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Habitat Ecology Of Molluscan Fauna And Its Ethno-Zoological Importance In Rural Livelihood Of Dhemaji District, Assam

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ABSTRACT

The present study deals with the habitat ecology of freshwater molluscan species of wetland of Dhemaji District of Assam. Freshwater molluscs (bivalves and gastropods) were found in a wide range of freshwater habitats, have varied life-history strategies and exhibit complex ecological interactions. Total eleven species of freshwater molluscan species were found in the study. The snail, Brotia costula and the bivalve Lamellidens marginalis were the most ubiquitous species in the study area. The study indicates that the molluscan community could be explored for possible use as food value and ethno-medicinal purpose in the rural area of the people of Dhemaji district, Assam.

Key words: Mollusc, Bivalves, gastropods, food value, ethno-zoology, habitat ecology.

Introduction

Dhemaji district occupies an area of 3217km^2. Being in a confluence of rivers with the mighty Brahmaputra river flanking the district and its numerous tributaries running through the district, the region is perennially affected by floods.

Freshwater molluscan species are the largest groups of animal after insects with at least 50,000 living species (and more likely around 200,000). They are the first living creature to have hard shells which include such familiar organisms as snails, octopuses, squid, clams, scallops, oysters, and chitons. It is regarded as the most ancient of animals on earth today. Freshwater molluscs are found in a wide range of freshwater habitats. They have varied life-history strategies and exhibit complex ecological interactions. These species have been known to play significant roles in human and veterinary health and thus

need to be scientifically exploring more extensively (Supian & Ikhwanuddin, 2002).Freshwater molluscs are fall into two groups, the Bivalvia and the Gastropods. The molluscs are common benthic communities. But the role of molluscs in the dynamic of the aquatic ecosystem and their contribution to biomass production are not well known. Therefore an attempt has been made to understand the species diversity of freshwater mollusc in lentic ecosystem in the region. Extraction of mollusc along with fish fauna is a major threat in the region.

The water quality should be assessed by the use of physical, chemical and biological parameters in order to provide a complete spectrum of information (Rosenberg and Resh, 1993). Benthic macro-invertebrates constitute an important part of aquatic organisms in aquatic environments. The aquatic organisms are exposed to anthropogenic disturbance as well as natural changes in their habitats which are to be responded in various ways. Gastropods and Bivalves are likely to be a common group of macro-benthic fauna in aquatic ecosystems. Molluscs occupy a prominent place among aquatic organisms suitable for biological monitoring (Goldberg, 1986; Salánki, 1989). They react strongly to environmental changes. This makes them suitable for studies of the relationship between organisms and environment (Ustaoglu et. al., 2001). The distribution of freshwater snails depends on water quality, e.g. pH, DO, calcium etc. and temperature. It has been reported that the toxicity of most substances is influenced by such factors as temperature, turbidity, DO, pH, CO_2 and water hardness (Okl and, 1969; Williams, 1970). Researchers have studied the ecology of different groups of invertebrates; little information is available about the ecology of aquatic gastropods in inland water bodies of Brahmaputra drainage system of Assam.

With a view to above, it has been proposed to study the Habitat Ecology of Molluscan Fauna and its importance in rural livelihood of Dhemaji district, Assam.

METHODS AND METHODOLOGY

Sites of investigation

The collecting of molluscan species was carried out in certain wetland of Dhemaji District, Assam.

Sampling of mollusc

Monthly samples of freshwater molluscs was collected from different sites during a period of one year. Sampling was carried out along the shoreline of each site and always by the same collector in the upper, middle and lower site of the wetland (Beels). Sample was

collected by passing a dip net (30 cm×40 cm) many times through the upper surface of sediment, water and vegetations on a depth of 20 cm (a column of water as parallel rectangles and its base is the rectangular net). The molluscs attached to the macrophytes was separated and all collected molluscs was kept in pre-labeled plastic containers. In the laboratory, it was counted and identified and then preserved in 70% ethyl alcohol.

Statistical Analysis

The basic statistical calculations (eg. average, standard deviation, correlation etc.) was done by following Bailey (1994). The correlation between the different hydrological parameters and biological parameters was determined as per the following formula (Biswas 1993).

Ecological factors

Water temperature, pH, dissolved oxygen, carbon dioxide was measured by digital probe apparatus. Water depth (cm) was measured by a wooden meter. The percentage of macrophytes was determined according to Ouyanget al. (2006) by simple estimation of the proportion of a site covered by floating and anchored plants.

Results and Discussion

The habitat types observed during the study period are characterized by:

Deep pool:

Deep pool characterized by flatter and deeper portion (greater than 2m) of the river may be mid-channel pool which is found in the mid portion of the open river. Majority of molluscan species prefer deep pool for their habitat. In deep pool, dissolved oxygen range from 3.84 ± 2.26 to 5.27 ± .09 mg/L while the current flow range from 0.21 ± 0.00 to 0.24 ± 0.00 m/s.

Confluence

In confluence of river, depth range in between 1.01 ± 0.26 to 1.85 ± 0.21 m and the dissolved oxygen content range from 4.87 ± 0.24 to 5.46 ± 0.37 mg/L. However water temperature also plays a significant role in the diversity of molluscan species. In the present study, water temperature range from 22.00 ± 0.00 to 32.50 ± 0.71˚C which provides excellent temperature for survival of the molluscan species.

Running water

It is the segment of river correlated with the beels a uniform current flow range from 0.22 ±0.00 to 0.23 ± 0.01 m/s. The depth was found to be range from 0.45 ± 0.21 to 1.28 ± 0.59 m while dissolved oxygen was 5.76 ± 0.11 to 5.55 ± 0.07 mg/L. It generally depends upon the season.

Fig 1: Deep pool habitat

Fig 2: Confluence habitat

Fig 3: Running water habitat

Table 1: Correlation matrix of Limnological parameters of wetland of the study area

* AT= Air Temperature, WT= Water Temperature, W. Current= Water Current, DO=Dissolved Oxygen, FCO_2= Free Carbon dioxide, Alka= Alkalinity, Hard= Hardness, Cond= Conductivity.

After the statistical analysis of the wetland (beel), the water temperature (r= 0.92)

	AT	WT	Depth	W.current	pH	DO	FCO2	Alka	Hard	Cond
AT	1									
WT	0.92	1								
Depth	0.88	0.83	1							
W.current	0.47	0.53	0.23	1						
pH	0.88	0.93	0.92	0.40	1					
DO	0.48	0.55	0.62	0.24	0.54	1				
FCO2	0.32	0.42	0.58	-0.30	0.46	0.50	1			
Alka	-0.90	-0.89	-0.78	-0.39	-0.78	-0.29	-0.39	1		
Hard	0.89	0.83	0.73	0.69	0.75	0.26	0.13	-0.85	1	
Cond	-0.94	-0.95	-0.81	-0.38	-0.88	-0.42	-0.43	0.93	-0.79	1

was found to correlate with air temperature. Increase in water temperature is directly proportional to the air temperature. Depth of the beel is also highly correlate with the air temperature (r=0.88) and the water temperature (r=0.83). The current flow of the beel has moderate correlation with air temperature (r=0.47) and water temperature (r=0.53) and that of poor correlation with the depth (r=0.23). pH has high degree of correlation with air temperature (r=0.88), water temperature (r=0.93) and depth (r=0.92) and that of poor correlation with water current (r=0.40). The dissolved oxygen shows moderate correlation with air temperature (r=0.48), water temperature (r=0.55), depth (r= 0.62) and pH (r= 0.54) but it shows poor degree of correlation with water current (r=0.24). The free carbon dioxide shows poor degree of correlation with air temperature (r= 0.32) and water temperature (r= 0.42), moderate degree of correlation with depth (r= 0.58), poor correlation with pH (r= 0.46) and dissolved oxygen (r= 0.50) but negative correlation with water current (r= -0.30). Alkalinity showed negative correlation with air temperature (r= -0.90), water temperature (r=-0.89), depth (r=-0.78), current flow (r= -0.39), pH (r= -0.78), dissolved oxygen (r= -0.29) and free carbon dioxide (r= -0.39). Hardness showed very high degree of correlation with air temperature (r= 0.89), water temperature (r=0.83), depth (r=0.73), water current (r=0.69) and pH (r=0.75) but very poor correlation with dissolved oxygen (r=0.26) and free carbon dioxide (r=0.13) and negative correlation with alkalinity

(r= -0.85). The conductivity of the water showed almost negative correlation with air temperature (r= -0.94), water temperature (r= -0.95), depth (r= -0.81), water current (r= -0.38), pH (r= -0.88), dissolved oxygen (r= -0.42), free carbon dioxide (r= -0.43) and hardness (r= -0.79) but high degree of correlation with alkalinity (r= 0.93) (Table 1).

Marophytes found in the study site

The occurrence and relative abundance of a variety of macrophytes at different site was observed on approximate eye estimation. These were categorized as common, abundant and occasional based on plot sampling and distance sampling method (Table 2). Six important taxa of submerged/floating macrophytes were recorded which were present at the study site.

Table 2: Macrophytes found in the study site

Sl. No.	Taxa			
1	Eichhornia crassipes	++	+ ++	+
2	Vallisneria species	++	+++	+
3	Hydrilla species	+++	+++	++
4	Potamogeton species	++	++	+
5	Ipomea species	+++	+	++
6	Jussia species	+	+	++

++: common, +++: abundance, + occasional,

Therapeutic use of molluscan species

The use of molluscan species for therapeutic purposes is one of the most consistent cultural practices observed by the various indigenous people of north eastern region of India. The malacofaunal species extracted by people for therapeutic and other cultural activities have been quantified and expressed in Table 3. Malacofauna includes Gastropods (43%) and Bivalves (57%) were used for therapeutic and other cultural practices.

The therapeutic and cultural use value shows that it ranges from 0.05 to 0.29 (Table 3). The highest use value is 0.29 was found in Pila globosa and Brotia costula respectively which was followed by Bellamya bengalensis with use value of 0.16. The other species was found less used in some way or other as decorative items or as an intermediate host by the people of this district. The Thiara scabra and Corbicula striatella was found with no use value the people of the region.

Table 3: Therapeutic used Value index of freshwater molluscan species of Dhemaji district, Assam

Sl. No.	Species	Use Value Index
1	Lymnaea accuminata	0.09
2	Bellamya bengalensis	0.16
3	Brotia costula	0.28
4	Corbicula assamensis	0.08
5	Lamellidens corianus	0.14
6	Lamellidens marginalis	0.14
7	Parreysia gowhattensis	0.05
8	Parreysia favidens	0.07
9	Parreysia favidens (deltae)	0.08
10	Parreysia theobaldi	0.07
11	Pila globosa	0.29

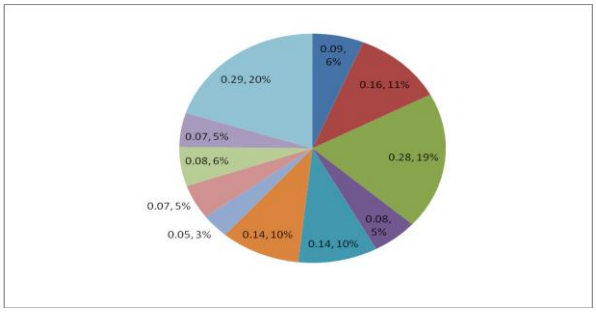

Fig 4: Therapeutic used Value index of freshwater molluscan species

Ethnozoology which covers holistic relationship between animals and man (Boriah et al., 2003; Roy & Singh, 2007). The ethnozoological practices and their impact on wild population of fresh water molluscan fauna need an understanding in the present context. The present study shows that therapeutic and meat consumption and economic subsistence are some reasons for the exploitation of molluscan fauna.

Molluscan farming may be explored as an alternative source to meet out the ethnic identity as well as to maintain ecological balance. Knowledge of resource availability, preparation, processing and formulation for therapeutic purpose also continues a part of the indigenous knowledge system in tribal community (Posey, 1987). The use of plant and plants derivatives has been a common practice in majority of human society but use of animal and their body parts use for therapeutic practices

and curing the various ailments has been seen in tribal society only, Wild plant and animals are important components of traditional medicines upon which an estimated more than 80% of the world's population has been said to rely for primary health care (WHO, 1993). A variety of molluscan species of gastropods and bivalves are used for medicinal purposes The therapeutic use value of species range from 0.05 – 0.29 (Table 3). The more use value the animals like Pila globosa and Brotia costula have the higher is the risk of extinction. The use of various body parts for therapeutic purposes and the animal extracted for traditional medicine are a significant aspect of this study.

At the same time the rural livelihood issue and health care system of tribal society should also addressed in right perspectives for the welfare of the tribal people. A large section of the tribal society believes that the use of traditional medicine is more effective than the modern medicine and no side effect.

The study has generated scientific information on habitat ecology of fresh water molluscan species and has provided deeper insight into utilization and their impact on wild population of the animal. The study has opened the door to undertake a pharmaceutical investigation of molluscan body parts that have to be used in traditional medicine through the indigenous knowledge.

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