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Study of Ecology and Shellfish Diversity of River Nabaganga at Jhenidah in South Western Part of Bangladesh

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Abstract

The river Nabaganga is an important river in the south-western part of Bangladesh and played a significant role in the economy of this region. The study was carried out during the period of June 2014 to July 2015 along the bank of the river. A total of 19 species were identified under 2 classes, 13 families and 14 genera. Molluscans form an important component in the food chain for the higher strata transferring the energy in the aquatic ecosystem. Some of the fresh-water molluscs are edible. The molluscans have an economical and commercial importance. The aim of the paper is to construct a diversity structure of shellfish of the river Nabaganga. These are the parts of our precious natural wild life, which also constitute important components of our fresh water ecosystem and biodiversity besides supporting livelihood to the rural people by the riverside areas in more than one way whether in terms of low-priced proteins or commercial utilization for lime and antique purpose.

Keywords

Diversity, Mollusca, Ecology, Pollution and River Nabaganga

Introduction

Molluscs are soft bodied animal which is encircled by calcareous shield and have been known to play important roles in the ecology of fresh water and also to public and veterinary health. So there is an urgent need to be exploring scientifically and more broadly the issue (Supian & Ikhwanuddin, 2002). Several species of freshwater gastropods are known to act as intermediate hosts for the analytic trematode parasites. Besides these, members of the family Pilidae and Thiaridae were reported to harbor larval trematodes (Subba-Rao, 1993;Karimi et al., 2004). A number of factors are measured as disturbing the ecology of snails and other intermediate hosts of diseases, therefore their focal and seasonal distributions (Hossein et al., 2011). These physical factors involved water current, temperature, turbidity, transparency and distribution of suspended solids; Chemical factors are various degree of ion concentration and dissolved gases in water. Biological factors such as availability of food, competition and predator-prey interactions (Williams, 1970; Ofoezie, 1999). Besides, the aquatic plants have been shown to play critical roles in the distribution of snails in different zones (Ofoezie, 1999). Though the importance of different ecological factors vary significantly from one ecological zone to the other and also vary from one water body to the other, there is a need to identify ecological factors which is responsible for survival and distribution of shellfishes in one water body to other bodies (Dazo et al., 1966; Klumpp & Chu, 1977; Ofoezie, 1999; Elkady et al., 2000; Carg et al., 2009).

Materials and Methods

The collection of molluscan was done at a specific duration of every month. The collected specimen was cleaned with a cleaning brush for removing of algal biomass on the shell and then they were fixed with 5% Formalin Solution. For the identification of malaco fauna standard literature was consulted and quantitative studies were conducted through various months.

Studysite

The study was conducted along the course of the river Nabaganga. Survey was carried out from December 2014 to November 2015. Survey was conducted twice per month. Sampling sites were selected based on their distribution, degree of shoal territory with depth less than one meter and ease of use.

Collection of Mollusca

Specimens were collected by using hand picking from study areas. Nets were also used to collect samples. All samples were transported to fisheries laboratory and specimens were preserved in 95% ethanol.

Identification

Species were identified based upon morphological characteristics of the shell and also with the help of the encyclopedia volume 17, Subba Rao (1993); Bouchet & Rocri (2005). Finally species were identified with the help of Zoological Survey of India, Kolkata.

Result and Discussion

Shellfish diversity of the river Nabaganga in Jhenidah district of south-western part of Bangladesh is shown in the table 1 and family wise species composition were shown in table 2 below.

Table 1 : Identified Shellfish Diversity of the river Nabaganga

Class	Subclass	Order	Family(13)	Scientific name (19) genus 14	Common name	Specis composition
Gastropoda						
	Prosobranchiata	Mesogastropoda	Viviparidae	*Bellamya bangalensis* (Lamarck)	River snail	10.53%
				Bellamya crassa (Benson)	Pond snail	
			Ampullariidae	*Pila globosa* (Swainson)	Apple snail	10.53%
				Pila virens (Lamarck)	Apple snail	
			Bithyniidae	*Bithynia (Diagonstoma) ceramepoma* **(Benson)**		10.53%
				Gabbia orcula frauenfeld Var pprodocta (Nevill)		
			Thiaridae	*Thiara (Thiara) scabra* (Muller, 1774)	Screw snail	5.26%
			Pleuroceridae	*Brotia (Brotia) costula* (Rafinesque)	Brotia snail	5.26%

Pulmonata	Pulmonata	Basommatophora	Lymnaeidae	*Lymnaea (Pseudosuccinnea)* acuminatae Lamarck	Lymneid snail	10.53%
				Lymnaea (Psedusuccinea) luneola Lamarck	Lymneid snail	
			Planorbidae	*Gyraulus labiatus* (Benson)		5.26%
		Stylomatophora	Bullinidae	*Indoplanorbis exustus* (Deshayes)	Rams horns snail	5.26%
			Ariophantidae	*Ariophanta interrupta* (Bencon)		15.79%
				Macrochlamys indica (Godwin -Austin)		
			Cerustuidae	*Rachis bangalensis* (Lamarck)		5.26%
			Acatinidae	*Acatina (Lissachatina) fulica fulica* (Bowdich)		5.26%
			Ariophantidae	*Macrochlamys sequax*	Disk shell	15.79%
Pelecypoda		Eulamellibranchiata	Unionidae	*Lamellidens marginalis*	fresh warer mussel	10.53%
				Lemellidens corianus (Lea)	fresh warer mussel	

In case of snail diversity of the river Nabaganga, 19 species were recorded under two classes, 4 orders and 13 families. Family wise species composition were Ariophantidae occupied 15.79%, and Viviparidae, Ampullariidae, Bithyniidae, Lymnaeidae Unionidae covered 10.53%. Rest of the families such as Thiaridae, Pleuroceridae, Pleuroceridae, Planorbidae, Bullinidae and Cerustuidae covered 5..26%.

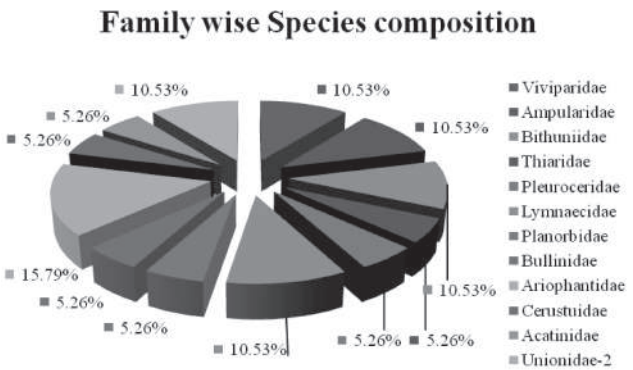

Table 2 : Family wise species composition of collected snails

During the period of study, it was revealed that gastropods and bivalves were dominant in fresh water body of the river Nabaganga. The findings showed similarities with Hossain and Baki (2014). On the basis of structure and function of molluscs, they were heterogeneous in their origin. Fresh water milluscs are now affected both extrinsic and intrinsic factors. The intrinsic factors include habitat degradation, pollution, unavailability of host plants and land use exercise. Prabhakar and Roy (2009) studied the taxonomic diversity of Shellfishes from Kosi region of North Bihar in India. They discovered 20 species of Gastropods and 10 species of Pelecypodes. Goswami et al. (2010) studied the taxonomic accounts of fresh water mollusca and Vincent et al. (1992) also studied sewage pollution impact on water quality and micro zoo benthic fauna.

Apple snails are the common items of Pila globosa found in Bangladesh and India generally eaten by farmers and pet birds. The haphazard use of pesticides in rice fields causes a serious a risk to the survival of shelled animals as they may change the biochemical component resulting in irregular changes in the ethology and physiology. In the present scenario, agriculture completely depends on agrochemicals. Surplus and uncontrolled and repeated use of agrochemicals in the variety of pesticides, fertilizers, and herbicides pollutes the aquatic environment. Molluscs are considered hardy in nature, the changes parameters in soil or water to a large scale affect their movement and feeding, they quickly closed themselves in their shells. This is the prime sign of changed environmental quality viz. pH, hardness of soil, water, and temperature etc. The uses of herbicides in the agricultural fields entered into the water body affect the existence of aquatic plants because aquatic plants were the shelters of some molluscs. Excessive uses of water for cultivation and supply of drinking water affect the diversity of molluscs due to lack of shelters. Over harvesting for lime production and preparation of poultry feed cause havoc to the diversity of fresh-water molluscs (Razi and Brown,1994). In addition migratory birds during winter lessen the molluscan diversity greatly due to overconsumption and shortage of water. Simultaneously, paddy cultivation on the river bed in winter causes the mass mortality of molluscs.

Molluscans form an important component in the food chain for the higher strata transferring the energy in the aquatic ecosystem. Subba Rao (1993); Garg et al. (2009) and Williams (1970) studied a correlation between the molluscan diversity with physiochemical parameter with an effect of water.

Ecosystem management and renovation of the ecology is an essential part of the

conservation for the mulluscans. The ecosystem of a water body has become gaining importance because this type of environments is being poorly managed. From the ecological point of view, producers and consumers showed a positive correlation in all aquatic habitats which possess entirely two different groups of animals one is producers and the other is consumers. Primary and secondary consumers used these as their principal source of energy and maintain energy flow in specific ecosystems. Thus prey-predator relationships in the ecosystem are maintained properly. But the ecosystem of the rivers is gravely hampered due to anthropogenic activities by the human. Man is the top ranking predator destroying the natural environment which caused tremendous effect in our society. Due to degradation of river ecology some species of molluscs are threatened, and some were extinct. According to the IUCN (1996) Red List of Threatened Animals Lists, there were 12 bivalves and 216 gastropods are extinct and 114 bivalves and 806 gastropods are threatened.

Conclusion

This study is conducted to make people aware who are residing by the side of the river, and the policy makers to make them realise how rivers are contaminated which is considered a life line for the South western part of Bangladesh which directly affect the faunal diversity of the molluscan species. Finally, everyone should apprehend that bio- diversity is the part and parcel of our existence.

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