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Species diversity of shellfishes in Madhepura district of Bihar

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Abstract- The abundance and distribution of some shellfishes of the coastal waters bordering different areas of Madhepura district of Bihar was studied between September and December, 2018. Specimens were collected monthly with the assistance of local fishermen. The population structure and distribution patterns were determined using Shannon-Weiner diversity index. The species population diversity showed great fluctuations in all the four different sampling sites during the different months of the observation period. All most of the shellfish species were found to be abundant during the months of September and October while during the other study period the species were present in few of the sampling site which may be due to high pollution status.

Keywords:- Shellfishes, Shannon-Weiner diversity index, Madhepura.

INTRODUCTION

Madhepura district is one of the thirty-eight districts of Bihar, India. Madhepura town is the administrative headquarters of this district. Madhepura district is a part of Kosi division which has rich biodiversity that contains a diverse assemblage of fish, shellfish (shrimps, crabs, lobster, gastropods and cephalopoda), reptiles and other living organisms. Shellfish harvested by the artisanal fishermen include white shrimps (*Nematopalaemon hastatus*), brackish river prawn (*Macrobrachium macrobrachion*), *Bellamya bengalensis*, *Pila globosa* etc. Shellfishes have been found out to be of very great commercial importance in most of the country. And thus the exploitation has been on the increase due to increasing population and increase in demand for protein sources by man[1]. The flesh of *Pila* and *Viviparous* sp. is used as medicine to cure asthma, swelling of joints, burns by aboriginal people of this region. The foot portion of these edible shell fishes is eaten in the form of curry as well as in roasted form at regular intervals. The shell fishes and crustaceans are farmed commercially and dominate world output of aquacultural resources. Among shell fishes, the pearl Oyster, *Unio*, *Pila*, dominates in one hand and crustacean's crabs (*Paratelphusa spinigera*) and prawns (*Macrobrachium* sp.) on other hand. Fish farming is a solution to the world food problem source of low cost animal proteins for lower income populations. Nwosu reported that there has been a significant reduction of the natural stock of shrimps in Nigerian coastal waters (probably due to environmental degradation which is detrimental to the abundance and life cycle of the shrimp species) while Deekae and Abowei stated that the unfriendly fishing methods of local fishers who use poisons and chemicals are affecting the shell fish population abruptly.[2, 3]

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MATERIALS AND METHODS

Description of Study Area

The study was carried out in Local area of Madhepura between September, 2018 and December 2018. The shrimps were collected on monthly basis between the months of September and December 2018, with the assistance of artisanal fishermen. The Shrimpers used boats with sizes ranging from 5 to 12m long. The boats were powered by small outboard engines and manned by an average of two men per boat, to which the shrimping nets are attached. The specimens were immediately preserved in iced packed cooler and transferred to the Fisheries and Aquaculture Laboratory, B.N Mandal University of, Madhepura where they were frozen at -4^{0}C before they were used for the research work. The specimens were sorted into different groups and identified to specific level using the FAO Species Identification Sheets.

Data Analysis

The data was analyzed using the Shannon Weiner diversity index by using the formula:

$$H = \Sigma\ pi \log pi$$

Where H = species diversity

pi = mean of individual species procured by the formula n/N

log pi = is the log product of po(mean of individual species

OBSERVATION

Table 1: Occurrence of Shellfishes in coastal waters areas of Madhepura district, between September and December, 2018.

Months	Species	Haraili	Baiwah	Budhma	Khagaria	% occurrence
September	*Sartoriana spinigera*	+	+	+	+	100
	Bellamya (Viviparous) variata	+	_	_	_	25
	Bellamya bengalensis	+	_	+	_	50
	Indoplanorbis exustus(Deshayes)	_	+	+	_	50
	Pila globosa	+	+	+	+	100
October	*Sartoriana spinigera*	+	+	+	+	100
	Bellamya (Viviparous) variata	+	_	+	_	50
	Bellamya bengalensis	+	+	+	_	75
	Indoplanorbis exustus(Deshayes)	+	_	_	_	25
	Pila globosa	+	_	+	_	50
November	*Sartoriana spinigera*	_	_	_	+	25
	Bellamya (Viviparous) variata	_	+	+	_	50
	Bellamya bengalensis	+	_	_	+	50
	Indoplanorbis exustus(Deshayes)	_	+	+	_	50
	Pila globosa	+	_	_	_	25
December	*Sartoriana spinigera*	_	+	_	_	25
	Bellamya (Viviparous) variata	+	_	_	+	50
	Bellamya bengalensis	_	_	+	+	50
	Indoplanorbis exustus(Deshayes)	_	_	_	_	0
	Pila globosa	+	_	+	_	50

RESULT & DISCUSSION

The present study on the species diversity of shell fisheries of the area of North-Bihar reveals that the most of the areas of this region was rich in diversity of molluscan and crustacean fauna. The abundance of shell fishes in terms of species diversity indicates a good life support system for fishes and birds. Shell fishes are the major component of the macro-invertebrates, they form link between zooplankton and vertebrate taxa, such as fishes and birds and play a key role in the energy flow and bio-geochemical cycle of the wetland habitats. A number of fish and avian fauna diversity directly depend upon the mollusks population of these habitats.

The occurrence of the shellfishes in the sampled stations is shown in Table 1. The table shows that *Sartoriana spinigera*, and *Pila globosa* were caught in all locations throughout the sampling period during the month of September while *Indoplanorbis exustus* (Deshayes) was caught only from two sampling site during the month of and *Bellamya (Viviparous) variata* was only observed in Haraili. *Indoplanorbis exustus* (Deshayes) were not caught from the Haraili. However during the month of October the species of shell fishes caught were lower than those obtained in the month of September.

Sartoriana spinigera was collected from all the sampling sites that were chosen for the study of species diversity. *Indoplanorbis exustus* (Deshayes) was present only in one of the sampling site that resembled the lower in species diversity. During the month of November *Bellamya (Viviparous) variata*, *Bellamya bengalensis* and *Indoplanorbis exustus* (Deshayes) were found in only two of the sampling sites.

While duering the month December most of the shell fishes species were found to be in less in number. The *Indoplanorbis exustus* (Deshayes) species were almost absent in all the four sampling site. While the other species were present in very low in number and were found only in few sampling sites of Madhepura district.

The result reveals that species diversity is a useful parameter for the comparison of communities under the influence of biotic disturbances or to know the state of succession and stability in the community as the diversity index. This indicates little difference in the species diversity of the shellfish communities. Balloch *et al*[5] found the diversity index to be a suitable indicator of water quality, Hughes[6] also concluded that this index was useful for community structure, but could not stand alone for assessing environmental quality while Costa and Fransozo[7] reported that the important factors that affect distribution and abundance of shrimps in the tropical region are water quality (temperature, salinity), nourishment and substrates.

Thus, this finding could be as a result of the prevailing highly similar environmental conditions as reported by Ekta[8]. Some important factors governing the abundance and distribution of aquatic communities includes, water quality, immediate substrates for occupation and food availability[9] and any ecological imbalance arising from any severe alterations of these factors may affect the environment. Also, Kennish[10] noted that anthropogenic activities could lead to the periodic or permanent elimination of estuarine dependent fish species from individual estuarine systems. Therefore, the relatively low composition and diversity may be as a result of stress imposed by land based pollutants, as well as substrate instability possibly arising from frequent anthropogenic activities in the area. Similar observations were made by Ajao and Fagade[11] on the western industrialized parts of Lagos Lagoon, which received a complex mixture of domestic and industrial wastes.

CONCLUSION

Above studies done on species diversity of the shell fishes concludes that the *Sartoriana spinigera and Pila globosa* were found to be very abundant and widely distributed throughout the various coastal areas of the Madhepura district. Although there were generally very high similarity among the shellfish communities in the four sampling station. However in few sampling stations the populations of the shellfishes were low due to pollution status. Thus there is very serious need to control and monitor to attain the fishes sustainable diversity.

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