put into practice. These kinds of studies will be useful for developing countermeasures to overexploitation and for developing preventative measures for maintaining good species diversity.

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