

**ANALYZING THE MARINE MOLLUSCAN BIODIVERSIFICATION AT DIGHA  
COAST, WEST BENGAL, PURBA MEDINIPUR, INDIA****Somnath Das\*<sup>1</sup>, Dr. Rakhi Das\*<sup>2</sup>, Dr. Deepak Kher\*<sup>3</sup>**

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DOI : <https://www.doi.org/10.56726/IRJMETS60205>**ABSTRACT**

The study conducted from June 2023 to May 2024 revealed that West Bengal's 158.2-kilometer coastline offers various biological resources for local consumption, including oyster harvesting. Despite malnutrition affecting India's 127 million population. As a result of the current molluscan species search, it was found that 22 species of bivalves belonging to 16 Genera, 14 families, 16 species of gastropods belonging to 13 Genera, 10 families and 3 order 3 family cephalopods fauna are found. The distribution of molluscan species usually plays a special role in seasonal variation. Mainly in the June to August rainy season due to low salinity, the abundance has decreased and in the rest of the seasons September to February months the species has been distributed to the highest extent. Mollusks, especially in southern India, are being considered a food source for poor communities, including fishermen, due to their high protein content and potential availability in Digha due to marine fishing resource depletion.

**Keywords:** Species, Seasonal Abundance, Molluscs, Bivalvia, Biodiversity, Digha Coast.

**I. INTRODUCTION**

The term "mollusks", derived from Latin, means "soft". Aristotle is attributed as the source of the word "mollusk". Mollusks are benthic organisms, typically larger than 1.0 mm, which reside on the bottom of bodies of water. Their body consists of a head, a visceral mass, locomotor organs (or digging legs), and a mantle that secretes calcareous needles or one or more scales. Chitin has small ribbon-like or radial teeth in the mouth, except in bivalves where it is absent. Mollusks are soft-bodied animals and are the largest and most important group of invertebrates, found in various habitats except air. They represent the largest group of marine invertebrates, making up 23% of all marine fauna. Named mollusks **Linnaeus (1758)**, while the term was initially proposed by **Johnston (1650)**, whose concept was never fully developed. Provided a more comprehensive understanding of this group, with concepts that approach modern thought **Cuvier (1795)**. Initially, other groups such as barnacles, brachiopods, and other Crustaceans were classified together with mollusks. The organisms in this group can be found in waters ranging from a depth of 10109 meters to an altitude of 5000 meters. This group is highly diverse, varying in size, shape, number, habitats, and habits. Estimated the number of marine mollusks at 31,643, the number of freshwater mollusks at 8,765, and the number of terrestrial mollusks at 24,503, bringing the total number of mollusks to 64,911 (approximately 5,006) **Wincourt (1940)**. Estimated the number of mollusk species to be 66535. India's share is 5070 mollusks, which includes 3400 marine mollusks and 183 freshwater mollusks **Subba Rao (1998)**. Estimated that the number of known extant species of described mollusks is between 50,000 and 120,000 **Chapman (2009)**. Estimated the total number of extant mollusks at 107,000, which includes approximately 12,000 freshwater gastropods and 35,000 terrestrial mollusks **David Nicol (1969)**. Marine mollusks play an important role on the ecosystem. They are a major food source for humans and other consumers and are also an important biological resource, much like fish. Many mollusks, especially cephalopods, are consumed by humans and other organisms. Digha is located on the east coast of India, facing the Bay of Bengal at 21°36'30"N latitude and 87°30'E longitude, in Purba Medinipur district. There is a concrete road from Talsary to Paschim Shankarpur, with a beach on one side and a forest of Casuarina and Keya trees on the other. The defining

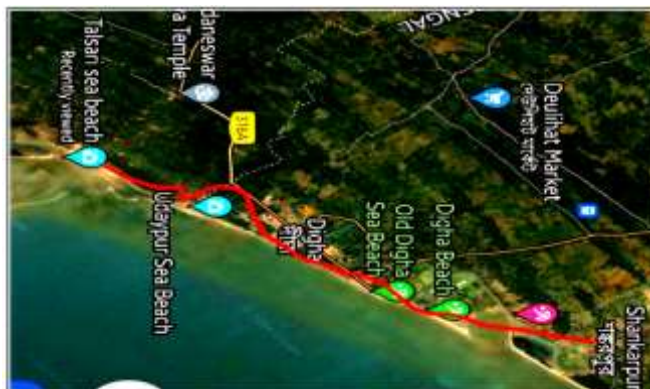
characteristic of mollusks is the presence of a soft body that is often enclosed within a calcium carbonate shell. However, not all mollusks have shells, some have reduced or internal shells, while others lack them entirely. Molluscs, especially shells, had a significant impact on Indian culture and economy. They were popular among the common people as ornaments, currency, and curio materials. Moreover, mollusks have been found to be an important

raw material for poultry feed, cement manufacturers, and fertilizers. India exports marine shells, especially bivalves and large snails, to various countries. Digha and its surrounding coastal areas are rich in mollusks, with a straight coastline and a wide intertidal zone. The beach is flat and compact, consisting of sand mixed with varying proportions of mud. Digha has about 10 km of potential coastline, making it ideal for effective use of marine fisheries resources. Additionally, there are five different ghat (point) surveys along the shores of Digha.

## II. MATERIALS AND METHODS

### STUDY SIDE:

Digha is one of the most popular beaches in Purba Medinipur district of west Bengal, India. And more than 40 lakh tourists visit Digha every year. Digha Latitude 21°41' North and Longitude 87°33' East. Its height is 6 meters above sea level. 5 ghats have been selected for molluscan study in Digha (Fig 1, Table1).



**Figure 1:** Diagrammatic view of Digha coast **Figure 2:** Satellite view of Digha coast showing areas of collection. Showing areas of the collection.

**Table 1:** Various spots (ghats) and its nature at Digha coast

Ghats ( spot)	Nature
Talsari	Beach with sand and rocks.
Udaipur	Beach with sand and mud.
Old Digha	Beach with sand and rocks.
Digha mohana	Estuary with sandy, rocks and muddy.
Shankarpur	Beach with sand.

**Table 2:** Climatic conditions of Digha coast

Parameters	Limit
Temperature	16°C to 35.50°C
Wind flow (average)	30 Km / hour
Annual rainfall	1000 mm to 1300 mm
Relative humidity	50% in December

### 1. Collecting sample:

First, the molluscan species were collected from the 5 selected Areas (Talsary to Shankarpur, 15.9 km) Digha. Molluscan were collected in three ways from reef areas and gastropods were collected by hand picking from

pits under soft mud using spades. Bivalves are hand-picked from the rocky reefs and intertidal zones scattered across the sandy beaches. Cephalopods are collected from coastal waters by dragnet fishing.

**2. Preserving & identifying sample:**

Then the collected species were washed thoroughly since the shells of dead species were found, the shells were thoroughly washed and dried and the species belonging to cephalopods were preserved in **70% alcohol +3% formalin +27% distilled water** and were identified.

**III. RESULTS AND DISCUSSION**

A survey of Mollusca species was conducted in Digha, in the present East Midnapore district. The experimental survey to record the molluscan species was conducted from June 2023 to May 2024. During the present study period from 2023 to 2024 selected morning time 9:00 AM to 11:30 AM, collected total number of 22 species of bivalves belonging to 16 Genera, 14 families, 16 species of gastropods belonging to 13 Genera, 10 families, and 3 species of cephalopods belonging to 3 Genera 3 families. All mollusk species are found in the different spots.

**Table 3:** List of available bivalvia fauna at digha coast

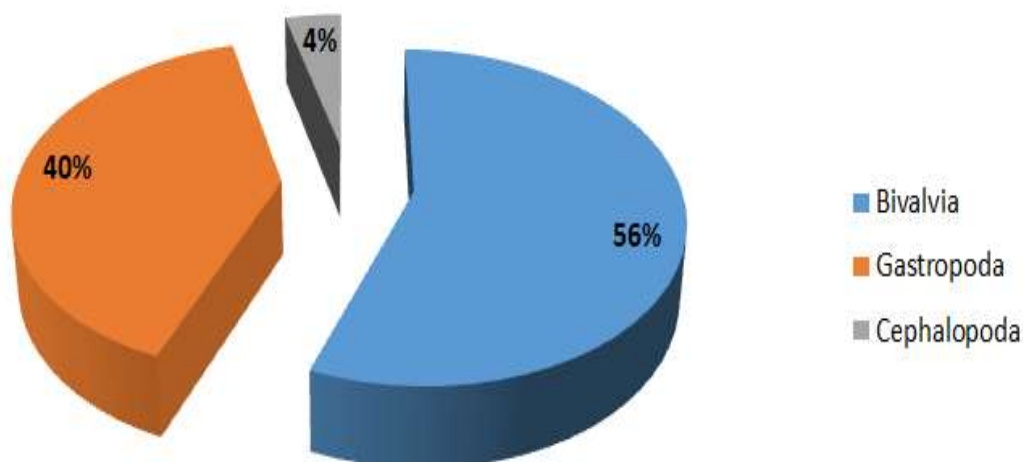
Sl. No.	Family Name (14)	Genera (16)	Specimen (22)
1	Arcidae	Anadara	Anadara granosa (Linnaeus, 1758)
			Anadara inequivalvis (Bruquierre)
		Scapharca	Scapharca cornea (Reeva, 1844)
2	Solecurtidae	Azorinus	Azorinus chamasolen
3	Psammobiidae	Apolymestis	Apolymestis edentula (Spenglar, 1782)
4	Pholadidae	Barnea	Barnea candida (Linnaeus, 1758)
5	Cardiidae	Trachycardium	Trachycardium egmontianum (Shuttleworth, 1856)
		Vepricardium	Vepricardium asiticum (Bruguiere, 1789)
6	Donacidae	Donax	Donax scortum (Linnaeus, 1758)
7	Glaucnomidae	Glaucnome	Glaucnome sculpta (Sowerby, 1844)
			Glaucnome varens(Linnaeus, 1767)
8	Macrtidae	Mactra	Mactra violacea (Gmelin, 1791)
			Mactra dissimilis (Reeve; 1854)
			Mactra luzonica (Reeve, 1854)
			Mactra chinensis (Reeve, 1854)
9	Mytilidae	Modiolus	Modiolus striatulus (Hanley, 1844)
10	Pharidae	Siliqua	Siliqua radiata (Linnaeus, 1758)
11	Ungulinidae	Dipolodonta	Dipolodonta bullata (Dunker, 1865)
12	Veneridae	Pelecyrora	Pelecyrora trigona(Reeve, 1850)
13	Petricola	Petricola	Petricola pholadiformis (Lamarck, 1818)
14	Pharidae	Siliqua	Siliqua radiate (Linnaeus, 1758)
			Siliqua winteriana (Dunker, 1852)

**Table 4:** List of available gastropoda fauna at digha coast

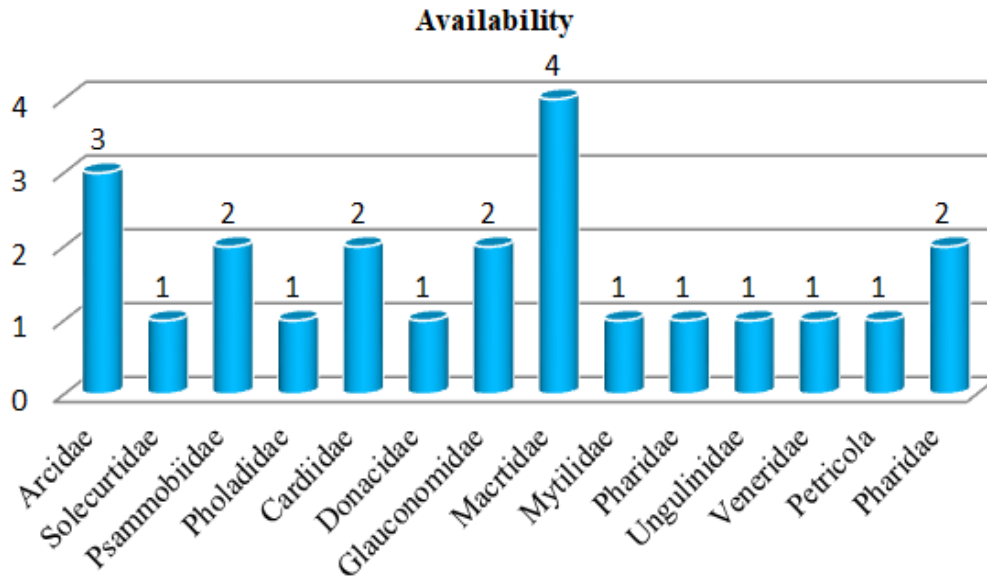
Sl. No.	Family Name (10)	Genera (13)	Specimen (16)
1	Olivaidae	Amalda	Amalda ampla (Lamarck, 1816)
2	Epitoniidae	Acrilla	Acrilla gracilis (Sowerby, 1816)
3	Potamididae	Cerithidea	Cerithidea obtuse (Lamarck, 1758)
4	Naticidae	Natica	Natica tigrina (Roeding, 1798)
			Natica lineate (Roeding, 1748)
			Natica gualteriana (Reciuz, 1843)
			Natica multipunctata (Blainville, 1758)
		Sinum	Sinum neritoiderum (Linnaeus, 1767)
		Polinices	Polinices didyama (Roeding, 1798)
5	Nassaridae	Nassarius	Nassarius stolatus (Gmelin, 1791)
6	Olividae	Oliva	Oliva olive (Linnaeus, 1758)
7	Potamididae	Pyrazisinus	Pyrazisinus scalatus (Heilprin, 1886)
		Telescopium	Telescopium telescopium (Linnaeus, 1758)
8	Tonnidae	Tonna	Tonna dolium (Linnaeus, 1758)
9	Turritellidae	Turritella	Turritella terebra (Linnaeus, 1758)
10	Nurcidae	Urosalpinx	Urosalpinx cinerea (Say, 1822)

**Table 5:** List of available cephalopoda fauna at digha coast

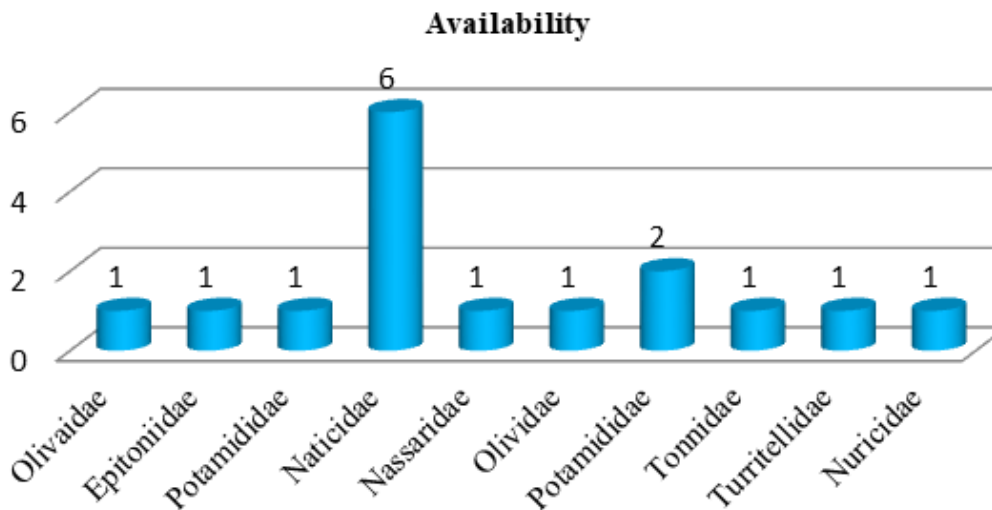
Sl.No.	Family Name (3)	Genera (3)	Specimen (3)
1	Loliginidae	Loligo	Loligo duvauceli (d’Obigny, 1848)
2	Octopodidae	Octopus	Octopus macropus (Risso, 1826)
3	Sepiidae	Sepia	Sepia aculeata (Ferussac , 1848)



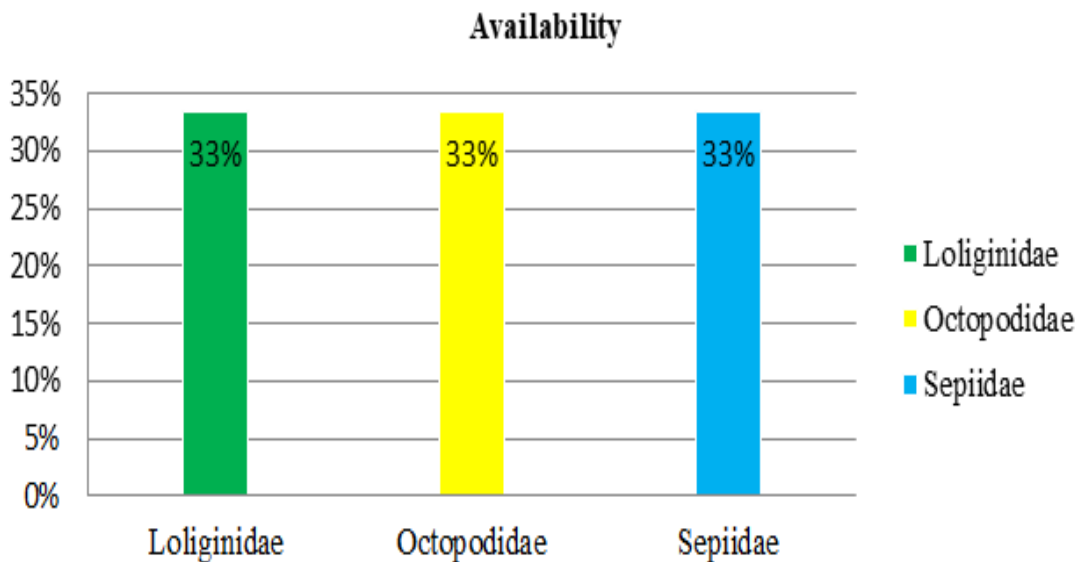
**Diagram 1:** Composition of marine molluscan groups at Digha coast.



**Diagram 2:** To show family wise distribution of bivalves in the study area.



**Diagram 3:** To show family wise distribution of gastropoda in the study area.



**Diagram 4:** To show family wise distribution of cephalopoda in the study area.

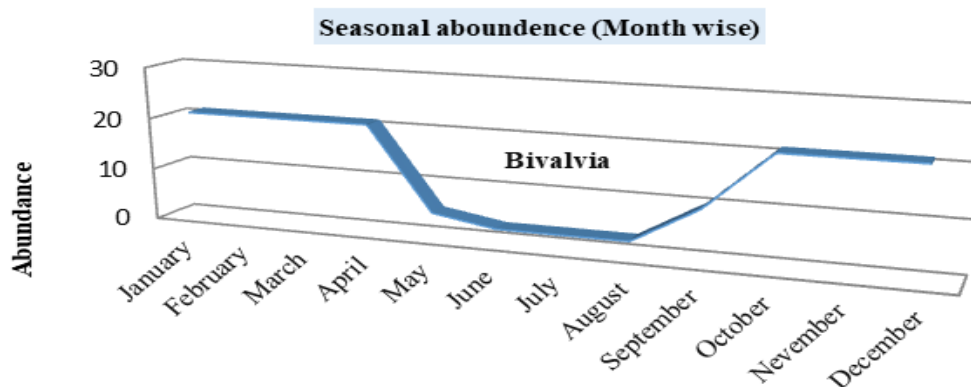
**Effects on marine molluscan species distribution due to seasonal abundance at Digha coast:**

These two processes of abundance and decline of mollusk species are usually caused by seasonal variations. The species has less population usually during monsoon. At that time usually June to August water salinity is low. The Population generally does not decrease much in the rest of the seasons. However, from September to December, the largest amount of species population occurs. *Mactra violacea*, *Mactra dissimilis*, *Mactra chinensis*, and *Modiolus striatulus* this species found in all seasons. Details of bivalve availability are shown in the table below.

**Table 6:** Seasonal availability of bivalvia fauna at Digha coast

Sl. No.	Specimen (Bivalvia)	J	F	M	A	M	J	J	A	S	O	N	D
1	<i>Anadara granosa</i>	+	+	+	+	-	-	+	-	-	+	+	+
2	<i>Anadara inequivalvis</i>	+	+	+	+	-	-	-	-	-	+	+	+
3	<i>Apolymestis edentula</i>	+	+	+	+	-	-	+	-	-	+	+	+
4	<i>Azorinus chamasolen</i>	+	+	+	+	+	+	+	+	+	+	+	+
5	<i>Barnea candida</i>	+	+	+	+	+	+	+	+	+	+	+	+
6	<i>Diplodonta bullata</i>	+	+	+	+	+	-	+	-	+	+	+	+
7	<i>Donax scortum</i>	+	+	+	+	+	+	+	+	+	+	+	+
8	<i>Glaucanome sculpta</i>	+	+	+	+	-	-	-	+	-	+	+	+
9	<i>Glaucanome virens</i>	+	+	+	+	+	+	+	+	+	+	+	+
10	<i>Mactra violacea</i>	+	+	+	+	+	+	+	+	+	+	+	+
11	<i>Mactra dissimilis</i>	+	+	+	+	+	+	+	+	+	+	+	+
12	<i>Mactra chinensis</i>	+	+	+	+	+	+	+	+	+	+	+	+
13	<i>Modiolus striatulus</i>	+	+	+	+	+	+	+	+	+	+	+	+
14	<i>Pelecyrora trigona</i>	+	+	+	+	-	-	-	-	-	+	+	+
15	<i>Petricola pholadiformis</i>	+	+	+	+	+	-	+	-	-	+	+	+
18	<i>Vepricardium asiticum</i>	+	+	+	+	-	-	-	-	-	+	+	+
19	<i>Pyrazisinus scalatus</i>	+	+	+	+	-	-	-	-	-	+	+	+
20	<i>Turritella terebra</i>	+	+	+	+	+	+	-	+	+	+	+	+
21	<i>Natica multipunctata</i>	+	+	+	+	+	+	+	+	+	+	+	+
22	<i>Urosalpinx cinerea</i>	+	+	+	+	+	-	-	-	+	+	+	+

{(+) = Present, (-) = Absent}



**Diagram 5:** To show family wise distribution of bivalvia in the study area.

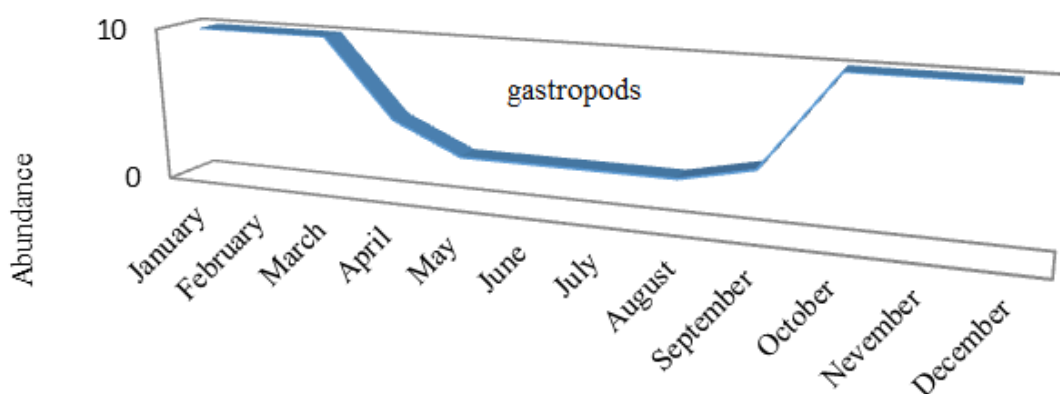


**Table 7:** Seasonal availability of gastropoda fauna at Digha coast

Sl. No.	Specimen (gastropoda)	J	F	M	A	M	J	J	A	S	O	N	D
1	Amalda ampla	+	+	+	+	-	-	+	-	-	+	+	+
2	Acrilla gracilis	+	+	+	+	-	-	+	-	-	+	+	+
3	Cerithidea obtuse	+	+	+	+	-	-	+	-	-	+	+	+
4	Natica tigrina	+	+	+	+	+	+	+	+	-	+	+	+
5	Natica lineate	+	+	+	+	+	+	+	+	-	+	+	+
6	Nassarius stolatus	+	+	+	+	+	-	+	-	-	+	+	+
7	Natica gualteriana	+	+	+	+	+	+	+	+	-	+	+	+
8	Oliva olive	+	+	+	+	-	-	-	+	-	+	+	+
9	Polinices didyama	+	+	+	+	-	-	+	-	-	+	+	+
10	Pyrazisinus scalatus	+	+	+	+	-	-	+	-	+	+	+	+
11	Sinum neritoiderum	+	+	+	+	-	-	+	-	-	+	+	+
12	Telescopium telescopium	+	+	+	+	-	-	+	-	-	+	+	+
13	Tonna dolium	+	+	+	+	+	+	+	+	-	+	+	+
14	Turritella terebra	+	+	+	+	-	-	-	-	-	+	+	+
15	Natica multipunctata	+	+	+	+	-	-	+	-	-	+	+	+
16	Urosalpinx cinerea	+	+	+	+	-	-	+	+	-	+	+	+

{(+) = Present, (-) = Absent}

Seasonal abundance (Month wise)

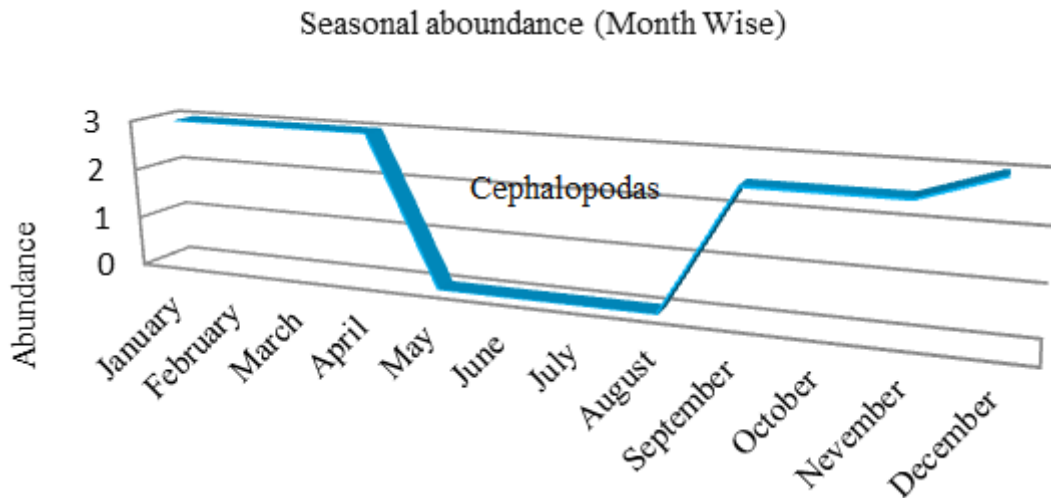


**Diagram 5:** To show family wise distribution of gastropods in the study area.

**Table 8:** Seasonal availability of cephalopoda fauna at Digha coast

Sl. No.	Specimen (cephalopoda)	J	F	M	A	M	J	J	A	S	O	N	D
1	Loligo duvauceli ( d'Orbigny, 1848)	+	+	+	+	+	-	-	-	+	+	+	+
2	Sepia aculeate (Ferussac , 1848)	+	+	+	+	+	-	-	-	+	+	+	+
3	Octopus macropus (Risso, 1826)	+	+	+	+	+	-	-	-	+	+	+	+

{(+) = Present, (-) = Absent}



**Diagram 6:** To show family wise distribution of cephalopods in the study area.

**Some important uses of marine molluscan species in human life:**

- Food & human:** Molluscan species have a shell & meaty part in the inner part, those meaty parts are used as food. The meaty part of the mollusks is very rich in nutrients and calcium and fat-free protein food. Among the Mollusca species like Bivalvia (clams, scallops, oysters, etc..), gastropods (snails) & cephalopods (octopus, squid) in particular, they are used as food.
- Lime:** An important activity of some rural people living in the Digha coastal area of India is collecting molluscan shells which are used for various purposes, through this work they earn their living. Molluscan shells are made into decorated items and sold in the market, but the important use is in making lime from molluscan shells. First, the molluscan shells are collected and then heated in kilns at high temperatures and later lime is prepared through some special process. This lime is used in various tobacco products (like- khaini, guthkha, etc..) and more like- cement, bleaching powder, etc.. is used in making.
- Use in home decorations:** Mollusca shell is a very hard material made of simple calcium carbonate. And because mollusca shells are of different sizes, shapes, and colors, mollusca shells are used to make various decorative items, such as garlands, etc. The most important aspect is that this mollusca shell plays a special role in earning money for some communities.



**Figure 3:** Molluscan shell



**Figure 4:** Choosing different shell



**Figure 5:** Cradle made of Molluscan shell



**Figure 6:** Shell Garland



#### IV. CONCLUSION

Presently after the survey it can be concluded that among these selected sites from Talsari to Shankarpur, Digha beach is rich in molluscan diversity and Talsari to Shankarpur beach is richer in molluscan than other places. The distribution of mollusca species is affected due to seasonal differences. And nowadays, due to the natural conditions (Global warming), seasonal differences are happening and affecting the distribution of species. These molluscan species are used as human food and are very nutritious food, minerals, protein & calcium, so molluscan species are very useful food. Molluscan species have a tremendous impact on the Indian economy. All kinds of wonderful ornaments and home decorating things are made with the shells of this molluscan species, so it is very popular with people.

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