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Edible marine molluscan fauna found at Digha coast, West Bengal, India

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Abstract

At present, the total population of India is about 127 crores. Among them a huge number of our children have been suffering from mal-nutritional diseases. They need protein feed and molluscs meat is a good source of protein. India harvested 1.73 lakh tones of Cephalopods, 0.04 lakh tones of Bivalves and 0.02 lakh tones of Gastropods from Indian marine resources in the year 2013-2014. In Southern part of India especially Andhra Pradesh, Tamilnadu, Kerala, Karnataka etc, the poor people including fisher folk population considered the molluscan meat as their feed. At Digha, the beach is about 10 kms long from Digha Mohana to Paschim Gadadharpur and 54 bivalve species, 35 gastropod species and 4 cephalopod species are found as per present study. Out of them 12 bivalves, 2 gastropods and 4 cephalopods are edible species but local people do not consume them except Cephalopods because they are getting different varieties of marine fishes in low price value. But in future the molluscan meat may be eaten by local poor people due to containing high protein in comparation with marine fishes and also scarcity of marine fishes.

Keywords: Bio-diversity, Digha Coast, Ecosystem, Edible Species, Molluscs, Nutritional Value, Usefulness.

Introduction

Molluscs are benthic organisms that live on or in, the bottom of the water body with greater than 1.0 mm size. They are soft bodied animals, a large and most important group of invertebrates which occupy all the possible habitats except aerial. The molluscs consist of the large phylum among the invertebrates. Molluscs are the largest marine phylum, comprising about 23% of all the named marine invertebrate organisms. They are found 10190 meter deep in the ocean to 5000 meter of elevation. It is a highly diversified group, differs in size, shape, number as well as its habit and habitat. Winckworth estimates 31643 number of marine molluscs, 8765 number of freshwater molluscs and 24503 number of terrestrial molluscs, making a total number of 64,912 molluscan species (approx. 65,000)[1]. Subba Rao made a conservative estimate 66535 number of molluscan species of which the Indian share is 5070 number of molluscan species, among them 3400 marine molluscs, 183 freshwater molluscs and 1487 terrestrial mollusks[2].

Molluscs play a major role in ecosystem by filtering phytoplanktons and then acting as a good source of food for higher organisms living in upper tropic level such as fishes. They oxygenate the bottom by reworking sediments and play a basic role in breaking down organic materials before bacterial re-mineralization. A number of mollusks particularly bivalves are consumed by human and others. They are also used as biological indicators because they can provide information on environmental conditions either due to the sensitivity of single species (indicator species) or because of some general feature that makes them integrate environmental signals for a long period of time. Their role in the ecosystem cannot be over looked as many of them are commercially important species and other are biological indicators as well as important in food web. It is proposed to conduct the study on the marine mollusks along the Digha coast.

Molluscs exhibits of significant diversity in shell shape, sculpture and colouration. The marine molluscs display flamboyance in colour and within and between the species comparison to the terrestrial and freshwater molluscs. Diversity is also evident in molluscs in their feeding habit. They are herbivorous, carnivorous, and detritovorous, someone acts as scavengers, and parasites, take part in commensalism also.

Some studies on marine biodiversity of Digha coast as well as surrounding coastal areas were carried out in the past[3]. But, the first comprehensive accounts of marine molluscs were prepared by Ramkrishna *et al*. Keeping view of these studies, the study was planned to monitor the population of individual group, their distribution and status. This report deals with comparative account of marine molluscan fauna at various present studies[4].

Materials and methods

Study area: The history of old and new Digha both is not so old. In 18th century, the Digha village under Birkul Parganas under the British rules was a health resort for the British in India. It was considered as a most popular weekend beach resort in our West Bengal. In the present time, about 40 lakhs over tourists visit Digha every year. Digha beach is situated close to

the Gangetic mouth on the east coast of India facing the Bay of Bengal at latitude $21^0$36´30´´N and longitude $87^0$30´E. Here, the sea is quite shallow with very little wave action on the beach and an extensive area about 250 m of the intertidal zone is exposed during low tides. The beach slope in shore area is very low up to the low water mark. The shore was subjected to considerable erosion in the recent past and the bank is presently protected with the construction of a sloping sea wall. The climate of study area is presented in Table-1.

Table-1: Climatic conditions of Digha coast.

Parameters	Limit
Annual rainfall	1000 mm to 1300 mm
Temperature	16^0C to 35.5^0C
Relative humidity	50% in December and 78% in July
Wind flow (average)	30 Km / hour
Tidal amplitude (average)	2 meter

There are so many variable molluscan species inhabit at Digha and its surrounding coastal areas. The coastal line is straight and large inter-tidal zone. The beach is flat and compact. The beach is made up of sand mixed with variable proportions of silt and which makes it very compact. Digha has potential coast line of about 10 km which offers scope for more effective exploitation of marine fishery resources. There are 8 number of different ghats (spots) studies at Digha coast. The ghats (spots) and their nature at Digha are shown in Table-2.

Table-2: Various Ghats (spots) and its nature at Digha Coast.

Ghats (spots)	Nature
Paschim Gadadharpur	Beach with sand and rocks.
Udaypur	Beach with sand and mud.
Ongaria Ghat	Beach with sand and rocks.
Jatranala Ghat	Beach with sand and gravels.
New Digha	Beach with sub- littoral rocky boulders.
Hospital Ghat	Beach with sand and rocks.
Sea Hawk Ghat	Beach with sand and rocks.
Digha Mohana	Estuary with sandy, muddy and rocky area.

Figure-1: Purba Medinipur District Map (Digha coast, Study area).

Seasonal abundance of Molluscan species: Molluscan species are available at Digha Coast more or less throughout the year. Highest population density is in post monsoon period from the months of September to February due to optimum water salinity and temperature. Availability goes down lowest in monsoon period mainly from the months of June to August due to lowest water salinity. Population density is optimum in summer season from March to May.

Results and Discussion

During present study, the total number of 54 species of Bivalves belonging to 18 families, 35 species of Gastropoda belonging to 18 families and 4 species of Cephalopoda belonging to 3 families have been identified at Digha coast of West Bengal. All of these except cephalopoda habitat (Sandy bottom) can be found in the different ghats (spots) of Digha coast.

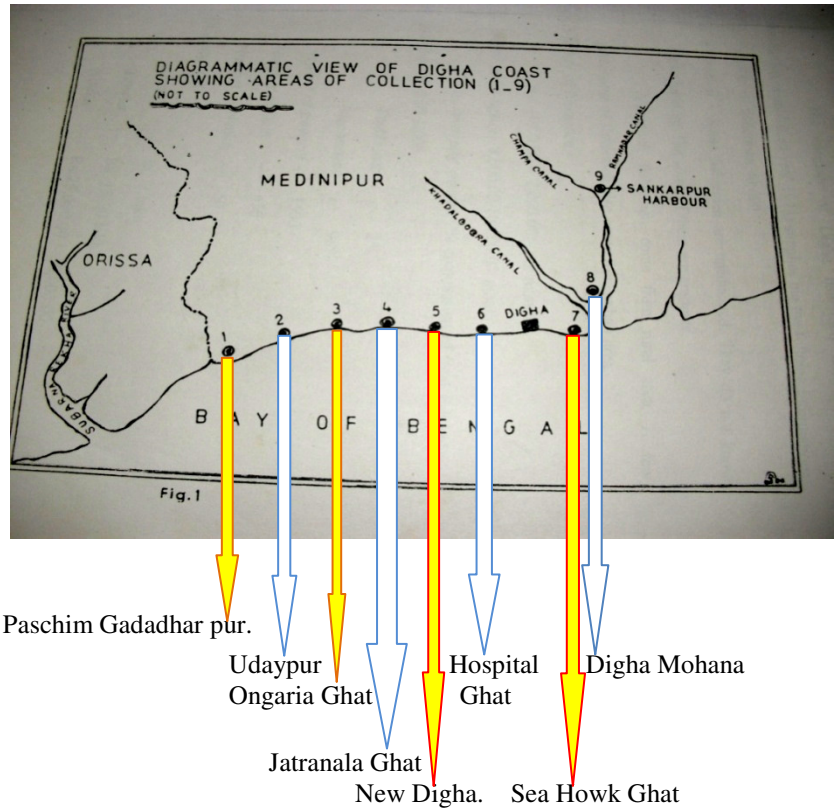


Figure-2: Diagrammatic view of Digha Coast showing areas of collection.

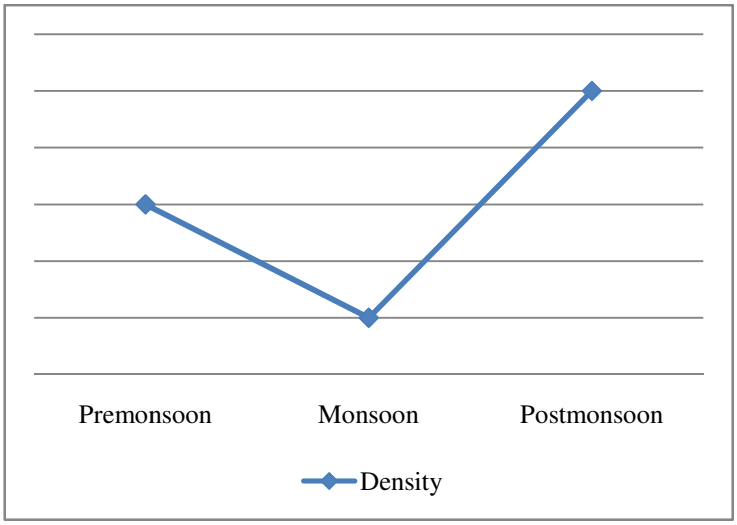


Figure-3: Seasonal Abundance of Molluscan Species at Digha Coast.

Table-3: List of Bivalvia available at Digha Coast[5-8].

Sl.No.	Family Name (18)	Genera (34)	Specimen (54)
1.	Arcidae.	Anadara.	*Anadara granosa* (Linnaeus, 1758).
			Anadara inequivalvis (Bruquiere, 1789).
			*Anadara antiquata (*Linnaeus, 1758).
		Scapharca	*Scapharca cornea* (Reeve, 1844).
2.	Asteropectinidae	Astropecten	*Astropecten indicus* (Doederlein, 1872).
3.	Cardiidae.	Trachycardium	*Trachycardium asiaticulum* (Brugierra, 1794).
4.	Corbiculidae.	Polymesoda.	*Polymesoda bengalensis* (Lamarck, 1818).
5.	Donacidae.	Donax.	*Donax incarnates* (Gmelin, 1791).
			Donax scortum (Linnaeus, 1758).
6.	Glauconomidae.	Glauconome	*Glauconome sculpta* (Sowerby, 1844).
			Glauconome virens (Linnaeus, 1767).
7.	Laternulidae.	Laternula	*Laternula truncate* (Lamark, 1818).
8.	Mactridae.	Mactra.	*Mactra mera* (Reeve, 1854).
			Mactra luzonica (Reeve, 1854).
			Mactra violacea (Gmelin, 1791).
			Mactra plicataria (Linnaeus, 1758).
			Mactra dissimilis (Reeve, 1854).
			Mactra cuneata (Gmelin, 1791).
			Mactra stultrum (Linnaeus, 1758).
		Roeta	*Roeta pulchella* (Reeve, 1850).
			Roeta peliculla (Reeve, 1854).
9.	Mytilidae.	Perna.	*Perna viridis* (Linnaeus, 1758).
		Modiolus	*Modiolus undulates* (Dunker, 1856).
			Modiolus striatulus (Hanley, 1844).
10.	Ostreidae.	Saccostrea	*Saccostrea cucullata* (Born, 1778).
		Crassostrea	*Crassostrea gryphoides* (Scholthein, 1813).

Sl.No.	Family Name (18)	Genera (34)	Specimen (54)
11.	Pharidae.	Pharella.	*Pharella javanica* (Lamark, 1818).
		Siliqua.	*Siliqua albida* (Dunker, 1865).
			Siliqua radiata (Linnaeus, 1758).
			Siliqua winteriana (Dunker, 1852)
12.	Pinnidae.	Pinna.	*Pinna bicolor* (Gmelin, 1791).
13.	Psammobiidae.	Apolymetis.	*Apolymetis edentula* (Spengler, 1782).
		Sanguinolaria	*Sanguinolaria acuminata* (Reeve, 1857).
14.	Pholadidae.	Barnea.	*Barnea candida* (Linnaeus, 1758).
		Pholas	*Pholas orientalis* (Gmelin, 1791).
15.	Solenidae.	Solen	*Solen brevis* (Gray, 1842).
16.	Tellinidae.	Tellina.	*Tellina sinuata* (Spengler, 1782).
			Tellina opalina (Chemitz, 1788).
		Strigilla.	*Strigilla splendida* (Anton, 1838).
		Macoma.	*Macoma birmanica* (Phillipi, 1849).
			Macoma truncata (Jonas, 1843).
			Macoma blairensis (Smith, 1906).
17.	Ungulinidae	Diplodonta.	*Diplodonta bullata* (Dunker, 1865).
18.	Veneridae.	Timoclea.	*Timoclea imbricata* (Sowerby, 1844).
		Meretrix.	*Meretrix meretrix* (Linnaeus, 1758).
			Meretrix casta (Gmelin, 1791).
		Katelysia	*Katelysia opima* (Gmelin, 1791).
		Katelesiya	*Katelesiya japonica* (Gmelin, 1791).
		Pelecyrora	*Pelecyrora trigona* (Reeve, 1850).
		Paphia	*Paphia textile* (Gmelin, 1791).
			Paphia semirugata (Philippi, 1847).
		Dosinia	*Dosinia prostata* (Linnaeus, 1758).
		Sunetta	*Sunetta scripta* (Linnaeus, 1758).
			Sunetta meroi (Linnaeus, 1758).

Table-4: List of Gastropoda available at Digha Coast[5-8].

Sl.No.	Family Name (18)	Genera (27)	Specimen (35)
1.	Architectonidae.	Architectonica	*Architectonica perspectiva* (Linnaeus, 1758).
			Architectonica laevigata (Lamarck, 1816).
2.	Bursidae	Bursa	*Bursa rana* (Linnaeus, 1758).
3.	Cassidae.	Phalium.	*Phalium bisulcatum* (Schubert & Wagner, 1829).
4.	Ellobidae.	Pythia.	*Pythia plicata* (Fe'russac, 1848).
5.	Epitoniidae.	Acrilla.	*Acrilla gracilis* (Sowerby, 1844).
		Merex	*Murex tribulus* (Linnaeus, 1758).
6.	Muricidae.	Seminricimula	*Seminricinula konkanensis* (Melvill, 1893).
		Thais.	*Thais licera* (Born, 1778).
			Thais blanfordi (Melvill, 1893).
7.	Melongenidae.	Pugilina.	*Pugilina cochlidium* (Linnaeus, 1758).
8.	Nassaridae.	Nassarius.	*Nassarius faveolatus* (Reeve, 1849).
			Nassarius stolatus (Gmelin, 1791).
		Nassaria	*Nassaria nassaria.* (Roeding P F, 1798).
9.	Naticidae.	Natica.	*Natica gualteriana* (Recluz, 1843).
			Natica lineata (Roding, 1798).
			Natica tigrina (Roding, 1798).
		Sinum	*Sinum neritoiderum* (Linnaeus, 1758).
		Polinices.	*Polinices didyma* (Roeding, 1798).
			Polinices tumidus (Swainson, 1840).
10.	Neritidae	Nerita	*Nerita grayana* (Recluz, 1843)
11.	Olividae.	Olivancillaria	*Olivancillaria gibbosa* (Born, 1778).
		Oliva	*Oliva oliva* (Linnaeus, 1758).
		Amalda.	*Amalda ampla* (Gmelin, 1791).
		Agaronia	*Agaronia nebulosa* (Lamark, 1811).
12.	Potamididae.	Cerithidae	*Cerithidea cingulate* (Gmelin, 1791).
			Cerithidea obtusa (Lamarck, 1758).
		Telescopium	*Telescopium telescopium* (Linnaeus, 1758).
13.	Renellidae	Gyrinum	*Gyrinum natator* (Roding, 1798).
14.	Terebridae.	Terebra.	*Terebra tenera* (Hinds, 1844).
15.	Tonnidae.	Tonna.	*Tonna dolium* (Linnaeus, 1758).
			Tonna sulcosa (Swainson, 1840).
16.	Turritullidae.	Turritella.	*Turritella attenuata* (Reeve, 1849).
17.	Trochidae.	Umbonium.	*Umbonium vestiarium* (Linnaeus, 1758).
18.	Volutidae.	Melo	Melo melo (Solander, 1786).

Table-5: List of Cephalopoda Available at Digha Coast[5-8].

Sl. No.	Family Name (3)	Genera (4)	Specimen (4)
1.	Loliginidae.	Loligo.	*Loligo duvauceli* (d'Orbigny, 1848).
2.	Octopodidae.	Octopus.	*Octopus macropus* (Risso, 1826).
3.	Sepiidae.	Sepia.	*Sepia aculeata* (Ferussac and d'Orbigny, 1848).
		Sepiella.	*Sepiella inermis* (Ferussac and d'Orbigny, 1848).

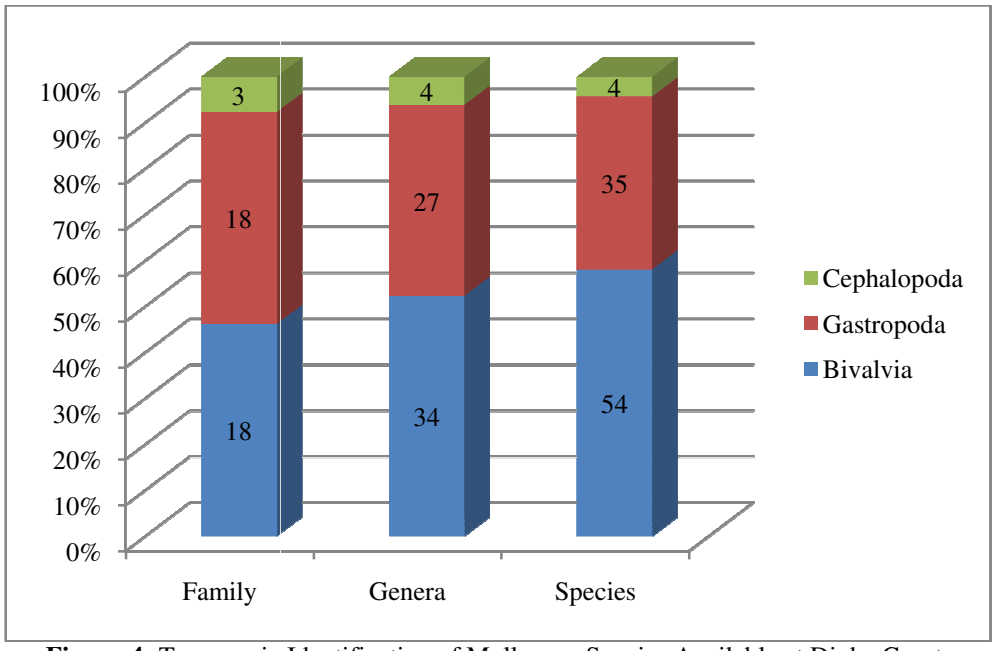


Figure-4: Taxonomic Identification of Molluscan Species Available at Digha Coast.

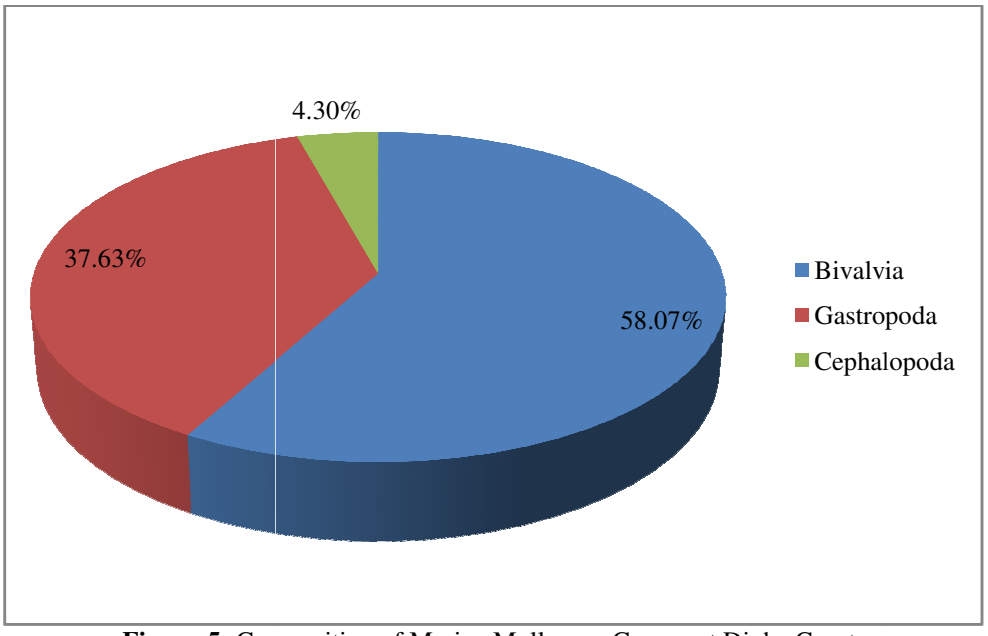


Figure-5: Composition of Marine Molluscan Groups at Digha Coast.

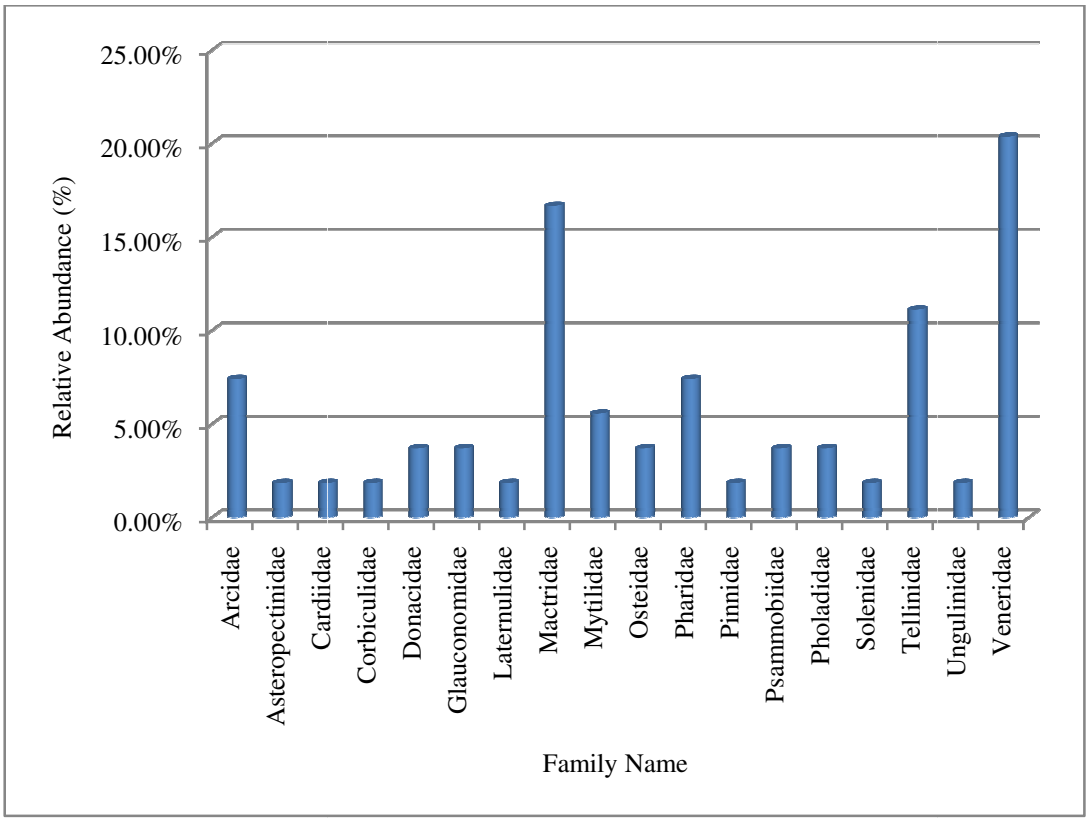


Figure-6: Showing Distribution of Bivalvias in Family-wise (%) from Study Area.

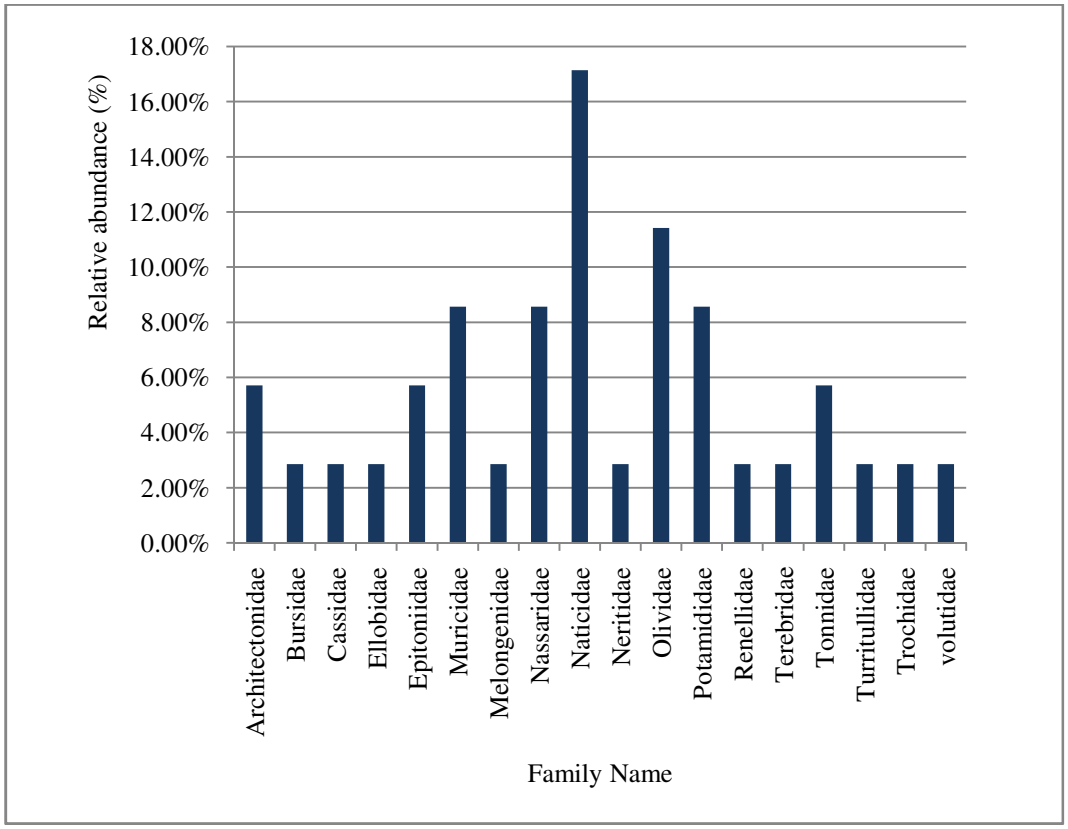


Figure-7: Showing Distribution of Gastropodas in Family-wise (%) from Study Area.

Among the available marine molluscan species at Digha coast, 12 bivalves, 2 gastropods and 4 cephalopods are edible as per survey report but local common people including fisher folk population consume only cephalopods (molluscs) meat but not others bivalves and gastropods meat due to perhaps lack of knowledge and availability of various types of marine fishes in cheap rate. But in future this situation will be changed; local common people will take the molluscs meat as their everyday food item when they will know the nutritive value and usefulness of meat in human body.

The edible marine molluscan species found at Digha coast are shown in the Table-6.

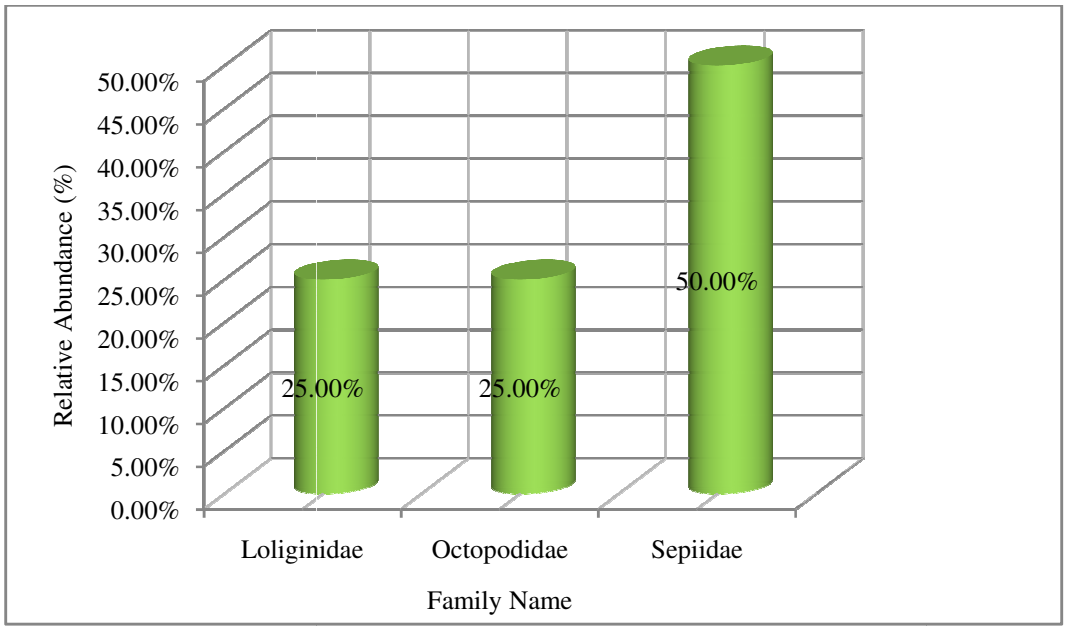


Figure-8: Showing Distribution of Cephalopodas in Family-wise (%) from Study Area.

Table-6: List of Edible Marine Bivalvia available at Digha Coast[9].

Sl.No.	Family Name (6)	Genera (8)	Specimen (12)
1.	Arcidae.	Anadara.	*Anadara granosa* (Linnaeus, 1758).
			Anadara inequivalvis (Bruquiere, 1789).
			*Anadara antiquata (*Linnaeus, 1758).
2.	Donacidae.	Donax.	*Donax incarnates* (Gmelin, 1791).
			Donax scortum (Linnaeus, 1758).
3.	Mytilidae.	Perna.	*Perna viridis* (Linnaeus, 1758).
4.	Ostreidae.	Saccostrea	*Saccostrea cucullata* (Born, 1778).
		Crassostrea	*Crassostrea gryphoides* (Scholthein, 1813).
5.	Solenidae.	Solen	*Solen brevis* (Gray, 1842).
6.	Veneridae.	Katelysia	*Katelysia opima* (Gmelin, 1791).
		Meretrix.	*Meretrix meretrix* (Linnaeus, 1758).
			Meretrix casta (Gmelin, 1791).

Table-7: List of Edible Marine Gastropoda available at Digha Coast[9].

Sl. No.	Family Name (2)	Genera (2)	Specimen (2)
1.	Olividae.	Olivancillaria	*Olivancillaria gibbosa* (Born, 1778).
2.	Trochidae.	Umbonium.	*Umbonium vestiarium* (Linnaeus, 1758).

Table-8: List of Edible Marine Cephalopoda Available at Digha Coast[9].

Sl. No.	Family Name (3)	Genera (4)	Specimen (4)
1.	Loliginidae.	Loligo.	*Loligo duvauceli* (d'Orbigny, 1848).
2.	Octopodidae.	Octopus.	*Octopus macropus* (Risso, 1826).
3.	Sepiidae.	Sepia.	*Sepia aculeata* (Ferussac and d'Orbigny, 1848).
		Sepiella.	*Sepiella inermis* (Ferussac and d'Orbigny, 1848).

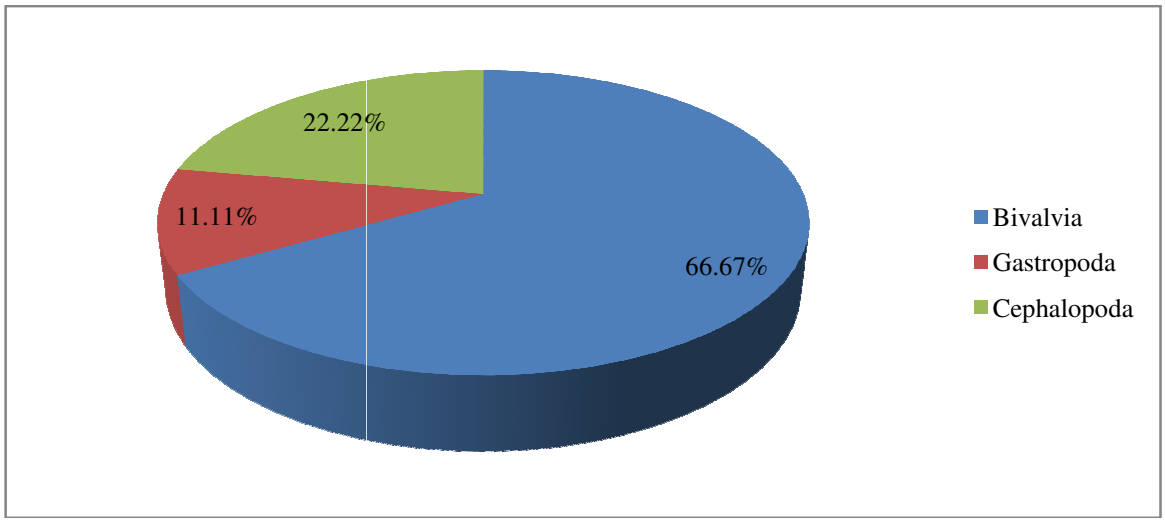


Figure-9: Composition of Edible Marine Molluscan Groups Available at Digha Coast.

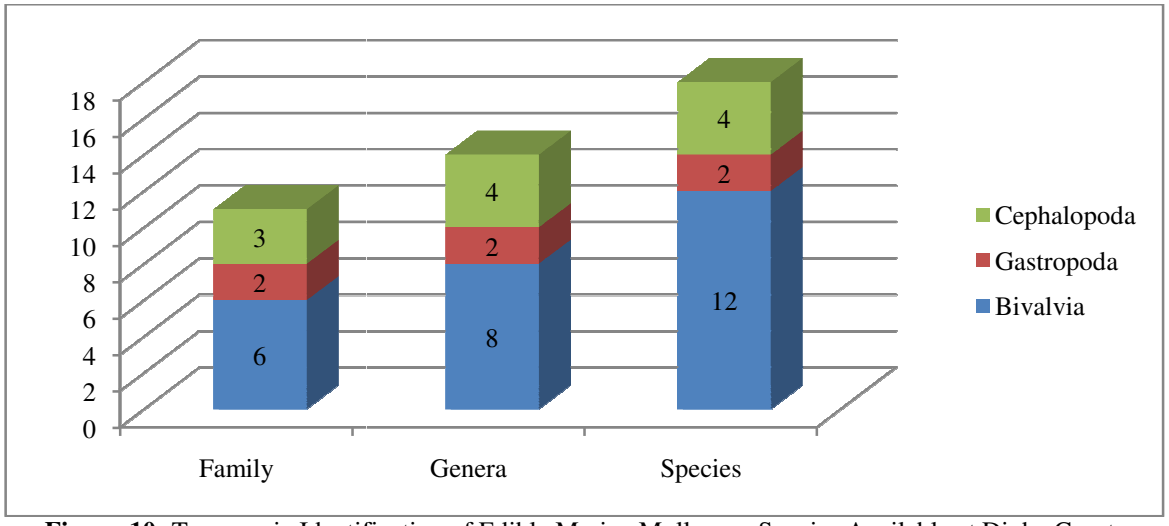


Figure-10: Taxonomic Identification of Edible Marine Molluscan Species Available at Digha Coast.

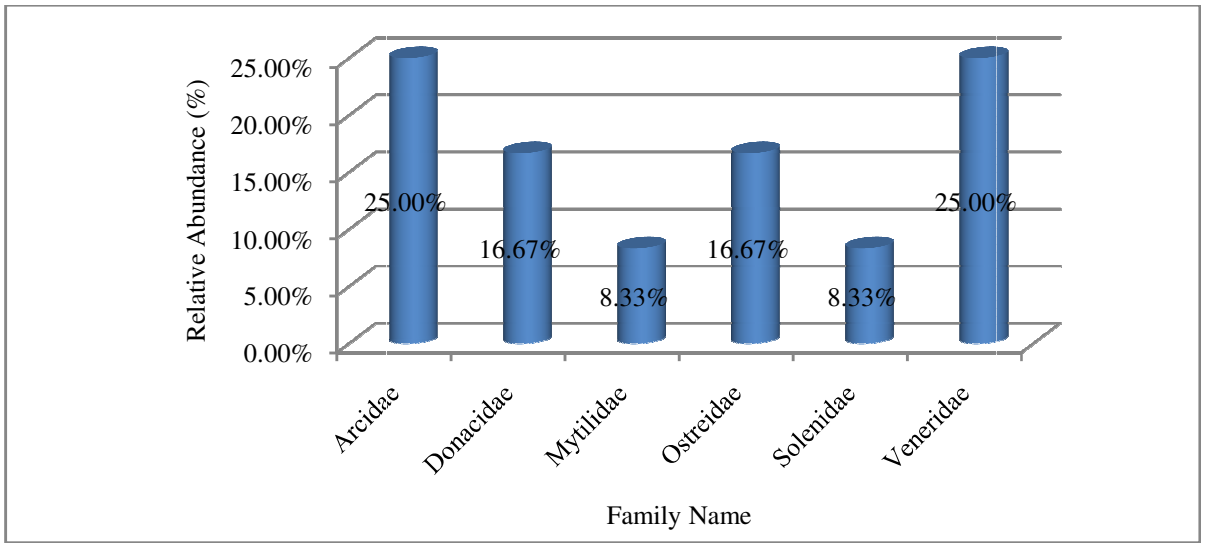


Figure-11: Showing Distribution of Edible Bivalvia in Family-wise (%) from Study Area.

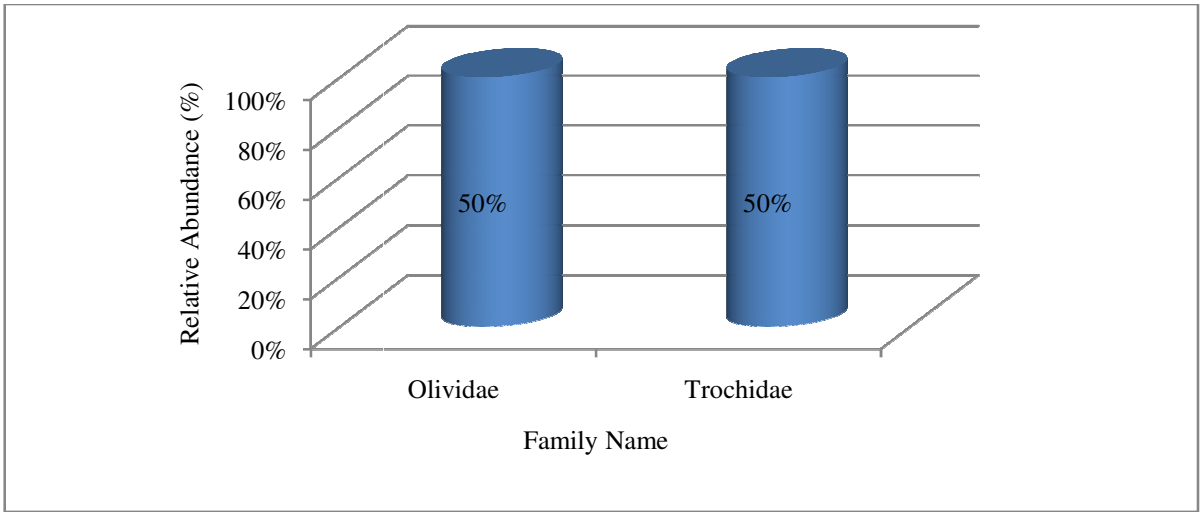


Figure-12: Showing Distribution of Edible Gastropodas in Family-wise (%) from Study Area.

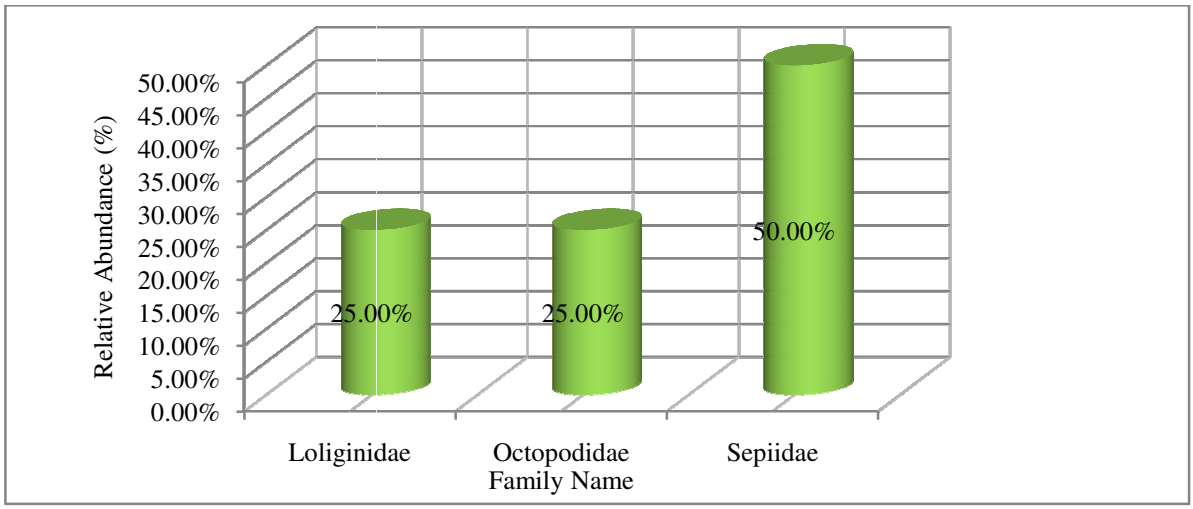
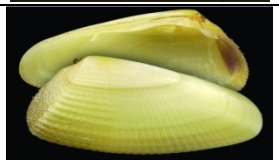
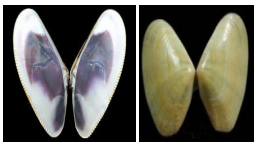


Figure-13: Showing Distribution of Edible Cephalopodas in Family-wise (%) from Study Area.

Table–9: Edible Marine Molluscs Species (Bivalves) available at Digha Coast[9].

Sl. No	Specimen (12)	Seasonal Abundance	Figure
1.	*Anadara granosa* (Linnaeus, 1758,) Common Name - Blood Clam/Cockle Clam	Found in the months of January, February, March, August, September, October, November and December in a year. Peak in winter season.	
2.	*Anadara inequivalvis* (Bruquiere, 1789). Common Name- Ark Shell Clam.	Found in the months of January, February, March, October, November and December in a year. Peak in winter season.	
3.	*Anadara antiquata* (Linnaeus, 1758). Common Name - Ark Clam.	Found in the months of January, February, March, September, October, November and December in a year. Peak in winter season.	
4.	*Crassostrea gryphoides.* (Scholtheim, 1813) Common Name – Kutch Oyster	Found in all the months of a year. Peak in winter season.	
5.	*Donax incarnates* (Gmelin, 1791). Common Name – Surf Clam.	Found in the months of January, February, March, April, May, June, October, November and December in a year. Peak in winter season.	
6.	*Donax scortum* (Linnaeus, 1758). Common Name - Wedge Clam.	Found in the months of January, February, March, April, May, June, October, November and December in a year. Peak in winter season.	
7.	*Katelysia opima* (Gmelin, 1791). Common Name - Baby Clam.	Found in the months of January, February, March, April, September, October, November and December in a year. Peak in winter season.	
8.	*Meretrix meretrix* (Linnaeus, 1758). Common Name - Yellow Clam/Hard Clam.	Found in the months of January, February, March, October, November and December in a year. Peak in winter season.	

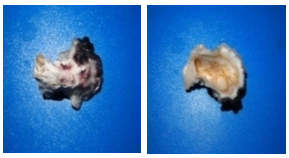
Sl. No	Specimen (12)	Seasonal Abundance	Figure
9.	*Meretrix casta* (Gmelin, 1791). Common Name – Matti.	Found in the months of January, February, March, October, November and December in a year. Peak in winter season.	
10.	*Perna viridis* (Linnaeus, 1758). Or. *Mytilus viridis.* (Hornell, 1921) Common Name – Green Mussel.	Found in the months of January, February, March, April, November and December in a year. Peak in winter season.	
11.	*Saccostrea cucullata* (Born, 1778). Common Name - Indian Rock Oyster.	Found in all the months of a year. Peak in winter season.	
12.	*Solen brevis* (Gray, 1842). Common Name – Razor Shell Clam.	Found in the months of January, February, March, April, October, November and December in a year. Peak in winter season.	

Table-10: Edible Marine Molluscs Species (Gastropods) Available at Digha Coast[9].

Sl.No	Specimen (2)	Seasonal Abundance	Figure
1.	*Olivancillaria gibbosa* (Born, 1778). Common Name - Olive Shell / Cone.	Found in the months of January, February, March, October, November and December in a year. Peak in winter season.	
2.	*Umbonium vestiarium* (Linnaeus, 1758). Common Name – Limpet.	Found in all the months of a year. Peak in winter season.	

Table-11: Edible Marine Molluscs Species (Cephalopods) Available at Digha Coast[9].

Sl.No	Specimen (4)	Seasonal Abundance	Figure
1.	*Loligo duvauceli* (d'Orbigny, 1848). Common Name – Squid.	Found in the months of January, February, March, April, May, September, October, November and December in a year. Peak in winter season.	
2.	*Sepia aculeata* (Ferussac and d'Orbigny, 1848). Common Name - Needle Cuttle Fish/Spined Cuttle Fish.	Found in the months of January, February, March, April, May, September, October, November and December in a year. Peak in winter season.	
3.	*Sepiella inermis* (Ferussac and d'Orbigny, 1848). Common Name - Spineless Cuttle Fish.	Found in the months of January, February, March, April, May, September, October, November and December in a year. Peak in winter season.	
4.	*Octopus macropus* (Risso, 1826). Common Name – Atlantic White Spotted Octopus/ Grass Scuttle.	Found in the months of January, February, March, and December in a year. Peak in winter season.	

The water content of overall edible marine molluscs is relatively high throughout the year. During monsoon season, high values of water content are obtained from the month July and onwards. Low values of water content are decreased from November and onwards during the post monsoon season. The average value of water content is low during the pre monsoon period compared to the monsoon and post monsoon seasons. Lowest and highest values of water content are observed in March and July in a year respectively. In general, the water content of the tissue of bivalves usually gives an indication of the time of spawning[10-14].

The protein content of molluscan species is at relatively high level trough out the year. It is being maximum in the month of May and minimum in the month of November. In the month of March and April, the protein content is high reaching its peak in the month of May. Afterwards, it decreased during the monsoon period. Generally seasonal changes in the biochemical composition are the characteristics of the seasonal activities of bivalves. Variations in biochemical constituents seem to be mainly influenced by reproductive cycle and availability of food. In marine molluscs, the reproductive cycle is governed by a number of factors like salinity, water temperature, day length and density of the surrounding medium[10-14].

The lipid content of marine molluscs shows a gradual increase from the month of February and peak in the gravid population of May before spawning. In June, the lipid content is sharply decreased and remained at low level upto July due to continuous spawning. Possibility of an increase in lipid content in bivalves during phytoplankton bloom has been reported. Lipid levels of almost same magnitude have been reported in the literatures from Indian waters[10-14].

Carbohydrate values fluctuated widely in all the months. Maximum value is in July and minimum in May. In general glycogen content shows variations with the breeding behaviour and development of the gonad. Carbohydrate percentage is at the peak in July and it decreased in September. In the month of November, the glycogen value is high again and the lowest value is recorded during the pre monsoon season[10-14].

Ash content in marine molluscs body also fluctuates in a year. It is highest in the month of May and lowest in the month of August. Ash content is similar with percentage of protein and lipid. However, changes in carbohydrate percentage show a completely different resulting in an inverse relationship between carbohydrate and protein[10-14].

Immensely great is the utilization of molluscs shell lime in all masonry construction and for white washing the buildings. Their use as fertilizers in plantations has also gained momentum in the recent years. From sandy shores washed shell are gathered in quantities. After the removal of meats for food, hells of all edible forms are collected. Dead shells in considerable

quantities are annually gathered from oyster and clam beds, shells of even pearl oysters and window – pan oysters are much used for lime.

All molluscan shells, big or small, dull ones or beautifully tined ones go into the making of toys, boxes, lamp bases of shades, garlands, rings, ash-trays, knife handles etc. most of the polished shells are sold as cunios, cameos are carved on large shells by removal of the surface layers and exposing the deeper layers of varied colour pattern. The corridors of the temples are flooded with soaps selling such articles. Almost obsolete now are much used as the whelks for purple dye, cuttle bone for polishing furniture, sepia for drawing ink, molluscan shells are pulverized and used in poultry feed for the birds to lay eggs with thick and perfect shells.

An industry is bound to develop for the export trade of frozen or canned meat of oyster, mussel and clam, edible gastropods and cephalopods for which the demand in countries abroad is good. This requires only a little initiative and enterprise on the part of the business circles as the processing facilities are already available in most parts of the country. More than this a greater demand for the shellfish food within our own country could be created by educating the people on the nutritive merits of the molluscs. By developing cultured practices of useful shellfishes substantial increase in yield could be expected. A huge amount of eroded sediments, fly ash along with several other industrial discharges have made every year this coast unsuitable for living species. This is directly reflected by the steady decline of the abundance of fin fish and shell fish seeds, smaller fin fishes and other nektonic forms. The data collected during last 10 years from the Department of Fishery, Government of West Bengal, relating to fish and shell fish landings at Digha and surrounding coast, reveals a drastic reduction of total landings of different fishery resources. Operation of huge number of fishing trawlers with nylon thread gears may be considered a major factor for such down going condition. It is well known that oil and other related organic products after being discharged from different fishing trawlers, ships and other marine vessels pollute considerably both pelagic and benthic environment. Domestic sewage in small quantities is known to fertile the sea water which leads to an increase in marine productivity because of eutrophication. Waste disposal from the tourist centers of Digha and nearby fishing harbours of Sankarpur contributes pollutants into the nearby estuaries and small marshes[15]. We should be sincere immediately to protect the biodiversity of Digha coast in West Bengal.

Conclusion

At Digha it is seen that all ghats (spots) do not show the availability of all marine mollusks population because increasing tourism, pollution, fluctuation of water parameters throughout the year and other anthropogenic activities. It proves that marine molluscan fauna are under heavy pressure. Present study shows that Udaypur ghat (spot) and Hospital ghat (spot) is most suitable location of marine mollusks population. However Digha Mohana and other ghats (spots) are under pressure due to early mentioned causes. Maximum marine molluscan species are available at Digha coast during winter season in the month from October to February. On the other hand population is minimum during rainy season in the month from June to July in a year. Public (tourist) should be conscious about bio- diversity of all ecosystems. All of them should know how different varieties of marine mollusks species as well as other populations are beneficial and play role in existence of human life. The law CRZ (Coastal Regulation Zone) must be implemented strictly by Government both State and Central for survival of marine population.

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