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MALACOFUANA DIVERSITY OF RIVER CHENAB FED STREAM (GHO-MANHASAN)

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ABSTRACT
The paper deals with the study of Molluscan fauna diversity of a sub-tropical stream in J and K. Although molluscs are common components of the benthic communities, their role in the dynamics of the aquatic ecosystem and their contribution to biomass production is not well known. The overall diversity in the stream constitutes nine species. Among nine species seven species belongs to families Viviparidae, Thiaridae, Lymnoidae, Physidae and Planorbidae of class Gastropoda and two species is of Family Pisididae of the class Bivalvia. *Melanoides tuberculata* of family Thiaridae was most dominant species ranged from 234 org/m^2 (spring) to 802 org/m^2 (summer). Class Bivalvia is represented by only 2 species *Pisidium mitchelli* and *Sphaerium indicum* in which *P. mitchelli* was dominant and had its minimum density 72org/m^2 in monsoon and maximum 360org/m^2 in winters. Different biological indexes are used to determine the diversity, dominance, species richness and evenness of the observed malacofauna. The result emphasize the importance of conserving the world's freshwater mollusks populations, which are declining at an alarming rate through habitat destruction, pollution declines in host fish and the invasion of non-native biota.

INTRODUCTION

Benthic macroinvertebrates are the animals that lack a back-bone, occupy the bottom of water body and generally are visible with the naked eyes. Aquatic macroinvertebrates play significant role in responding to a variety of environmental conditions of rivers and streams and therefore may be used as bio-indicators for water quality assessment. The functional role of macrobenthic communities in the trophic dynamics of reservoir ecosystems is well acknowledged. The composition, abundance and distribution of benthic organisms over a period of time provide an index of the ecosystems. In recent years, there is a greater emphasis world over for better understanding of benthic environment, its communities and productivity and this has led to increased exploitation of many inland water bodies.Though a lot of work has been done on the hydrological and macrobenthic faunal aspects on lotic freshwater bodies by earlier workers viz:- Dutta and Malhotra (1986), Dutta *et al.,* (2000), Sawhney, (2004), Mushtaq, (2007) and Sawhney, (2008) but no work has been done on the molluscan diversity.

The phylum Mollusca is a large assemblage of animals having diverse shapes, sizes, habits and occupies different habitats (Rao, 1993). Within the large group of animals known as molluscs, three subgroups – snails, mussels and clams – have representatives that live in fresh water. Because all freshwater mollusks have hard shells that are often washed up on shores, they are some of the most conspicuous of the freshwater invertebrates. Freshwater mollusc live in all types of wet habitats from large lakes and rivers to roadside ditches and backyard ponds. They are most commonly found along the shallow edges of water bodies where warmer temperatures and additional light provide them with more food than is available in deeper water. Although mollusks are common components of the benthic communities, their role in the dynamics of the aquatic ecosystem and their contribution to biomass production is not well known. They have ecological and economic importance because they are consumed mainly by fish, mammals, crustaceans, birds and are also served for human consumption. Some of mollusca have parasitological importance due to being hosts to parasitic organisms, which are agricultural pests. The study of these organisms is important due to the fact that the occurrence of some species is related to polluted areas, while for others, the presence of clean, unpolluted water is essential for their occurrence.

Freshwater mollusks have been known to play significant roles in the public and veterinary health and thus need to be scientifically explored more extensively. In the present paper some of the basic observations on the molluscan diversity of a subtropical stream, a tributary of River Chenab, have been presented.

MATERIALS AND METHODS

This study which was carried out in October 2008 to august 2009 covered the River Chenab fed stream Gho-Manhasan. River Chenab is one of the largest rivers of the Indus basis and thus it feeds to maximum parts of the Jammu region of JandK.

River Chenab gives rise to many streams and Gho-Manhasan is one of them which is located at 32.56ºN 74.95ºE. This stream is sole source for the population of adjoining areas which depends on this stream for irrigation and domestic purposes. Since, no work has been done on this and this stream exhibits a great diversity so, it becomes a necessity to explore the diversity exhibiting in it.

The mollusks of the littoral zone were collected by hand picking and for the smallest species a sieve for soil samples was used. They were brought to the laboratory, washed and then preserved in polythene bags. Identifications were done on the basis of Preston (1915); Tonapi (1980); Rao (1989) and also were carried to Zoological survey of India (Calcutta, India).

To understand a particular biotic community it is very important to work out certain indices. For this Shanon-Weiner ($\overline{H}$) (Shannon-Weiner, 1949), Marglef's index (d^-) (Marglef, 1958), Simpson's index (d_{Simp}) (Simpson, 1949) and Pielou's evenness index (P_i) (Pielou, 1966) were calculated.

RESULTS

During the present study a total of 9 species of Mollusca belonging to 6 families were observed (Table 1). The population of Gastropoda was recorded throughout the year and is represented by 7 species. The density of order Gastropoda ranged between 9 to 802org/m^2 with maximum in summer and minimum in autumn. Amongst the Gastropoda group *Mellanoides tuberculata* was dominant (47.18%) followed by *Gyraulus ladacensis* (18.50%), Bellamya bengalensis (15.40%), Lymnaea luteola (4.37%), L.accuminata (f.brevissima) (2.16%), while 2 species (*Pisidium mitchelli* and *Sphaerium indicum*) of order Trigoindae (Bivalvia) was recorded and density of this group represented by 18-360 org/m^2 showing their peak in winter.

Mellanoides tuberculata is the commnest and most wide ranging member of the family Thiaridae, found dominant in the stream. *M. tuberculata* contributed 47.18% of the total number of species recorded, *L.luteola* being a minor contributor forms only 2.16% of the overall density of molluscan fauna observed. Among bivalves *Pisidium mitchelli* forms 15.38% and thus dominates *Sphaerium indicum* (6.49%). Low Shannon-Wiener indices were recorded, varying between $\overline{H}=0$ to $\overline{H}=1.623$. Species dominance index *i.e.* Simpson's index varied between ($d_{Simp}=0$ to $d_{Simp}=0.549$).

Table 2: Seasonal variations in different biological indexes of the Molluscan Fauna

Months	Shannon ($\overline{H}$)	Marglef (d^-)	Simpson (d_{Simp})	Pielous (P_i)
October	0.793	0.361	0.549	0.722
November	0	0	0	0
December	0	0	0	0
January	1.306	0.621	0.293	0.811
February	1.22	0.513	0.338	0.830
March	1.231	0.514	0.327	0.883
April	1.623	0.865	0.213	0.905
May	1.167	0.625	0.233	0.725
June	1.585	0.933	0.266	0.814
July	1.266	0.595	0.310	0.913
August	0.902	0.532	0.522	0.650
September	1.176	0.813	0.328	0.655

Marglef's richness index recorded minimum in November and December $d^-=0$ and was maximum in June $d^-=0.933$. Pielou's evenness index was low $P_i=0$ in winter season but was found to be maximum $P_i=0.913$ due to the presence of some communities in which abundances and distributions were more homogenous, such as in the dry period of June.

DISCUSSION

The distribution and abundances of freshwater mollusks in Gho-manhasan stream may be attributed to the availability of food, shelter and oviposition sites. Water bodies rich in organic and silt matter are known to support thriving populations of macro invertebrates because of reduction in water current and as such the substratum tends to make mollusks indistinguishable from their typical lentic habitat (Whitton, 1975). Mollucs are represented in freshwater bodies by classes Gastropoda and Pelecypoda and is a group of most diverse and dominant benthic water bodies. Molluscs were found abundant in Gho-manhasan stream particular the marginal areas. Their abundance might be attributed to the presence of vegetation in the shallow depth, which emerged when the stream was dry during the post-monsoon period and formed a good feed leading ton their multiplication as has also been observed by earlier workers Gupta (1976) and Manoharan *et al.,* (2006).

Minimum density of gastropods recorded during autumn may be due to aestivation (Singh and Munshi, 1992). A higher count of Gastropods recorded during summer may be due to the effect of reproduction of these macrobenthic invertebrates, as small sized mollusks were observed in collection during

Table 1: Seasonal fluctuation of molluscan fauna (org/m^2) recorded in Gho

Class	Order	Family	Genus	Species	Spring	Summer	Autumn	Winter
Gastropoda	Mesogastropoda	Viviparidae	Bellamya	bengalensis f.typica(lamarck)	-	72	90	63
		Thiaridae	Melanoides	tuberculata(Muller)	234	802	432	549
	Basommatophora	Lymnoidae	Lymnaea	accuminata	-	54	36	-
				(f.brevissima)	-	117	36	54
				luteola	54	81	-	36
				(f.typica)				
				accuminata(f.patula)				
		Physidae	Physa	acuta (Draparnaud)	36	54	27	-
		Planorbidae	Gyraulus	ladacensis(Nevill)	198	252	9	315
Bivalvia	Trigoinidae	Pisididae	Pisidium	mitchelli (Prashad)	72	136	72	360
			Sphaerium	indicum(Deshayes)	72	54	18	126

- manhasan, during Oct.2008 to Sept.2009

this period (Dutta and Malhotra, 1986). Numerical abundance of *M.tuberculata* may be due to the reason that it is among the hardiest of the prosobranchs and it covered mainly in its parthenogenetic mode of reproduction it can occupy a great diversity of habitats (Berry and kadri, 1974). Some other Gastropods which are used as pollution indicators include *Physa acuta, Lymnaea accuminata*, and *L. luteola*. In addition both bivalvia species *Pisidium mitcheli* and *Sphaerium indicum* can also tolerate greater nutrient concenterations are also used like some other Gastropods, as a bioindicator of water (Metcalf, 1984). The high frequency of *Pisidium can* be attributed to their ability to support variations at water level (Junk and Robertson, 1997).

CONCLUSION

This study indicates that in many freshwater systems molluscan populations may be playing a central role in supporting both local and ecosystem level biodiversity. The ultimate extirpation and extinction of such molluscan populations may therefore have profound effects on the wider ecosystem. The result emphasize the importance of conserving the world's freshwater molluscs populations, which are declining at an alarming rate through habitat destruction, pollution declines in host fish and the invasion of non-native biota (Aldridge, 2004 and 2007).

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