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A Study of Marine Molluscs With Respect to Their Diversity, Relative Abundance and Species Richness in North-East Coast of India.

KEYWORDS: Diversity, species richness, relative abundance, north-east coast.

Poulami Paul	Dr. A. K. Panigrahi	Dr. B. Tripathy
Zoological Survey of India , New Alipore, Block-M, Kolkata-700053.	Fisheries and Aquaculture Ext. Laboratory, Department of Zoology, University of kalyani, West Bengal.	Zoological Survey of India , New Alipore, Block-M, Kolkata-700053.

ABSTRACT *The distribution and diversity of marine molluscs were collected in relation to their species richness and relative abundance in family wise and species wise in different season at five coastal sites in north-east coast of India during June,2011 to May,2014. A total of 63 species of marine molluscs were recorded, among them 31 species of gastropods belonging to 19 families and 23 genera and 32 species of bivalves belonging to 15 families and 24 genera .An increase of species density and diversity in the post monsoon season was observed at maximum selected sites. The maximum density of molluscs fauna was recorded in Bakkhali and Chandipur and highest diversity was recorded in Digha from selected localities during study period. From these localities is a wide chance of research to further explore both on the possibility of commercial purpose and ecosystem conservation.*

Introduction-

Molluscs in general had a tremendous impact on Indian tradition and economy and were popular among common people as ornaments, currency and curio materials. Moreover, Molluscs (shell) have been found to be important raw materials for poultry feeds, cement producer, fertilizers. India exports sea shells mainly bivalves and large gastropodes to various countries. Molluscs are second largest after arthropoda as numerical abundance. Abundance and seasonal variation of marine molluscs have been reported throughout India by different authors. Devraj (1998) recorded total 258 species of molluscs in the region og Gulf of Mannar. Jayaseeli and Murugan(2003) have recorded 77 species of bivalves on Tuticorin coast. Khade and Mane (2012) dealed with the diversity of molluscs at four localities from West coast of India. The availability of marine molluscs in north-east coast of India were also done by some worker. Subba Rao (1992) dealt with the estuarine and marine molluscs of West Bengal. The malacofauna of Hoogly estuary was also studied (Subba Rao et al., 1995). Recent the distribution of intertidal malacofauna at Sagar Islands was reported by Dey et. al.(2005) and detailed study of mangrove associate molluscs of sundarbans by Dey (2006). Subba Rao et al. (1991) recorded 324 species from entire coastal part of Odisha, among them 170 species belonging gastropods,147 species of bivalves,one species of Scaphopodes and 6 species of Cephalopodes. In Rushikulya estuary, a total of 41 species of which gastropods consists of 14 species and bivalves 27 species was recorded (Subba Rao et al.,1992).There is no major studies in north-east coast of India on commercially important molluscs and their availability and abundance. So, for a better understanding of marine ecosystem, studies on the availability of marine molluscs along the entire ecosystem of north-east coast of India are essential. The present study deals with the intertidal molluscan diversity of this coast and the population ecology of molluscan species of north-east coast of India, mainly the Digha, Shankarpur,Bakkhali, Talsari and Chandipur beach.

Materials and methods-

Study area-

The study area were selected namely Digha (station-1), Shankarpur (station-2) and Bakkhali (station-3) of West Bengal coast and Talsari (station-4) and Chandipur(station -5) of Odisha coast during June,2011 to May,2014.

Analysis of data-

Recent study involves identification and quantitative analysis of molluscan shells of the north-east coast of India mainly 5 station for three seasons pre-monsoon (February-May), monsoon (June-September) and post-monsoon (October-January).The sampling was done randomly from intertidal region at these sites. Data were collected during day time mostly,pooled seasonally and this was repeated throughout the period. The observation was carried out during low tide. Total 30 times a quadrate of 30 cm x 30 cm was laid. The data collected on numerical abundance were subjected to statistical analysis such as species diversity, abundance,species richness and evenness to draw a better conclusion also. The number of molluscan species for a particular season was utilized to determine the Shannon-Wiener index. This index value is used to determined the diversity nature of molluscs in particular beach fauna and also the level of disturbance in that selected stations. One way anova was performed to know the variation in the distribution of species with respect to different season.

Result and discussion-

The present investigation was undertaken to assess the present status of biodiversity of fauna of gastropoda and bivalvia of north-east coast of India. In the present study were documented a total of 63 species of molluscs, among them 32 species of gastropods belonging to 22 genera out of 19 families and 31 species of bivalves belonging to 23 genera out of 19 families from the selected localities of Digha, Shankarpur, Bakkhali, Talsari, Chandipur (given inTable-1 & Table -2). In family wise landings among gastropods the maximum recorded family were Naticidae,Nassariidae and Trochidae and minimum representation were from the family Ellobidae,Neritidae,Epitomidae (Fig-1).In bivalves The most abundant families are Veneridae,Mactridae and Tellinidae and the family Arcidae,Solenidae and Cultellidae contributed the least numbers (Fig-2).

High species diversity was found in Digha and Shankarpur beach due to the presence of higher number of dif-

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ferent species. The bivalvia fauna diversity maximum was recorded in station 1(Digha beach) and station 2 (Shankarpur beach) and minimum diversity in station 5(Chandipur beach).The most dominant fauna was identified and followed by Timoclea imbricata (Sowerby), Meretrix meretrix (Linnaeus), Apolymetis edentula Spengler, Barnea candida Linnaeus, Mactra luzonica Deshayes (Fig-3).The minimum density of gastropods was observed in station 1(Digha coastal area). Among the gastropod group of fauna Umbonium vestiarium (Linnaeus), Natica tigrina (Roeding), Cerithidea cingulata (Gmelin), Turritella attenuata Reeve, Turricula javana (Linnaeus) was dominant during the study period and the other species followed by Architectonica perspectiva (Linnaeus), Pugilina cochlidium (Linnaeus), Olivancillaria gibbosa (Born) was not dominant and very less in number(Fig-4).

The maximum diversity and richness of gastropods and bivalve were recorded in this study from Digha and Shankarpur beach and maximum number of bivalves and gastropods were observed from Chandipur coast followed by Bakkhali coast mainly Turricula javana (Linnaeus), Natica tigrina (Roeding) and Nassarius stolatus (Gmelin) were much abundant in Chandipur beach and Anadara granosa (Lamarck), Anadara inequivalvis (Bruguiere), Striarca lactea (Linnaeus) Crassostrea cuttakensis, Crassostrea gryphoides (Schlotherin) ,Saccostrea cucullata (Born) ,Placuna placenta (Linnaeus) were available in Bakkhali coast .In Talsari,number of Cerithidea cingulata (Gmelin)was so high due to estuarine habitat.So,the maximum densities of gastropods and bivalves were recorded from Chandipur and Bakkhali rather than the other selected sites.

The monthly variations in abundance for the total area surveyed showed that the fauna of molluscs seasonally varied.The lowest density was in the month of July because of monsoon season when the salinity and temperature dropped down. The population density increased steadily from September to reach the maximum number in December during post-monsoon season. It is clearly noticed by many research workers that the postmonsoon period is the most favourable time for the molluscan species. Seasonal contribution of gastropods and bivalves both was maximum in the post monsoon followed by premonsoon and monsoon season might be due to stable environment factors such as DO and salinity.During the monsoon season the population of mollusca was very declined at almost all the selected sites. The over-exploitation and over fishing of some molluscan species as a sources of commercial purpose has lead to gradual decline of the species. The reason for less number of species in the present study may be due to pollution and other environmental disturbance in the marine waters. Therefore, decline in the abundance of molluscs along with change in the community structure in regular different type of exploitation may be another cause for recording the less number of species compared to earlier workers.

Conclusion:

It can be concluded from the present study that among the selected sites, Digha beach are rich in molluscan diversity and Chandipur and Bakkhali beach are much molluscan density area rather than other sites.The molluscs have a tremendous impact on Indian tradition and economy and also very much popular among people as ornamental as well as curio materials.

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Class-Bivalvia

Family(15)	Species(32)	D	S	T	C	B
Arcidae	Anadara granosa (Lamarck)	+	+	_	_	+
Arcidae	Anadara inequivalvis (Bruguiere)	+	+	_	+	+
Noetiidae	Striarca lactea (Linnaeus)	_	_	_	_	+
Mytilidae	Perna viridis (Linnaeus)	+			+	+
Ostreidae	Crassostrea cuttakensis	_	_	_	_	+
Ostreidae	Crassostrea gryphoides (Schlotherin)	_	_	_	_	+
Ostreidae	Saccostrea cucullata(Born)	_	_	_	_	+
Placunidae	Placuna placenta (Linnaeus)	_	_	_	_	+
Ungulinidae	Diplodonta bullata Dunker	+	+	+	+	+
Mactridae	Mactra luzonica Deshayes	+	+	+	+	+
Mactridae	Mactra mera Reeve	+	+	+	+	+
Mactridae	Mactra violacea Gmelin	+	+	+	+	+
Mactridae	Mactra plicataria Linnaeus	+	+	+	+	+
Solenidae	Solen brevis Gray	+	+	+	+	+
Pharidae	Pharella javanicus (Linnaeus)	+	+	+	+	+
Pharidae	Siliqua albida Dunker	+	+	+	_	_
Pharidae	Siliqua radiata (Linnaeus)	+	+	+	_	_
Tellinidae	Tellina sinuata Spengler	+	+	+	_	_
Tellinidae	Strigilla splendida (Auton)	+	+	+	_	_
Tellinidae	Macoma birmanica(Phillipi)	+	+	+	+	+
Tellinidae	Macoma truncata Jonas	+	+	+	+	+
Psammobiidae	Apolymetis edentula Spengler	+	+	+	+	+
Donacidae	Donax incarnates Gmelin	+	+	+	+	+
Donacidae	Donax scortum linnaeus	+	+	+	+	+
Corbiculidae	Polymesoda bengalensis Lamarck)	+	+	+	+	+
Veneridae	Timoclea imbricata(Sowerby)	+	+	+	+	_
Veneridae	Meretrix meretrix (Linnaeus)	+	+	+	+	+
Veneridae	Pelecyora trigona (Reeve)	+	+	+	_	_
Veneridae	Paphia textile (Gmelin)	+	+	+	_	_
Veneridae	Dosinia prostata (Linnaeus)	+	+	+	+	_
Veneridae	Glauconome sculpta (Sowerby)	+	+	+	+	_
Pholadidae	Barnea candida linnaeus)	+	+	+	+	_

Table-1: Occurrence of Bivalves from study sites of North-east coast of India. Here D =Digha,S= Shankarpur,T=Talsari,C=Chandipur,B=Bakkhali & Presence of species(+) & Absence of species (-).

Class- Gastropoda

Family(19)	Species(32)	D	S	T	C	B
Trochidae	*Umbonium vestiarum* (Linnaeus)	+	+	+	+	_
Neritidae	*Nerita(Amphinerita) violacea* (Gmelin)	–	–	–	–	+

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Littorinidae	*Littoraria scabra scabra* linnaeus	–	–	–	–	+
Littorinidae	*Littoraria undulata* Gray	–	–	–	–	+
Littorinidae	*Littoraria melanostoma* (Gray)	–	–	–	–	+
Stenothyridae	*Stenothyra deltae* (Benson)	–	–	–	–	+
Assimineidae	*Assiminea brevicula* (Pfeiffer)	–	–	–	–	+
Potamididae	*Cerithidea cingulate* (Gmelin)	+	+	+	+	+
Potamididae	*Cerithidea obtusa* Lamarck	+	+	+	+	+
Potamididae	*Telescopium telescopium* linnaeus	–	–	–		+
Turritellidae	*Turritella attenuata* Reeve	+	+	+	+	+
Naticidae	*Natica gualteriana* Recluz	+	+	+	+	+
Naticidae	*Natica lineata* Jousseaume	+	+	+	+	+
Naticidae	*Natica tigrina* (Roeding)	+	+	+	+	+
Naticidae	*Polinices didyma* (Roeding)	+	+	+	+	+
Naticidae	*Polinices tumidus* (Swainson)	+	+	+	+	+
Tonnidae	*Tonna dolium* (Linnaeus)	+	+	+	+	–
Tonnidae	*Tonna sulcosa* (Swainson)	+	+	+	+	–
Cassidae	*Phalium bisulcatum* (Schubert & Wagner)	+	+	+	+	+
Epitoniidae	*Acrilla gracilis* (Sowerby)	+	+	+	+	+
Muricidae	*Thais lacera* (Born)	+	+	+	+	+
Muricidae	*Thais blanfordi* (Melvil)	+	+	+	+	+
Nassaridae	*Nassarius faveolatus*(Reeve)	+	+	+	+	+
Nassaridae	*Nassarius stolatus* (Gmelin)	+	+	+	+	+
Melongenidae	*Pugilina cochlidium* (Linnaeus)	+	+	+	+	+
Olividae	*Olivancillaria gibbosa*(Born)	+	+	+	+	+
Olividae	*Amalda ampla* (Gmelin)	+	+	+	+	+
Turridae	*Turricula javana* (Linnaeus)	+	+	+	+	+
Terebridae	*Terebra tenera* A.Adams	+	+	+	+	+
Architectonidae	*Architectonica perspectiva* (Linnaeus)	+	+	+	+	–
Architectonidae	*Architectonica laevigata* (Lamarck)	+	+	+	+	–
Ellobidae	*Pythia plicata* (Fe'russac)	+	–	–	–	–

Table 2: Occurrence of Gastropodes from study sites of North-east coast of India. Sites are same as table-1.

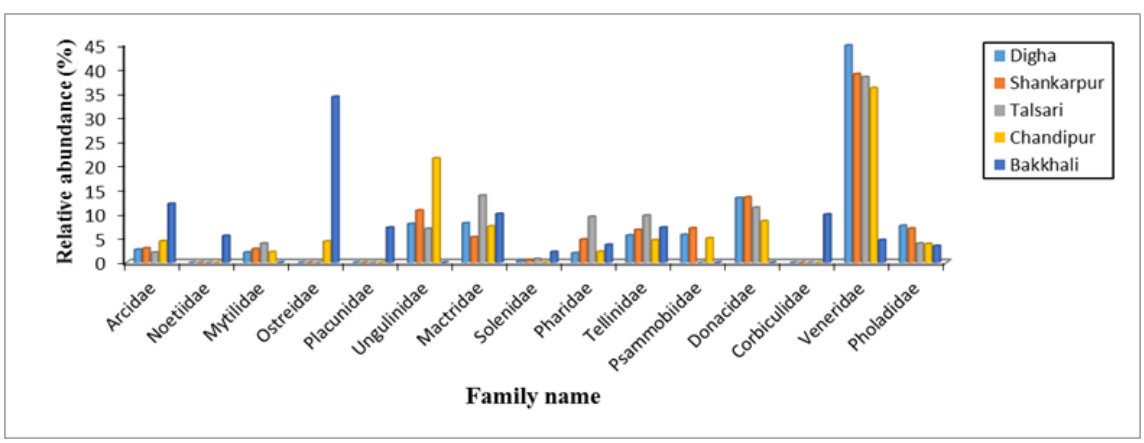

Fig: 1. Showing distribution of Bivalves in family-wise (%) from study sites.

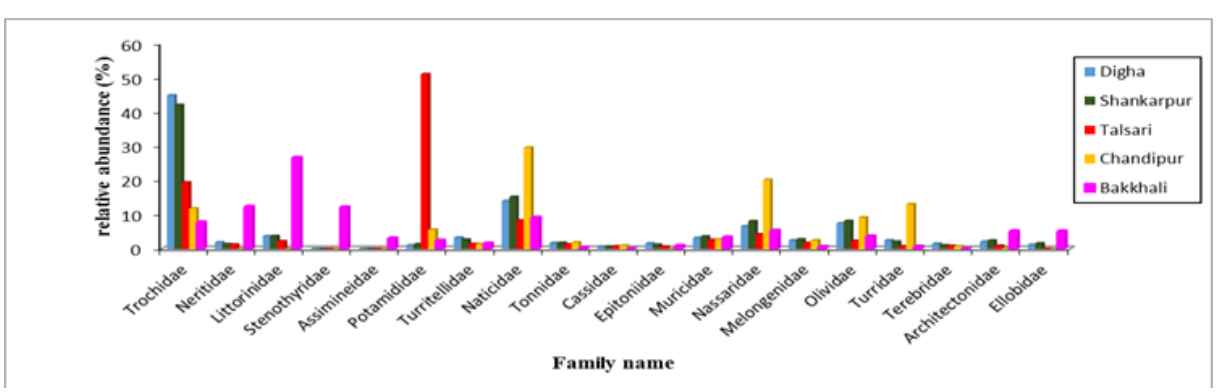

Fig-2. Showing distribution of Gastropods in family-wise (%) from study sites.

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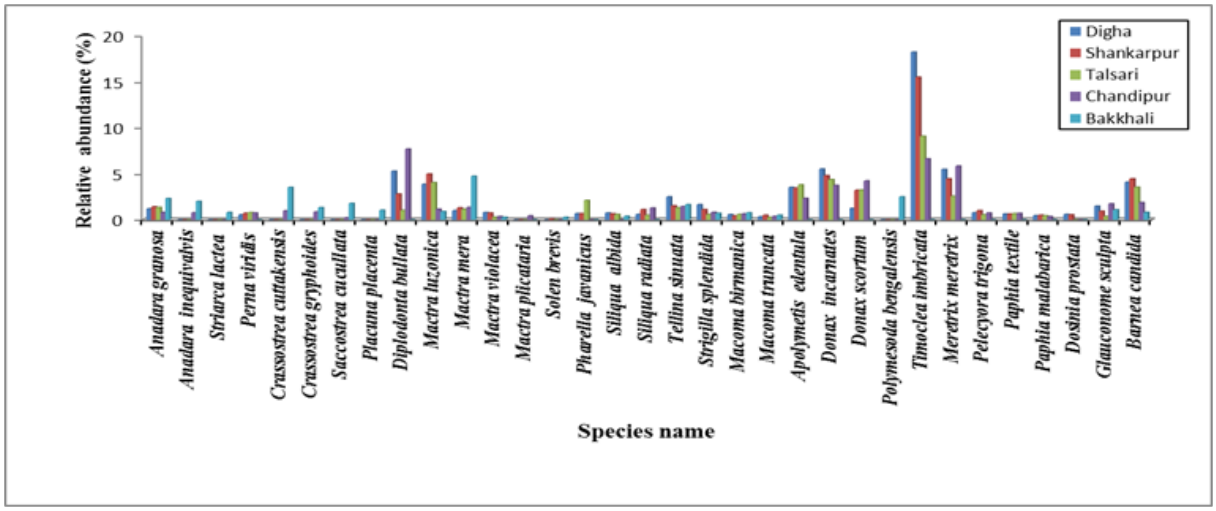

Fig-3. Showing distribution of Bivalves in species-wise (%) from study sites.

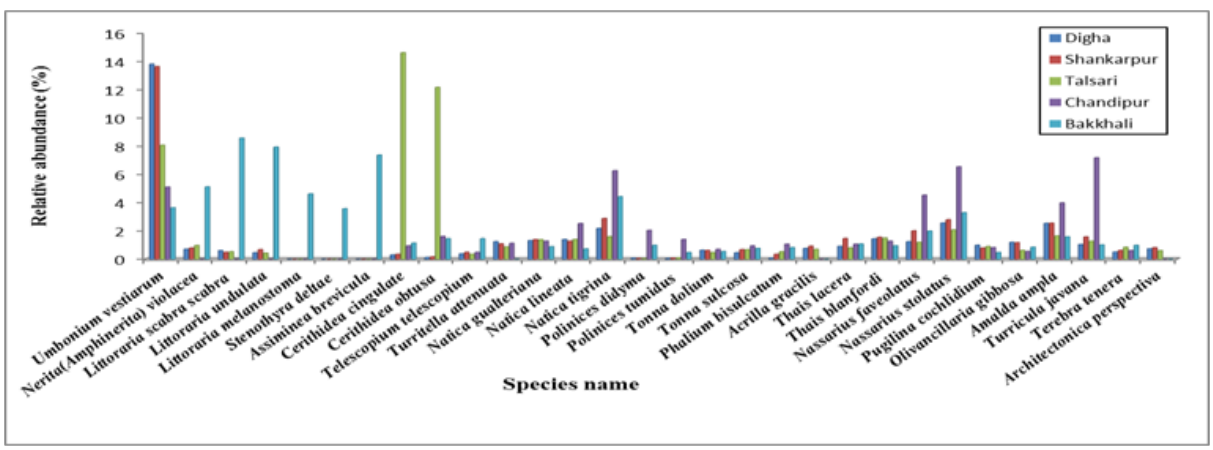

Fig-4. Showing distribution of Gastropodes in species-wise (%) from study sites.

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