

A SYSTEMATIC CHECKLIST OF MARINE MOLLUSCA AT THE COAST OF BHAVNAGAR, GULF OF KHAMBHAT, GUJARAT

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Abstract: The Gulf of Khambhat is a south to north penetration of the Arabian Sea on the western shelf of India between the Saurashtra peninsula and mainland Gujarat. It is located approximately between latitude 20° 30' and 22° 20' N and longitude 71° 45' and 72° 53' E. The study was conducted at two different sites of coastal area of Bhavnagar i.e.; Ghogha and Zanzmer. Coast of Ghogha is muddy and covered by two sub species of *Avicennia* namely *Avicennia marina* var. *marina* and *Avicennia marina* var. *acutissima*. Zanzmer is rocky coast with varying types of tidal pools and puddles. Certain species of green and red algae is also occurs at this place. Total 20 species of mollusca belonging from 13 families of two different classes were recorded. *Trochus radiates* is schedule I species according to wildlife protection act 1972 was also found in large number along the coast line. *Trochus niloticus*, *Cerithium morus*, *Cerithidea cingulata*, *Turbo brunneus*, *Littorina scabra* and *Octopus vulgaris* were also abundant on both the study area.

Keyword: Intertidal Zone, Molluscan Diversity, Bhavnagar coast.

Introduction: The intertidal zone of any ecological area is considered as the most productive with the greatest diversity of plant and animal life. Because of its accessibility, the intertidal zone remain highly explored than any other area [1]. Among the diversity of Intertidal area, the molluscs are highly successful animal group in terms of ecological adaptation and they are found in nearly all habitats ranging from deepest ocean trenches to the intertidal zone, freshwater and land where they occupy a wide range of habitats [2]. The phylum mollusca is a large assemblage of animals having diverse shapes, sizes, habits and occurs in different habitats [3]. As molluscs are primary consumers in aquatic ecosystems [4], they have been used as environmental indicators. Due to their economical and ecological importance, as well as sedentary life, molluscs have been assumed as an important organism in monitoring contaminants in different ecosystems [5]. They are abundant, many are sedentary and easy to collect, which makes them ideal organisms in biomonitoring [6] programs. Bivalve and gastropod molluscs are among the most useful organisms for environmental monitoring [7]. Some molluscs are important (to the ecosystem) as vectors of parasite. Mollusca are very abundant and form an important link in the food chains. Amongst marine products, molluscs constitute an edible group next to fish and crustaceans. Molluscs in general, have not been investigated much despite their wide distribution in marine communities [8]. The spatial patterns in the structure of assemblages on hard substrates have been widely documented from intertidal substrates [9] [10]. Quantitative information on distribution patterns of molluscan assemblages is mainly focused on soft substrates and coral reefs [11], Antarctic Sea [12],

Mediterranean Sea [13] [14] and tropical environments [15] [16]. According to a rough estimate done around three decades ago, the rocky Saurashtra coastline along with the Gulf of Kachchh supports about 210 species of marine algae, over 150 species of molluscs [17]. Bombay Natural History Society has carried out a survey on the coastal area of Saurashtra by Deepak Apte However, no detailed information available, of intertidal fauna especially Molluscan forms in the Bhavnagar District coast. These studies have been conducted long before the commercial exploitation of the coastal area had begun and hence could be used as reference. The present study deals with the intertidal Molluscan diversity of rocky, Sandy, Muddy coastal areas and Mangrove intertidal area and the ecology of Molluscan species at Bhavnagar District, Gulf of Khambhat, Gujarat.

Materials and Methods:

Study Area: The Gulf of Khambhat is a south to north penetration of the Arabian Sea on the western shelf of India between the Saurashtra peninsula and mainland Gujarat. The study was conducted at two different sites of coastal area of Bhavnagar i.e.; (1) Ghogha and (2) Zanzmer.

Ghogha: The geographic location of Ghogha is 21° 39' N latitude and 72° 16' E longitude. It is one of the oldest ports in India the intertidal area of Ghogha is mainly mudflats with sparse rocks and mangroves. Coast of Ghogha is muddy and covered by two sub species of *Avicennia* namely *Avicennia marina* var. *marina* and *Avicennia marina* var. *acutissima*.

Zanzmer: The geographic location of Zanzmer is 21° 2' N latitude and 71° 48' E longitude. It is located on seaward side of Gulf of Khambhat and is of rocky coast line with varying types of tidal pools and puddles. Certain species of green and red algae is also occurs at this place.

Data Collection: The intertidal zone of sampling site was surveyed regularly from August 2014 to December 2014 once in a month and all the molluscan species encountered were properly recorded during the lowest tides and later classified systematically and a checklist was prepared. The complete study was conducted in absolutely non-destructive manner, involving extensive digital photography, in which the organisms were not disturbed. The total length of Ghogha coast is about 1.2 km, Zanzmer coast is about 1 km.

Transect and Movement: Transect sampling is one of the most widespread ecological techniques for sampling both plants and animals. The structural attributes of the intertidal fauna were studied by transect method [18] [19] [20] [21]. Provide good previous accounts of non-destructive sampling methods for quantifying the abundances of intertidal populations. The main problem in using any other method like belt transect as that all these methods would come out with the result of avoiding a major proportion of the area. The greatest advantage of foot transect method was that it took the maximum available ground into consideration. At all the sites, criss-cross direction was followed to cover the maximum exposed area on the intertidal belt. The visits were made at the lowest tides of the months. We could not quantify the data as our main objective was to prepare a systematic checklist of mollusca.

Results & Conclusion: The result deals with the diversity of Mollusca in the intertidal zones of the Bhavnagar coast of the Gulf of Khambhat. The sampling sites have been surveyed regularly and all the species of mollusca that were occurring along the entire intertidal area have been recorded during

lowest tide for the present study. Total 20 species of mollusca belonging from 13 families of two different classes were recorded (Table I & II). Ghogha is located on the mid western coast of the Gulf of Khambhat in Bhavnagar District of Gujarat; the intertidal area is muddy with sparse rocks and mangrove habitat. The entire study area harbours about 11 species (Table: - I), of which two species each of *Turbinidae* and *Cerithiidae* while rest of the families having single species as their representative. *Trochus niloticus*, *Cerithium morus*, *Cerithidea cingulata*, and *Assiminea spp.* were found in large numbers and other species were found in few numbers. *Assiminea spp.* and *Littorina scabra* were observed abundant in mangrove area. Other species were recorded sparsely on the entire coast. Zanzmer is located on the shore of the seaside on the Gulf of Khambhat, the entire area is rocky shore line with tidal pools and puddles which harbours large number of marine macro fauna. The entire study area has about 18 species of mollusca of which *Turbinidae*, *Neritidae* and *Cerithiidae* families were having maximum diversity, represented by *Trochus niloticus*, *Trochus radiates*, *Turbo brunneus*, *Astraea stellata*, *Astraea semicostata*, *Nerita crepidularia*, *Nerita oryzae*, *Retina costata*, *Cerithium morus*, and *Cerithidea cingulata*. Whereas, rest of the families have less number of organisms distributed all over the coast. *Trochus radiates* is schedule I species according to wildlife protection act 1972 was also found in large number along the coast line. *Trochus niloticus*, *Cerithium morus*, *Cerithidea cingulata*, *Turbo brunneus*, *Littorina scabra* and *Octopus vulgaris* were also abundant on both the study area. Which shows their adaptability to live in both the habitats i.e rocky and muddy.

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TABLE:-I. Molluscan diversity in Intertidal area of Ghogha coast.

Class	Order	Family	Species Name
Gastropoda	Archeogastropoda	Trochidae	<i>Trochus niloticus</i> Linnaeus,1758
		Turbinidae	<i>Turbo brunneus</i> Roding,1791
			<i>Astraea stellata</i> Gmelin, 1791
		Cerithiidae	<i>Cerithium morus</i> Lamarck,1822
	<i>Cerithidea cingulata</i> Gmelin, 1791		
	Littorinimorpha	Bursidae	<i>Bursa granularis</i> Roding,1798
		Littorinidae	<i>Littorina scabra</i> Linne,1758
		Assimineidae	<i>Assimineia</i> spp.
Neogastropoda	Nassariidae	<i>Nassa reeveanus</i> Dunker,1847	
Systemmatophora	Onchidiidae	<i>Onchidella</i> spp.	
Cephalopoda	Octopoda	Octopodidae	<i>Octopus vulgaris</i> Cuvier,1797

TABLE: - II Molluscan diversity in Intertidal area of Zanzamer coast.

Class	Order	Family	Species Name
Gastropoda	Archeogastropoda	Trochidae	<i>Trochus niloticus</i> Linnaeus,1758
			<i>Trochus radiates</i> Gmelin,1791
		Turbinidae	<i>Turbo brunneus</i> Roding,1791
			<i>Astraea stellata</i> Gmelin, 1791
			<i>Astraea semicostata</i> Kiener,1850
		Neritidae	<i>Nerita crepidularia</i> Lamarck,1822
			<i>Nerita oryzae</i> Recluz,1841
			<i>Retina costata</i> Gmelin,1791
		Patellidae	<i>Clypidina notata</i> Linne,1785
		Cerithiidae	<i>Cerithium morus</i> Lamarck,1822
	<i>Cerithidea cingulata</i> Gmelin, 1791		
	Littorinimorpha	Bursidae	<i>Bursa granularis</i> Roding,1798
		Littorinidae	<i>Littorina scabra</i> Linne,1758
		Neogastropoda	Buccinidae
	Olividae		<i>Oliva gibbosa</i> Born,1778
<i>Oliva nebulosa</i> Lamarck,1822			
Nassariidae	<i>Nassa reeveanus</i> Dunker,1847		
Cephalopoda	Octopoda	Octopodidae	<i>Octopus vulgaris</i> Cuvier,1797

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