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## Underwater-coastal diversity and Statistical analysis of edible bivalve of Sheva (Raigad), coast of India

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### Abstract

Underwater and coastal diversity of edible bivalve molluscs was studied twice in each season monsoon, post monsoon, winter and summer July 2011 to June 2012 with the help of Self Contain Underwater Breathing Apparatus (SCUBA) diving by Dive Master (DM). At each locality diversity and number of species were collected from Nagaon, Kegaon, open sea and local markets too. From selected study sites of Raigad district Coast are a wide chance to research for further explore both on the possibility of commercial value and ecosystem conservation.

**Keywords:** Diversity, edible bivalve, Sheva, coast of India

### 1. Introduction

Among the exploited bivalve molluscs resources of India, clams are widely distributed and abundant, the form subsistence fisheries all along the Indian coast and fished by men, women and children from the intertidal region to about 4m depth, they use to collect by handpicked. These organisms usually inhabit bottom substrates for at least part of their life cycle. Several species of veneridae family clams that occur along the coast of Maharashtra *Placenta placenta* one is important for its food value. It contributes about 80% to the total production of clams landed annually mainly from Kalbadevi (Shirgaon creek) and (Kajali, Bhatye creek) estuaries along Ratnagiri coast, Maharashtra <sup>[1]</sup>. Bivalve provides an important source of protein for human besides fish, it can be found in many parts of the world such as marine, brackish, fresh and terrestrial areas. Marine bivalve consists of various species that is used for many purposes besides their nutritional source <sup>[2]</sup>. Amongst several marine living resources the shell fishes play a vital role in India's economy of their popularity is increasing due to their delicious and food value. The bivalves such as oysters, mussels and clams serve the nutritional needs of the coastal population. They are good source of minerals, protein and glycogen and are easily digestible compared to other animal foods <sup>[3]</sup>. The present paper investigates the underwater and coastal diversity of edible bivalve molluscs in rocky shore, sandy beach, muddy areas, selected localities at Raigad district coast, Maharashtra.

### 2. Materials and Methods

**2.1.1. Nagaon:** Lat. 18°51.994"N and Long. 072°56.355"E. The rocky open shore, about 10m rocky area open during low tide, black pebbles were present at the above high water mark, in scattered small mangroves trees of *Bruguiera sexangula* (Lour.) Poir. were recorded, on the eastern side away from the high water mark town is about 20-30m, due to nearest village there is domestic water discharged, no mangroves species. Mangrove: *Bruguiera sexangula*,

**2.2 Kegaon:** Lat. 18°52.995"N and Long. 072°54.704"E. The rocky open shore, about 10-20m rocky area open during low tide, pebbles were present at the above high water mark on the western side, on the rocky pits and crevices two scattered mangroves trees of *Bruguiera sexangula* (Lour.) Poir. *Sonneratia alba* J. Smith., were recorded from mid tide to till high tide mark, on the northern side away from the high tide mark town is about 30-40m, from the village domestic water discharged into the water of study localities, which is nearest to the study localities, there is no fishing activities is going on. Mangrove: *Bruguiera sexangula*, *Sonneratia alba*.

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**2.3 Mora:** Lat. 18°54.676”N and Long. 072°55.445”E. The rocky open shore, about 10-20m on the rocky shore slightly mud mixed, small pebbles were present at the above of high water mark, in dense large mangroves trees of *Sonneratia alba* J. Smith, *Avicinia marina* (Forsk.) Vierh. were recorded, on the southern side away from the high tide mark town is about 10-20m, due to nearest village there is domestic water discharged, due to fishing activities oil discharged. Mangrove: *Sonneratia alba*, *Avicinia marina*.

**2.4 Panaje:** Lat. 18°54.615”N and Long. 072°56.812”E. The rocky open shore, below high tide mark about 60-70m marshy area open during low tide, rocky and pebbles were present at the above of high tide mark, above mid tide mark in scattered mangroves trees *Bruguiera sexangula* (Lour.) Poir. were recorded, there is no domestic water discharged from the village, there is no fishing activities therefore no oil discharged from fishing boat. Mangrove: *Bruguiera sexangula*.

**2.5 Sheva:** Lat. 18°55.739” N and Long. 072°57.214”E. The rocky open shore, about 10-20m rocky and muddy area opens during low tide, big black stones and pebbles were present at the above of high tide mark, in scattered large mangrove trees of *Avicinia marina* (Forsk.) Vierh. were present, Jawaharlal Nehru Port Trust (JNPT) about 40-50m away on the northern side from the high tide mark, domestic water discharged.

Live animals were collected twice in each season monsoon, post monsoon, winter and summer July 2011 to June 2012. Also SCUBA diving kit (equipments) are used for underwater observation by D.M. for this study. From study localities such as Nagaon, Kegaon, Mora, Pnaje and Sheva, of Raigad district coast, as Soon after fishing or collection, they were brought to the laboratory and the shells were brushed to clean the fouling biomass and mud. They were then stocked in filtered seawater pumped in the laboratory from the estuary for observation then animal preserved in 70% alcohol for taxonomical identification of external structure of typical shells, especially, lunal, umbo, and operculum. Internal parts such as teeth, adductor muscles, hinged scars. The shells were identified from Zoological Survey of India, Kolkata. Also using the following reference: Annotated checklist of Indian Marine Molluscs (Cephalopoda, Bivalve and Scaphopoda) Part-1 Ramakrishna and A. Dey. Occasional Paper no. 320, ZSI - 2010 [4].

**3. Results**

The SCUBA one is the important tool used for the underwater study of the diversity, we went underwater vertically and horizontally in the Sea, for collection of alive species. Among five localities after taxonomical study, class bivalve belongs to four orders, four families and seven species are recorded. One species from Mytilidae family which is belongs to Order MYTILOIDA. Two species from Veneridae family which is belongs to Order VENEROIDA. Two species from Ostridae family which is belongs to Order STREOIDA. One species from family Anomiidae which is belongs to Order PTERIOIDA. Total Seven genus and seven species of edible bivalve molluscs have recorded during the study. The data presented on edible molluscs from different habitats like rocky shore, sandy coast, muddy, swampy with mangrove associated species. According to localities five species from Nagaon, four species from Kegaon, four species recorded from Mora, three species from Panaje while from Sheva coast massively *Placenta placenta* were recorded with variations in size also.

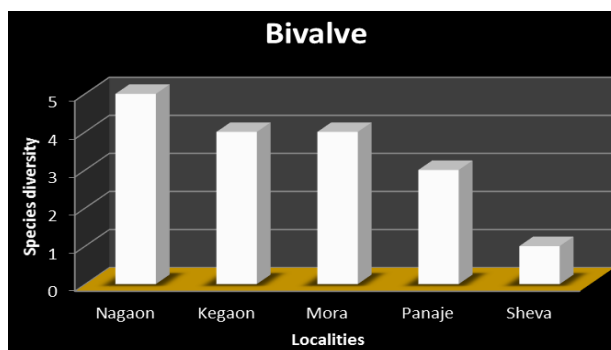
One is very essential Sheva study locality, across the Maharashtra coast where the *Placenta placenta* occurs in rich diversity, the local people fisherman/women use to collect these species for the mainly for two purpose as a food and commercial as well as ornamental use too.

**3.1 According to Shannon Wiener Diversity Index**

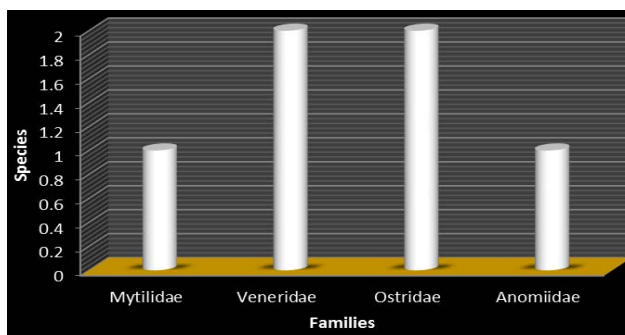
**Table 1:** Showing the Shannon Wiener diversity Index of study localities.

No. of sample	pi=sample/sum	ln (pi)	pi*ln (pi)
05	0.281	-1.269	-0.356
04	0.270	-1.309	-0.353
04	0.239	-1.431	-0.342
03	0.145	-1.931	-0.279
01	0.062	-2.780	-0.172
sum=17			Sum = -1.502

H= 1.502  
 $H_{max} = \ln(N) = \ln(4)=1.609$   
 Evenness =  $H/H_{max} = 1.502/1.609 = 0.933$   
 Result: Shannon diversity index (H) = 1.502  
 Evenness = 0.933



**Fig 1:** Bivalve species according to localities on the coast of Raigad district.



**Fig 2:** Bivalve species according to families on the coast of Raigad district.

According to table no 1. The Shannon diversity index (H) is 1.502, while evenness is 0.609 recorded, according to graph no. I. The Nagaon have more diversity and according to graph no II seven species and seven genus from four families from four orders recorded. The value of edible bivalve is very high for those people are living on the coastline, because in the monsoon season entire fishing is stopped, that time they use to use the bivalve as a main food, not only monsoon season throughout the year people use to used bivalve as palatable tasty food like oysters. The bivalve species found from the selected study localities of Raigad coast. These species were recorded higher at Nagaon probably due to rocky habitat

differences. The overall molluscs diversity was recorded higher. The oysters were recorded on the mud banks, mud flats, sandy muddy area swamps, prop-roots and pneumatophores.

#### 4. Discussion

The relatively high temperature, high oxygen content, low wave energy and the semi-enclosed nature are gives high food availability to the species. Decomposed material of the plant litter from August onwards is an important component of nutrient cycling in wetlands and it harbours a large number of diverse species<sup>[5]</sup>. The lowest density was in the month of July because of monsoon season. In monsoon, due to self-dilution of the body fluid, the sensitive molluscs were unable to adjust the fluctuating osmotic balance quickly hence their mortality was high. After the month of July because of adjustment by animal the mortality rate of molluscs decreased gradually, it means density of molluscs is increased. It also understood that in the month of July, the salinity and temperature dropped down which made the condition adverse for the molluscs<sup>[6]</sup>. The observation of Bivalves populations in ecosystem is important to evaluate their condition<sup>[7]</sup>. In Malaysia some of marine bivalve such as *Anadara granosa* is being cultured for commercialization. In Sarawak mangrove forest covered 173,792 ha of the land which is suitable for molluscan habitat<sup>[8]</sup>. Studies on mangrove associated molluscan fauna of various Indian peninsular estuaries viz. Godavari and Krishna estuaries<sup>[9]</sup>, Mahanadi estuary<sup>[10]</sup>. The bivalves are active and therefore it is more conspicuous, with mangrove chemo-symbiotic associations have also been reported<sup>[11]</sup>. The assemblage of oysters were to occur on the mud banks, mud flats, sandy muddy area swamps, prop-roots and pneumatophores and mussel were found attached to wherever hard substratum is available such as prop-roots and pneumatophores and oysters beds<sup>[12]</sup>. *Crassostrea cattuckensis* of medium (88.99 mm shell length) size from Bhatye estuary at Ratnagiri were collected in monsoon winter and summer seasons<sup>[13]</sup>. The numerical abundance and biomass of molluscs can be equally impressive<sup>[14]</sup>. The number of 23 molluscan species recorded from the mangrove forest from Hong Kong<sup>[15]</sup>. The number of 29 species of bivalves recorded from the mangrove root systems on the Atlantic coast of Colombia & Wood-boring bivalves are also common in the mangrove forest<sup>[16]</sup>. The 25 species of molluscs (13 gastropods and 12 bivalves) were recorded from Krangad estuary, South East Coast of India<sup>[17]</sup>. A total account of Sundarban 56 species of molluscs including 31 gastropods and 25 bivalves recorded<sup>[18]</sup>. The number of 12 bivalves mangrove associated recorded at Ratnagiri, Maharashtra, India<sup>[19]</sup>. A total account of 19 bivalves from 9 families recorded from selected sites of Raigad district Coast<sup>[20]</sup>.

#### 5. Conclusion

During the present study the underwater and coastal diversity of edible molluscs at five localities at Raigad district coast varies significantly. Finally according to graph no II seven species and seven genus from four families from four orders recorded. The present study revealed that all recorded molluscs are indigenous species of Sheva localities have greater commercial value and biodiversity importance. The total number and type of edible molluscs probably is influenced by habitat and geographical condition. According to graph no I Nagaon and Kegaon probably have suitable habitat to support large number of edible molluscs diversity. *Perna viridis* found abundantly in the Mora locality, maximum number of species

was observed from mud flats along the mangroves. The oysters (*S. cucullata* and *C. cattuckensis*) were found attached to wherever hard substratum is available. so, there is urgent need to conservation and sustainable utilization of bivalve species for rural development and ecosystem.

#### 6. References

1. Mohite SA, Mohite AS. Gonadal development in the short neck clam *Paphia malabarica* in relation to hydrographic parameters in Kalbadevi estuary. College of Fisheries, Ratnagiri-415629, Maharashtra, India. Journal Mar Biol Ass India. 2009; 51(2):164-172.
2. Hamli H, Idris MH, Kamal AHM, King WS. Diversity of Edible Molluscs (Gastropod and Bivalvia) at Selected Division of Sarawak, Malaysia. Department of Animal Science and Fishery, Faculty of Agriculture and Food Sciences University Putra Malaysia Sarawak Campus, Nyabau Road, 97008 Bintulu, Sarawak, Malaysia. International Journal on Advanced Science Engineering Information Technology. 2012; 2:5-7.
3. Suryavanshi GD, Shaikh AM, Mane UH. Impact of zink on protein content of oyster *Crassostrea cattuckensis* from Ratnagiri coast, Department of zoology, Yogeshwari Mahavidyalaya, Ambajogai, Dist. Beed-431517. J Ecotoxicol Environ Monit. 2012; 22(4):323-328.
4. Ramakrishna, Dey A. Occasional Annotated Checklist of Indian Marine Molluscs (Cephalopoda, Bivalve and Scaphopoda) Part-1, Zoological Survey of India, Kolkata. 2010, 320.
5. Thakur S, Yeragi SG, Yeragi SS. Population Density and Biomass of Organisms in the Mangrove Region of Akshi Creek, Alibag Taluka, Raigad District Maharashtra. International Day for Marine Biological Diversity, Marine Biodiversity 2012.
6. Patole VM. Ecology and biodiversity Mangroves in Mochamad Estuary of Vengurla, South Konkan, Maharashtra. Ph.D. Thesis, University of Mumbai. 2010.
7. Irma D, Sofyatuddin K. Diversity of Gastropods and Bivalves in mangrove ecosystem rehabilitation areas in Aceh Besar and Banda Aceh districts, Indonesia. AACLIJBS. 2012; 5(2):55-59.
8. Paul CPK. Management of Mangrove Forest of Sarawak. (Online). *Wetland* 10 pdf. 2012.
9. Radhakrishnan Y, Janakiram R. The Mangrove molluscs of Godavari and Krishna estuary. In: Recent researches in estuarine biology, Natarajan R. (ed), Hindustan publishing corporation (L), Delhi, India, 1975, 177-184.
10. Subba Rao NV, Mookherjee HP. On the collection of molluscs from Mahanadi estuary, Orissa. In: Researches in estuarine biology, Natarajan R. (ed), Hindustan publishing corporation (L), Delhi, India. 1975, 165-176.
11. Leбата JHL, Primavera JH. Gill structure, anatomy and habitat of Anodontiaedentula: evidence of symbiosis. JSR, 2011; 20(3):1273-1278.
12. Suresh M, Arularasan S, Ponnusamy K. Distribution of molluscan fauna in the artificial mangroves of Pazhayar back water canal, Southeast Coast of India. AASR, 2012; 3(3):1795-1798.
13. Suryavanshi GD, Shaikh AM, Mane UH. Heavy Metals concentration in rock oyster *C. cattuckensis* from Ratnagiri coast. Dept. of zoology, Yogeshwari Mahavidyalaya, Ambajogai, Dist. Beed-431517. J Ecophysiol Occup Hlth. 2011; 11:175-180.
14. Sasekumar A. Distribution of the macro fauna on a

- Malayan mangrove shore. *J Anim Ecol.* 1974; 43:51-69.
15. Wells FE. Distribution of marine invertebrates in a Hong Kong mangrove, with emphasis on molluscs. In: Morton, B.S. (Ed.), *Proceedings of the Second International Marine Biological Workshop: The marine Flora and Fauna of Hong Kong and Southern China*, Hong Kong University Press, Hong Kong, 1986, 1990, 783-793.
  16. Alvarez- Leon R. Mangrove ecosystems of Colombia. Conservation and sustainable utilization of mangrove forests in Latin America and Africa Region. ITTO/ISME Project PDL, 14/90, Yokohama, Japan. 1983, 75-113.
  17. Venkatesan V, Kalidas C, Pariyappanal U, Zacharia, Rajagopal S. Distribution of Molluscan fauna in the Karangad estuarine mangroves, South East Coast of India. *AES Bioflux*, 2010; 2(2):113-119.
  18. Dey A. Handbook on Mangrove Associate Molluscs of Sundarbans: 2006, 1-96. (Zool. Surv. India, Kolkata).
  19. Khade SN, Mane UH. Diversity of edible Bivalve and Gastropod Molluscs from Ratnagiri, Maharashtra. *IJSPER*, 2012; 8(1-4).
  20. Khade SN, Mane UH. Diversity of Bivalve and gastropod Molluscs from selected localities of Raigad district, Maharashtra, West coast of India. *WJST*, 2012; 2(6):35-41.