Diversity of mollusca in selected coastal wetlands of Nagapattinam district in the East Coast of Tamil Nadu, Southern India

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Abstract

Molluscan species are one of the diversified organisms in coastal wetlands which provide various ecosystem services including their role as predator and prey that influences the community structure of these areas. Assessment of molluscan diversity was carried in the coastal wetlands of Tamil Nadu, southern India viz., Tranquebar, Chinnangudi, Pazhaiyar and Thirumullaivasal and totally 71 species belonging to 6 orders and 30 families of two classes gastropods and bivalves were recorded between December 2001 and March 2002. The molluscan species richness was highest in Tranquebar (63 species), followed by Pazhaiyar (57 spp.) and Thirumullaivasal had lowest of 48 species. The order Mesagastropoda had maximum species of 16 which was in Pazhaiyar. The Neogastropoda had maximum of 19 species in Tranquebar and Pazhaiyar. The order Prinodontida and Heterodontida had maximum species of 8 and 17, respectively in Tranquebar. The order Archaeogastropoda was the most diversified (H′ = 1.386) in different study sites used and the Sinopaliata was the lowest (H′ = 0) as they were found only in the Tranquebar area. The molluscan order diversity was highest in the Thirumullaivasal (H′ = 1.5125) and lowest on Pazhaiyar (H′ = 1.4601). Tranquebar had the highest molluscan family diversity (H′=2.9905) and Pazhaiyar had the lowest diversity (H′ = 2.749). The families Veneridae (H′=1.883) followed by Donacidae (H′ = 1.3611) were the most diversified in terms of distribution in different sites and Cerithiidae was the lowest (H′ = 0.08). It is suggested that future studies need to be done across the years including all the seasons and microhabitats of the sites to elucidate the diversity prey organisms and productivity of this coastal area.

Key words : coastal, wetlands, diversity, Molluscan species, prey, richness

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INTRODUCTION

Mollusca, a phylum comprising of 6 classes, are soft bodied, unsegmented animals usually having a hard shell (Apte 1998). Molluscs began to evolve on our planet some 600 million years ago (Cambrian Period). They are the second largest living organisms comprising more than 1,00,000 species. Today they flourish in a wide variety of habitats from deep sea to highest elevations, because of their adaptability. Mollusca have evolutionary and ecological significances and play an important role in the food chain by acting as predators as well as prey. The majority of the molluscs are the major food for a lot of higher animals especially to many aquatic birds. Furthermore, good amount of research has been conducted on molluscs around the world. In India the Malacological studies is an old science, hence already a huge amount of contribution were made (for example Rao, 1925; Prashad, 1928) but most of the studies were restricted to taxonomy and classification (for example Apte, 1998).

The Coromandel (East coast) coast of India, especially the Tamil Nadu region is important to shorebirds as many important wetlands such as Pichavaram mangroves, Point Calimere swamps, Udyamarthandapuram water bird sanctuary, Muthuphat Lagoon, Vaduvoor lake etc, are situated here (Sampath and Krishinamoorthy, 1990; Thiyagesan and Nagarajan 1995; Nagarajan and Thiyagesan, 1996; Nagarajan and Thiyagesan 1998). These coastal wetland are especially important in the context that they serve as a wintering area for birds as appreciable number of many species of birds annually migrate from Arctic Siberia to wintering grounds in India enroute passage to Australia (Sampath and Krishinamoorthy, 1990). In addition, these wetlands are being used as stopover sites by birds both during inward and outward migration (Sampath and Krishinamoorthy, 1990; Thiyagesan and Nagarajan 1995; Nagarajan and Thiyagesan, 1996; Nagarajan and Thiyagesan 1998). Velasquez and Hockey (1991) had also stated that intertidal mudbanks are the most important foraging habitat for migratory waterbirds. The mudflats and sand flats of the east coast of Tamil Nadu had been shown to harbour a great variety of shore birds

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(Sampath and Krishinamoorthy, 1990; Nagarajan and Thiagesan, 1996). However, the information on the prey spectrum is scanty and sporadic especially on the macro-invertebrates. Different molluscan species are the major prey items for various bird species and also other organisms (e.g. Nagarajan et al. 2002a,b,c; 2006). Hence, we aim to evaluate the diversity and distribution of molluscan species on some of the coastal wetland of east coast of Tamilnadu, namely viz., Tranquebar, Chinnangudi, Pazhaiyar, and Thirumullaivasal which have been used as foraging habitats by several species of wintering migratory waterbirds.

MATERIALS AND METHODS

Study Area

Four coastal wetlands *viz.*, Chinnangudi, Tranquebar, Pazhayar and Thirumullaivasal spread over the stretch of Coromandel coastline of Nagapattinam District of Tamil Nadu, India constituted the study sites of the present investigation.

Chinnangudi: It is fishing coastal village, which is located 25km east of Mayiladuthurai. The sea is separated from the village by a sand bar. The seashore is sandy in nature. The river Uppanar makes the estuary in this site and has a wide diversity of coastal wetlands.

Tranquebar: The marine zone on the east coast of Tranquebar is located at about 25 km east of Mayiladuthurai. The beach is steep and sandy with scattered masses of brickwork and buildings from the ruins of an old 17th Century Fort, the seaward face of which is now damaged and submerged due to encroachment by the sea. Large isolated Brick-blocks and portion of fort walls lie buried in the beach. It facilitates as substratum for many algae, crustacean, gastropods, bivalves, sea anemone and other rocky stone fauna. The Uppanar estuary is to some extent, a bar built estuary and sand bar is shifted depending upon the strength of the flow of freshwater due to monsoonal rains. The estuarine biotype is greatly influenced by the discharges of irrigation channels, backwaters and tidal water. The width of estuary is not altered from time by any erosion and it is measured about 50 meters in diameter and 1000m in length. The average depth of the estuary is about 1.5 meter.

Pazhaiyar: It is one of the important fishing landing sites of the east coast. The river Collidam mixes with sea in Pazhaiyar and makes a wide estuary and is located 20km east of Sirkazhi. The estuary is separated by a wide sand bar. This estuary makes a wide variety of coastal wetlands in this area. The major source of income for this village is fishing and several mechanized boats are in operation for fishing.

Thirumullaivasal: It is fishing coastal village which is located 25km east of Sirkazhi. The sea is separated from the village by a sand bar, amidst the river Uppanar mixes with the Bay of Bengal. The seashore is sandy shore in nature. The estuary makes many coastal wetlands and some of them are wide open water areas which has many muddy islets. The islets are exposed during low tide and supports a wide variety of benthic organisms. The accessibility for human to this islets is difficult and so there is no disturbance on these areas. The area has a patchy distribution of mangrove vegetation and Acacia and Prosopis vegetation.

Study Period: Assessments of molluscan species in various study sites were conducted between December 2001 and March 2002.

Collection and Preservation of Molluscan forms

Molluscan forms are generally found in the mudflats on the shore areas of sea and estuary. Extensive surveys were conducted in the low tidal areas of sea shore by walk and shells were handpicked. The collected animals and shells were brought to the laboratory, cleaned and preserved in 10% formalin. Later they were identified up to species level by using the identification manuals of Apte (1998) and Hornell (1951)

Collection of Molluscan Shells

Usually the molluscan collection was done during low tide when shells are exposed from the mud flat. The collected shells were put into a plastic bucket. The researchers wore appropriate gloves to get protection from the harpoon type of radula which can inject venom present in the cones of the shells. Empty shells were collected easily, when they were washed ashore. Many species attach themselves to sea weeds or algae. Bunches of algae were shacked to get the attached shells. The collected shells were washed by using water and then put them in a bottle with 4% formalin.

Species Identification

The molluscan identification was done by using the key features of Apte (1995), and Hornell (1951). Some of the rare specimens were identified by getting expertise from Prof. Antony Fernando, CAS in Marine Biology, Annamalai University, Portonovo.

Diversity Index

Shannon-Weiner diversity measure (H') (Shannon and Wiener, 1949) was used to assess diversity of molluscan order and family of the coastal wetlands.

$$H'' = - \sum \; pi \log_e pi$$

H'' = Shannon-Weiner diversity measure

Table 1: Molluscan species collected from different study sites of east coast of Tamil Nadu, Southern India between December 2001 and March 2002. '+' indicates presence and '-' indicates absence

S.No	Systematic position	Study Sites			
		Tranquebar	Chinnangudi	Pazhaiyar	Thirumullaivasal
Class : Gastropoda; Order : Archaeogastropoda					
1	**Family : Trochidae** - *Umbonium vestiarium*	+	-	+	+
2	**Family : Patellidae** - *Cellana radiata*	+	+	-	-
3	**Family : Architectonidae** - Architectonidae laevagata	+	+	+	+
4	*Trochus radiatus*	+	+	+	+
Order : Mesogastropoda					
5	**Family : Naticidae** - *Natica lineata*	+	+	+	
6	*Natica tigrena*	+	+	+	+
7	*Natica albulla*	+	-	+	-
8	*Natica didyma*	+	-	+	-
9	**Family : Cypraeidae** - *Erosaria ocellata*	+	+	-	+
10	**Family : Turritellidae** - Turritella terebracera	+	+	+	+
11	*Turritella duplicata*	+	+	+	-
12	**Family : Bursidae** - *Bursa elegans*	+	+	+	+
13	*Bursa spinosa*	+	+	-	+
14	**Family : Tonnidae** - *Tonna dolium*	+	+	+	+
15	**Family : Ficidae** - *Ficus gracilus*	+	+	-	+
16	*Ficus intermediatus*	-	-	+	+
17	**Family : Cassidae** - *Phalium glaucum*	-	+	+	+
18	*Phalium canaliculatum*	+	-	+	+
19	**Family : Cerithiidae** - *Cerethium morus*	+	+	+	+
20	**Family : Potamididae** - Telescopium telescopium	-	-	+	+
21	**Family : Cymatidae**- *Cymatium cingulatum*	-	-	+	+
22	*Cymatium* sp.	+	+	-	-
23	*Cancellaria* sp.	-	-	+	-
24	**Family : Naticiidae** - *Sinum* sp.	+	-	+	+
Order : Neogastropoda					
25	**Family : Turridae** - *Turriscella* sp.	-	+	-	+
26	**Family : Muricidae** - *Murex trapa*	+	+	+	+
27	*Murex carbonnieri*	+	+	+	+
28	*Murex virginus*		+	+	+
29	**Family : Xancidae** - *Xancus pyrum*	+	-	+	-
30	**Family : Nassariidae** - *Nassarius dorsatus*	+	+	-	+
31	*Bullia vittata*	+	+	+	-
32	*Bullia belengeri*	-	+	+	+
33	**Family : Harpidae** - *Harpa conoidalis*	+	+	+	-
34	**Family : Nassarridae** - *Nassarius stolatus*	+	+	+	-
35	**Family : Muricidae** - *Rapana bulbosa*	+	-	+	+
36	*Thais carinifera*	+	+	-	-
37	*Thais bufo*	+	+	+	+
38	*Thais mutablis*	+	-	+	+
39	**Family : Conidae** - *Conus mutablis*	+	-	+	+
40	*Conus figulinus*	+	-	+	-
41	*Conus inscriptus*	+	-	+	-
42	**Family : Buccinidae** - *Bobylonia spirata*	+	+	+	+
43	*Bobylonia zylonica*	+	+	+	+
44	**Family : Muricidae** - *Thais* sp.	+	+	+	-
45	**Family : Volemidae** - *Hemifuges pugilinus*	+	+	+	+
46	*Hemifuges cochlidium*	+	+	+	+

S.No.	Systematic position	Study Sites			
		Tranquebar	Chinnangudi	Pazhaiyar	Thirumullaivasal
	Class : Bivalvia; Order : Prinodontida				
47	**Family : Arcidae** - *Anadara granulosa*	+	+	+	-
48	*Anadara inequalis*	+	+	-	+
49	*Anadara rhombeo*	+	+	+	+
50	**Family : Pectinidae** - *Pecten* sp.	+	+	+	+
51	*Chalmys tranquebarcus*	+	+	+	+
52	**Family : Ostreidae** - *Saccostera cucculata*	+	-	+	+
	Order : Heterodontida				
53	**Family : Donacidae** - *Donex scortum*	+	+	+	-
54	*Donex cuneatus*	+	-	+	+
55	**Family : Veneridae** - *Meritrix casta*	+	+	+	-
56	*Paphia malabaricus*	+	+	+	+
57	*Catalysis opima*	+	+	+	+
58	*Meritrix meritrix*	+	+	+	-
59	*Paphia textile*	+	+	-	+
60	*Sunetta scripta*	+	+	+	+
61	*Dosina* sp.	+	-	+	+
62	*Cardium* sp.	+	+	-	+
63	*Paphia ala – papilonis*	+	+	+	+
64	*Cardium flavum*	+	+	-	+
65	*Cardium bicolar*	+	-	+	-
66	**Family : Mactridae** - *Mactra cornea*	+	+	+	-
67	**Family : Tellineda** - *Telline phillitinasus*	+	-	+	+
68	*Telline sinuata*	+	+	-	+
	Order : Sinupalliata				
69	**Family : Mytilidae**- *Pholas orientalis*	+	+	+	-
	Order : Heterodontida				
70	**Family : Solenidae** -*Siliqua radiata*	+	+	-	-
71	**Family : Mytilidae**- *Perna viridis*	+	+	+	+
	Total Species	63	50	57	48

Pi = Proportion of individuals found in the total population

RESULTS

Molluscan Species-wise Distribution

Totally 71 species belonging to 6 orders and 30 families were collected from four different coastal wetlands of Nagappattinam District, Tamilnadu, Southern India which are listed in table 1. The molluscan species richness in Tranquebar, Chinnangudi, Pazhaiyar and Thirumullaivasal were 63, 50, 57 and 48 respectively (Table 1).

Molluscan Class-wise Distribution

Two classes of molluscs were collected from all areas. They were gastropods and bivalves. Maximum number of species (38 species) of gastropods was observed in Pazhaiyar. Chinnangudi and Thirumullaivasal had each 31 species of gastropods. Tranquebar has maximum number of 25 species of bivalves and Thirumullaivasal had the lowest number of 17 species of bivalve species (Table 1).

Molluscan Order-wise Distribution

There were six different orders and their relative percent occurrence in different study sites are enlisted in table 2. The order Mesagastropoda had maximum species of 16 which was in Pazhaiyar. The Neogastropoda had maximum of 19 species in Tranquebar and Pazhaiyar. The order Prinodontida and Heterodontida had maximum species of 8 and 17, respectively, in Tranquebar. The order Archaeogastropoda was the

Table 2. Number of molluscan orders, relative percentage and diversity of different of orders across the study sites of east coast of Tamil Nadu, Southern India, between December 2001 and March 2002.

Study Sites	Molluscan Orders											
	Archaeo gastropoda		Meso gastropoda		Neo gastropoda		Prinodontada		Heterodontida		Sinupaliata	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Tranquebar	3	25	15	26.3	19	27.9	8	28.5	17	32.07	1	1
Chinnangudi	3	25	12	21.5	16	23.5	7	25	12	24.52	0	0
Pazhiyar	3	25	16	28.7	19	27.9	7	25	12	22.64	0	0
Thirumullaivasal	3	25	14	24.56	14	20.5	6	21.42	11	20.7	0	0
Total	12	100	57	100	68	100	28	100	62	100	1	0
Diversity (H′)	1.386		1.38		1.3773		1.3807		1.3716		0	

Table 3: Number of orders, relative percentage and diversity of different orders of molluscs in various study sites of east coast of Tamil Nadu, Southern India, between December 2001 and March 2002.

Molluscan Orders	Study Sites							
	Tranquebar		Chinnangudi		Pazhiyar		Thirumullaiv	
	No.	%	No.	%	No.	%	No.	%
Archaeogastropoda	3	4.7	3	5.8	3	5.2	3	6.25
Mesogastropoda	15	23.8	12	23.5	16	28	14	29.16
Neogastropoda	19	30.1	16	31.3	19	33.3	14	29.16
Prinodontida	8	12.9	7	13.7	7	12.2	6	12.5
Heterodontida	17	26.98	12	24	12	21.1	11	29.91
Sinopaliata	1	1.58	-	-	-	-	-	-
Total	63	100	50	100	57	100	48	100
Diversity (H′)	1.4634		1.4835		1.4601		1.5125	

most diversified (H′=1.386) in terms of variety of study site used and the Sinopaliata was the lowest (H′=0) as they were found only in the Tranquebar area (Table 2). The molluscan order diversity was highest in the Thirumullaivasal (H′=1.5125) and least on Pazhaiyar (H′=1.4601) (Table 3).

Molluscan Family-wise Distribution:

The distribution of molluscan families, relative occurrence and diversity in different study sites are listed table 4 and 5. The study site Tranquebar had the highest diversity (H′=2.9905) and Pazhaiyar had the lowest diversity (H′=2.749) in relation to molluscan family. The families Veneridae (H′=1.883) followed by Donacidae (H′=1.3611) were the most diversified in terms of distribution to different sites and Cerithiidae was the lowest (H′ = 0.08) (Table 5).

DISCUSSION

Results of the present study showed that there were 71 species belonging to 6 orders and 30 families of the mollusca found in the coastal wetlands *viz.*, Tranquebar, Chinnangudi, Thirumullaivasal and Pazhaiyar. It revealed that these areas are rich in molluscan diversity and distribution. Strong *et al.* (2008) witnessed that the largest molluscan classes *i.e.,* Gastropoda and Bivalvia survived and well established in all continents. Leal (2002) emphasised that bivalves and gastropods can live in a highly diverse gamut of habitat conditions. Archiogastropoda was the most diversified in terms of varieties of study sites used. The species of this order strongly preferred to live in sandy shore especially the beaches in mesolittoral zone (Apte, 1998). The study sites are dominated by sandy shore beaches hence this could be a reason for the maximum diversities of Archiogastropoda.

The diversity of molluscs was highest in Thirumullaivasal and lowest in Pazhaiyar. The Thirumullaivasal is a virgin area in relation to human exploitation whereas the Pazhaiyar is one of the major fish landing sites of east coast. So, there is serious disturbances caused by human and also there is a possibility for oil pollution because of the intensive

Table 4. Number of families, relative percentage and diversity of different molluscan families in various study sites of east coast of Tamil Nadu, Southern India, between December 2001 and March 2002.

Molluscan Family	Study Sites							
	Tranquebar		Chinnangudi		Pazhiyar		Thirumullaivasal	
	No.	%	No.	%	No.	%	No.	%
Trochidae	0	0	0	0	1	1.75	1	2.08
Patellidae	1	50	1	50	0	0	0	0
Architetonidae	2	25	2	25	2	25	2	25
Naticidae	4	30.76	2	15.38	5	38.46	2	15.38
Cypracidae	1	33.33	1	33.33	0	0	1	33.33
Turritellidae	2	28.53	2	28.53	2	28.53	1	14.28
Burcidae	2	28.53	2	28.53	1	14.28	2	28.53
Tonnidae	1	25	1	25	1	25	1	25
Ficidae	1	20	1	20	1	20	2	20
Cassidae	1	16.6	1	16.6	2	33.3	2	33.3
Cerithiidae	1	25	1	25	1	25	1	25
Potamididae	0	0	0	0	1	50	1	50
Cymatidae	1	20	1	20	2	40	1	20
Turridae	0	0	1	50	0	0	1	50
Muricidae	7	26.92	6	23.07	7	26.92	6	23.07
Xancidae	1	50	0	0	1	50	0	0
Nassarridae	3	25	4	33.3	3	25	2	16.6
Harpidae	1	33.3	1	33.3	1	33.3	0	0
Conidae	3	42.85	0	0	3	42.85	1	14.28
Buccinidae	2	25	2	25	2	25	2	25
Volemidae	2	25	2	25	2	25	2	25
Arcidae	3	30	3	30	2	20	2	20
Pactimidae	2	25	2	25	2	25	2	25
Ostreidae	1	33.3	0	0	1	33.3	1	33.3
Donacidae	2	33.3	1	16.6	2	33.3	1	16.6
Veneridae	11	30.5	9	25	8	22.2	8	22.2
Mactridae	1	33.3	1	33.3	1	33.3	0	0
Tellinidae	2	40	1	20	1	20	2	40
Mytilidae	2	28.57	2	28.57	2	28.57	1	14.28
Solenidae	1	50	1	50	0	0	0	0
Total	63	100	50	100	57	100	48	100
Diversity (H')	2.9905		2.945		2.749		2.9712	

usage of mechanized boat for fishing around the year. Hence, the disturbances associated with the oil pollution could be the reason for the lower diversity of molluscan forms in Pazhaiyar area.

The family-wise diversity showed that the Tranquebar had the highest diversity and Pazhaiyar had the lowest diversity. The Tranquebar is the only rocky shore area among the study sites. The rocky shore supports considerable amount of algae, which is the main source of food for molluscan species. This could be the reason for the highest molluscan family diversity in this area.

Natural populations of gastropods are severely affected by ecological constraints and fluctuation in the abiotic factors and their survival might be depend upon physiological capacity to tolerate stress and

Table 5. Number of molluscan families, relative percentage and diversity of different families across the study sites of east coast of Tamil Nadu, Southern India, between December 2001 and March 2002.

Molluscan Family	Study Sites								
	Tranquebar		Chinnangudi		Pazhiyar		Thirumullaivasal		Diversity (H')
	No.	%	No.	%	No.	%	No.	%	
Trochidae	-	-	-	-	1	1.75	1	2.08	0.1507
Patellidae	1	1.63	1	1.96	-	-	-	-	0.1441
Architetonidae	2	3.27	2	3.92	2	3.5	2	4.16	0.542
Naticidae	4	6.55	2	3.92	5	8.77	2	4.16	0.65
Cypracidae	1	1.63	1	1.96	-	-	1	2.08	0.224
Turritellidae	2	3.27	2	3.92	2	3.5	1	2.08	0.436
Burcidae	2	3.27	2	3.92	1	1.75	1	2.08	1.0779
Tonnidae	1	1.63	1	1.96	1	1.75	1	2.08	0.294
Ficidae	1	1.63	1	1.96	1	1.75	2	4.16	0.347
Cassidae	1	1.63	1	1.96	2	3.5	2	4016	0.3936
Cerithiidae	1	1.63	1	1.96	1	1.75	1	2.08	0.08
Potamididae	-	-	-	-	1	1.75	1	2.08	0.1507
Cymatidae	1	1.63	1	1.96	2	3.5	1	2.08	0.3414
Turridae	-	-	1	1.96	-	-	1	2.08	0.157
Muricidae	7	11.5	6	11.8	7	12.3	6	12.5	1.0218
Xancidae	1	1.63	-	-	1	1.75	-	-	0.1378
Nassarridae	3	4.91	4	7.84	3	5.26	2	4.16	0.6346
Harpidae	1	1.63	1	1.96	1	1.75	-	-	0.2148
Conidae	3	4.91	0	-	3	5.26	1	2.08	0.3828
Buccinidae	2	3.27	2	3.27	2	3.5	2	4.16	0.4882
Volemidae	2	3.27	2	3.92	2	3.5	2	4.16	0.4882
Arcidae	3	4.91	3	5.88	2	3.5	2	4.16	0.4882
Pactimidae	2	3.27	2	3.92	2	3.5	2	4.16	0.4882
Ostreidae	1	1.63	-	-	1	1.75	1	2.08	0.2157
Donacidae	2	2.53	1	1.96	2	3.5	1	2.08	1.3611
Veneridae	11	18	9	17.6	8	14	8	16.6	1.883
Mactridae	1	1.63	1	1.96	1	1.75	-	-	0.8511
Tellinidae	2	3.27	1	1.96	1	1.75	2	4.16	0.3917
Mytilidae	2	3.27	2	3.92	2	3.5	1	2.08	0.436
Solenidae	1	1.63	1	1.96	-	-	-	-	0.1441

fluctuations (Kalyoncu, 2009). Gastropods usually play an important role in fresh water ecosystem by providing food for many animals and by grazing on vast amount of algae and detritus (Agudo-Padron, 2011). Freshwater biodiversity patterns are closely associated to local geographic features and physiochemical habitat structure, in combination with biological effects (Malm *et al*., 2005).

A large number of shorebirds feeding on benthic molluscs are visiting these areas during winter season (Pandiyan, 2000) and this could be because of the availability and accessibility of molluscan prey species. A further understanding of their ecology requires a long term study including the prey predator interaction of these areas,which would yield the biological significance of this area. The present report should be of good use in that perspective. The role of food abundance on water bird densities had been well established (Mc Knight and Low, 1969; Schroeder, 1973; Hoffman *et al*., 1981; Parker *et al*., 1992). Johnson *et al* (1990) found that the availability of *Pila virens* to be the most significant factor that influence the

abundance of open-bill storks at Kolleru lake, Andhrapradesh, India. According to Safran *et al*. (1997), the ecology of waterbirds are closely tied to the distribution and abundance of food resources and for many species of waterfowl and shorebirds benthic invertebrates are an important dietary component that influences habitat selection. Pandiyan (2000) found a strong relationship between invertebrate prey abundance and the waterbird availability in the same study area,which is a very critical factor in determining the use of these habitats by the shore birds. The availability of molluscan species in this area is a probable reason for the preference of this area by waterbirds.

Moreover, the molluscan species such as *Babylonia eylanica, Conus betulinus* and *Murex pecten* are reported to be uncommon (Apte, 1998). In the present study these species were reported from the study area indicated that this area is having large potential for a wide variety of molluscan forms. So it would be interesting to take a long term study which involves the modern techniques such as karyotying, which would yield new species of molluscan forms.

So, these kinds of study should be done in future across the year including all the seasons and microhabitats of the areas to elucidate fully and to understand the diversity and productivity of this coastal area.

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