



Diversity of Mollusca from the coast of Ratnagiri district coast of Maharashtra, India.

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Abstract

The numbers of molluscs was comprised of gastropods *Planaxis sulcatus*, *Littorina scabra* and *Dostia violacea* and the bivalve species namely *Cerithium cingulata*, *Telescopium telescopium*, *Nodilittorina melanostoma* and *Casidula nucleus*. *Crassostrea cattuckensis*, *Saccostrea cucullata*, *Anadara granosa*, *Meretrix meretrix* were recorded dominant. Shellfish is a colloquial and fisheries term for exoskeleton bearing aquatic invertebrates used as food, including various species of molluscs, crustaceans, and echinoderms. Although most kinds of shellfish are harvested from saltwater environments, some are found in freshwater. In addition, a few species of land crabs are eaten, for example *Cardisoma guanhumi* in the Caribbean. Shellfish are among the most common food allergens. The wide diversity of bivalve and gastropod mollusks from mangrove habitats, rocky substrata, sandy beaches, and muddy habitats found along the Indian coast contributes to its nutritional worth. Between January 2018 and December 2019, 17% of bivalves and 63% of gastropods were found. There is a great opportunity to investigate the potential ecological significance and conservation of the productive molluscan fauna in various settings.

Keywords: diversity, mangrove, rocky habitat, muddy, sandy bivalve, gastropod, Ratnagiri district coast.

Introduction

The faulting of the Gondwanaland during the Cretaceous period Continental Drift is responsible for India's straight and regular coastline. As a result, there aren't many ideal natural harbor locations along India's coast. On the Indian coast, marine mollusks have been found in a variety of settings. Thirteen states and Union Territories (UTs) make up India's 7516.6 km of coastline. In the rocky intertidal zone along the coast, they are more numerous and varied. sandstones, intertidal

flats, and mangrove ecosystems. Coral reefs, mangroves, sandy beaches, rocky shores, sea grass beds, and deeper seas are just a few of the places where they can be found [1]. One of the world's ecologically varied ecosystems, mangroves are rich in nutrients and organic matter and sustain a sizable biomass of flora and animals [2]. Oysters, mussels, cockles, and gastropods that are edible are gathered in large quantities for local consumption. Mangrove roots and lower parts of trunks provide substrate for oysters and mussels.

Because these animals are filter feeders, they are confined to microhabitats below mean high water and are usually only abundant in areas adjacent to open water. Large populations of the blood clam, *Anadara granosa*, and other cockles can be found in mudflats on mangrove strands, where they are partially hidden in the sediment [3]. There are 2,580 faunal species that live in mangroves in India, including prawns, crabs, mollusks, fish, fish parasites, insects, reptiles, amphibians, and mammals [4]. Oysters, mussels, and clams provide a good source of minerals, protein, and glycogen and are easier to digest than other animal meals, meeting the nutritional needs of the coastal population [5]. Currently, 4,130 of India's 5,288 recognized mollusk species are located in maritime habitats [6]. The Indian marine region is exploited for six species of oysters, two species of mussels, sixteen species of clams, five species of pearl oysters, three species of gigantic clams, one species of window pane oyster, and other gastropods such as Sacred Chank, *Trochus*, and Turbo in addition to fifteen species of cephalopods [7]. The present papers investigate the diversity of bivalve and gastropod molluscs of mangrove, rocky coasts, sandy beach from selected study localities of Raigad district coast.

Materials and Methods

In the Ratnagiri district coast line the study area was divided in four localities viz.

1. Ganpatipule: (Lat. 16°54.545" North and Long. 073°05.165" East). The sandy shore, about 05m area exposed during the low tide, along hill there is one rocks flat platform, in the rocks pits gastropods diversity were more than bivalve species, village about ½ kms on the north-eastern side from the high tide mark, by one small canal domestic discharge occurrence from the village which is meets to the sea beside study localities.

2. Kalbadevi: Long. 073°01.752" East and Lat. 18°01.686" North. Large mangrove trees of *Sonneratia alba* J. Smith and *Ceriops tagal* (Perr.) (Robinson) are scattered across the backwater muddy area, which has an exposed intertidal

mudflat of about 20 meters during low tide. The sea water flows are circular, with three sides of land and one side of sea water influx. Oyster beds are scattered across the boulders in an area of about two kilometers, and no household water is released.

3. Bhatye: (Lat. 18°02.556" North and Long. 073°00.598" East). The open, fine sandy beach included rocks on both the north and south sides; the intertidal shore was roughly 15 meters long, and the tide inflow caused sand to be deposited in rock fissures. They are drawn to the area because of its proximity to the sea, easy access by road, lovely sandy beach, and direct domestic discharge into the sea. **4. Kurli:** Long. 072°59.944" East, Lat. 18°03.062" North. The village is about 60–70 meters from the high tide mark on the eastern side, the rocky shore (surf beaten), the 05–10 m intertidal area exposed during low tide, fishing is done by boat, there is a cement-built jetty for landing the fish catch, and domestic discharge occurs. Mangrove-associated bivalve and gastropod species are among the live critters that were hand-picked. Five 1-meter-long nylon rope quadrates were produced at random in each location directly above the bed. Twice during the summer, winter, and post-monsoon seasons, from June 2018 to May 2019. Locations include Kurli (Rocky area), Shrivardhan (Sandy beach), Lada (Muddy region), and Ranpar (Rocky area). They were taken to the lab shortly after fishing, where the mud and fouling biomass were removed from the shells by brushing them. The animals were then stored in 70% alcohol for taxonomical identification of the exterior structure of characteristic shells, particularly lunal, umbo, and operculum, after being stocked in filtered saltwater pumped from the places for observation. Adductor muscles, teeth, and hinges are internal components. The Zoological Survey of India in Kolkata is where the shells were identified. use the following references as well: An annotated list of marine mollusks in India (Cephalopoda, Bivalve, and Scaphopod) Ramakrishna and A. Dey in Part 1. ZSI-2010 Occasional Paper No. 320.

Results

In specific locations along the shore of the Raigad district, the number of bivalve shellfish species (14 species from 6 families and 4 orders) was larger than that of gastropods (49 species from 15 families and 5 orders; 78%). For example, Table 1 lists gastropods and bivalves, respectively. The information on the variety of ecologically significant mollusks from sandy, rocky, and muddy-mangrove environments. During the study period, bivalve species were found in higher localities at Lada (08 bivalve species and 12 gastropod species), Kalbadevi (06 bivalve species and 30 gastropod species), Ranpar (05 bivalve species and 22 gastropod species), and Shrivardhan (3 bivalve species and 3 gastropod species). In these conditions, oysters (*Crassostrea catuckensis* & *Saccostrea cucullata*), clams (*Anadara granosa*), mussels (*Perna viridis*), bivalves, and gastropods play an important role as food for common people who live along the coast because fishermen cannot go out to sea with their boats during the monsoon season. The 14 species from 6 families of bivalves that were recorded in

"fig. 1" show that muddy and mangrove settings are more diverse for bivalve species, with the families Ostridae, Arcidae, Mytilidae, and Veneridae dominating. 49 species of gastropods from 15 families were found in these four locations, as shown in "fig. 2." This suggests that rocky habitats are substantially more diverse. The two species of the Onchidiidae family are found in muddy environments. Additionally, slugs and onchidium were observed in the Raigad district's Akshi Creek [8]. Pichavaram mangroves have been used to study the pulmonate snail *Cassidula nucleus* [9]. In vellar estuary mangroves, *Nerita (Dostia) crepidularia* has a variety of habitats. During high tide, animals move to the plant stem on the intertidal mudflat, and during low tide, animals move to the mud flats [10]. Locality Kalbadevi has a higher diversity of gastropod and bivalve species than the other three places, as seen in "fig.3". Due to the huge swampy area with mangroves in the second locale, Lada, oysters are found in great density and are particularly beneficial to the locals, both commercially and edibly (see "table 1").

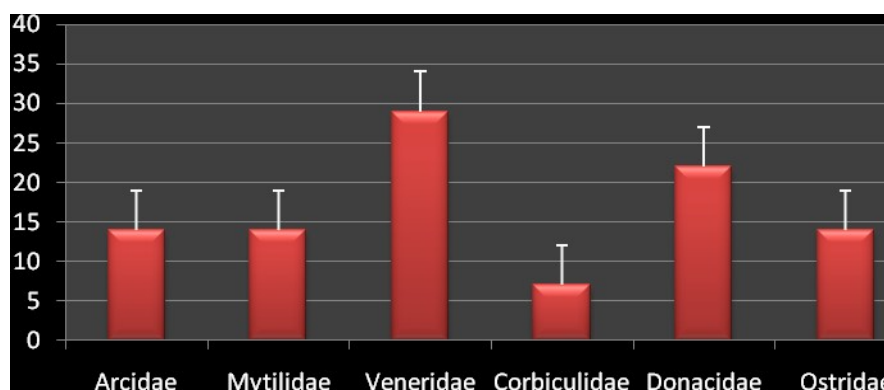


Fig. 1. Showing distribution of families of bivalve species in % from selected study sites.

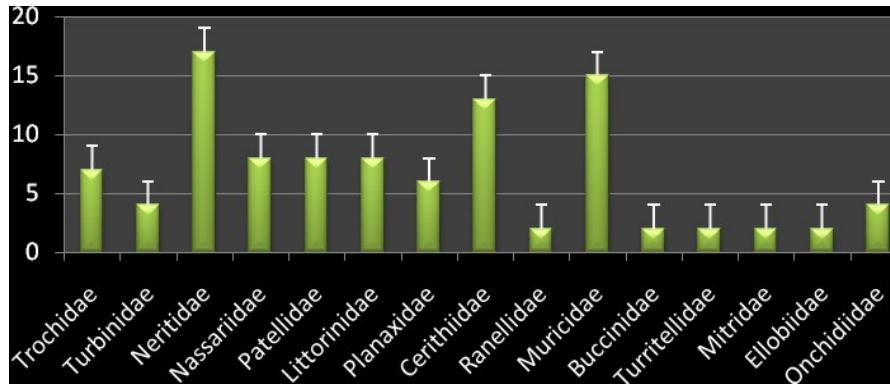


Fig. 2. Showing distribution of families of gastropod species in % from selected study sites.

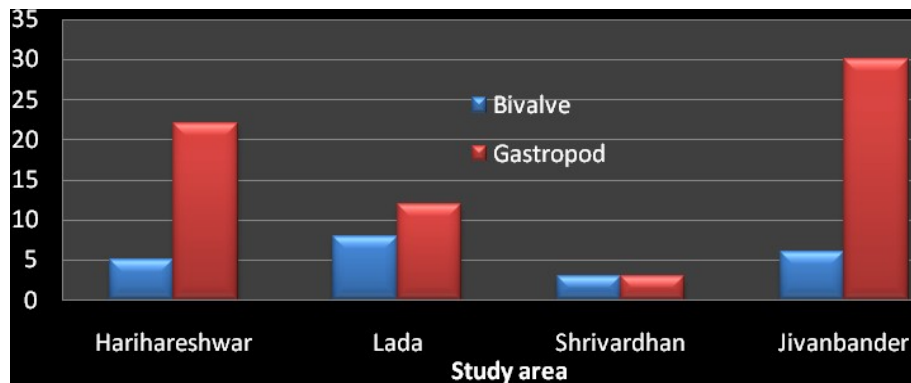


Fig.3. Showing distribution of bivalves & gastropods from selected study sites.

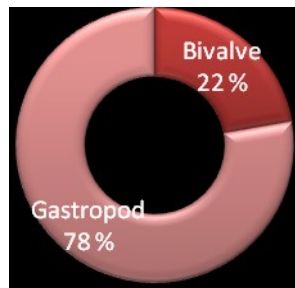


Fig.4. In percentage molluscan species recorded at four study sites.

Discussion

There are notable differences in the variety of bivalves and gastropod mollusks at four locations along the coast of Ratnagiri district. 22% of bivalve species and 78% of gastropod species were found in specific Raigad district coastal locations throughout the study period (see figure no. 1). The shallowness of the chosen areas, the

comparatively high temperature, the high oxygen content, the low wave energy, and the semi-enclosed habitat are the distinctive features of these marine ecosystems. In wetlands, decomposed plant litter from August onward plays a significant role in the cycling of nutrients and is home to a wide variety of organisms [8]. Due to the monsoon season, July had the lowest density. The sensitive mollusks had a significant

mortality rate during the monsoon because they were unable to swiftly adapt to the changing osmotic balance due to self-dilution of bodily fluids. Due to adjustment, the mortality rate of mollusks gradually declined after July. The density of mollusks increased as a result. It also recognized that the temperature and salinity decreased in July, creating unfavorable conditions for the mollusks [11].

During the post-monsoon period in November 2019, the population density reached its highest point. Many researchers have observed that the post-monsoon season is the most conducive to the arrival of new molluscan species. High densities of all molluscan species, particularly *Telescopium*, *Potamides*, *Natica*, *Nerita*, *Littorina*, and oysters, are supported by the mangroves. Mangrove plant trunks, pneumatophores, and stilt roots were all heavily infested with *Littorina* sp. Many different species of mollusks can be harvested there [8]. Molluscan communities are useful markers of regional circumstances [12]. As benthos organisms, gastropods and bivalves are frequently employed as bio-indicators of water health. In addition to playing a part in the food chain, gastropods and bivalves are capable of producing a billion larvae in the form of planktons, which support the biotic population. To assess the condition of the mangrove ecosystem, it is crucial to observe the populations of bivalves and gastropods [13]. Certain marine bivalves, such *Anadara granosa*, are cultivated for commercial purposes in Malaysia. 173,792 hectares of land in Sarawak were covered by mangrove forests, which are ideal for molluscan habitat [14]. *Crepidularia*, *Littorina* sp., and *Cerithidea* sp. were found in the mud banks, mudflats, mangrove forest, sandy muddy area marshes, prop roots, and pneumatophores in the *Nerita* (*Dostia*) region. Mangrove plants' mud flats contain *Telescopium telescopium*. There have also been reports of bivalves favoring the more active and consequently more noticeable mangrove with chemosymbiotic relationships [15]. Oyster assemblages were found on mud banks, mud flats, mangrove forests, sandy muddy region wetlands, prop-roots, and pneumatophores.

Mussels were discovered affixed to any hard substratum that was present, including oyster beds and prop-roots and pneumatophores [16]. From microbial variety to macrofaunal populations, mangroves provide a rich supply of faunal resources. Because of their strong primary output in the food chain as predators, herbivores, detritivores, and filter feeders, mollusks are able to reach high biomass in mangrove ecosystems. Mollusks can have similarly astonishing biomass and numerical abundance [17]. 39 species of gastropods are found in Australian mangroves, according to various studies on mangrove-associated mollusks worldwide [18]. Chinese mangroves have 28 species [19]. 23 types of mollusks from Hong Kong's mangrove forest [20]. The mangrove root systems on Colombia's Atlantic coast are home to 29 species of bivalves, and wood-boring bivalves are also prevalent there [21]. 44 species in Malaysia's Sematan mangrove forest [22]. In general, numerous surveys of Indian mangrove molluscs were reported by [23] & [24]. A total account of Sundarban 56 species of molluscs including 31 gastropods and 25 bivalves [25]. 12 species of bivalve and 13 species of gastropod mangrove associated molluscs at Ratnagiri, Maharashtra, India [26] and the total 19 bivalves belongs 9 families while 39 gastropods belongs 15 families from selected sites of Raigad district coast [27]. Gastropods are typically one of the dominant and most conspicuous macrofauna in mangrove systems, and occupy wide range of ecological niches [28].

Conclusion

Within the Ratnagiri coast research areas, there are differences in the rich richness of marine shellfishes. One locality had high species diversity, which was caused by a greater number of distinct species. According to the current study, every bivalve and gastropode found in Bhatye and Ranpar is an indigenous species with higher commercial worth and biological significance. Their habitat and geographic location most likely have an impact on the overall quantity and variety of shellfish.. Lada and Kalbadevi most likely have adequate habitat for a wide variety of edible,

commercial, and ecological mollusks. In mangrove environments, gastropods perform an important ecological role. Additionally, gastropods prefer stony settings. The gastropod biodiversity of mangroves, however, is mostly unknown. Therefore, documentation of the biodiversity of the group of ecosystems under threat is required. Molluscan species need to be conserved and used sustainably.

Acknowledgments

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