

A CORRELATION BETWEEN FRESHWATER MOLLUSCAN DIVERSITY WITH BHIMA RIVER POLLUTION NEAR PANDHARPUR, MAHARASHTRA, INDIA

Waghmare P.K.*[©], Rao K.R.*and Shaikh T.A.**

Department of Zoology, Walchand College of Arts and Science, Solapur-413006, (M.S), India.

Department of Zoology, MMP College, Mangalweda, Dist. Solapur, (M.S), India.

([©]E-mail: padmshriwaghmare@gmail.com)

ABSTRACT

The Bhima River originates in Western Ghats in Maharashtra and flow south east and is most important tributary of Krishna river. These river confluences with Nira at Niranarsingpur. This river is considered as lifeline for entire Solapur district and water will being utilized for agricultural industrial and drinking. Because of human activities and due to the release of millions of liters of untreated sewage and industrial effluent into the river every day the river is getting heavily polluted. Molluscs are considered as important link in aquatic ecosystem. Any variation in surrounding water in influence of the pollution results a greater impact on the freshwater molluscs diversity. The present work from Bhima river which was survey of Molluscan fauna from Gopalpur, near Pandharpur (latitude 17° 66'N 75° 36'E longitude) from Maharashtra. (Environmental status Report, Maharashtra Pollution Control Board, August-2005). This site is the most vulnerable place where in there was considerable distribution and abundance of the molluscs noticed during our entire study. All together about 15 species of freshwater molluscs were identified from in this area. There observed the drastic decrease in the overall number of molluscan species from summer 2010 onwards. This may be due to the pollution of Bhima river water, which results in reduction in the numbers of molluscan species.

KEY WORDS: Bhima river, Diversity, Molluscan, Pandhrpur.

INTRODUCTION

Pandharpur in Maharashtra is considered as the Dakshin Kashi which is one of the Pilgrims centre situated on the banks of the Bhima River known popularly as “Chandrabhaga”. The pilgrims visit this place and take holly bath in the Bhima river. The waste water discharged not only from nearby district into the Bhima river but also various water nalas from Malpe, Gopalpur and Lendaki which directly various physicochemical parameter of the river water. The sanitary facilities of the pilgrims are very poor and influence the heavy pollution into the water, in addition to this due to improper and insufficient arrangement for the garbage distribute leads to the river, Gopalpur is also an important worship site for pilgrims, result huge quantity of raw sewage is generated and join the river (Environmental status Report, Maharashtra Pollution Control Board, 2005).

Molluscs form an important component in food chain for the higher strata transferring the energy in the aquatic ecosystem. Some of the fresh water mollusca are edible. The molluscan are having an economical and commercial importance where in the soft bodies of the molluscan are being used as bait for fishing purposes. Molluscan shells are also used for making knife handles, preparation of buttons, useful in the decoration as door curtains and manufacturing of poultry food. Subba Rao and Dey (1989) and Garg *et al.* (2009) studied a correlation between the molluscan diversity with physicochemical parameter with effect of water from Ramasagar reservoir from located in north way site of Dhatia city, Madhya Pradesh. Piola and Johnston (2008) studied the influence of pollution on the native diversity of invertebrates of new southwales, Australia. Amit Kumar Prabhakar and Roy (2009) studied the taxonomic diversity of shell. Shell fishes from Kosi region of North Bihar, India were they discovered 20 species of Gastropod, 10 species of Pelecypoda. Verma and Saksena (2010) studied the sewage pollution impact on water quality and micro zoobenthic fauna from Kalpi river, Gwalior, Madhya Pradesh. The present investigation has been undertaken to study impact of pollution on the molluscan diversity from the Bhima River flowing through Pandharpur. This study to aware the people who are visiting the Pandharpur in lakhs every year, how they are contaminating the Bhima River which is considered as a life line for the Solapur District which directly affect the faunal diversity of the molluscan species.

MATERIALS AND METHODS

Bhima river basin form Maharashtra state comprising the districts of Pune and, later on it enter to Karnataka state at Gulbarga and join as a tributary of the river Krishna, and is known famously as “Chandrabhaga”. In the entire course of its flow the river is polluted at various places with industrial and domestic discharges. Bhima river at various places in and around Pandharpur city is drenched with various nalas form nearby colonies (Figure 1- 1.3). Molluscan are exploited by different criteria of people of various places along the banks of Bhima river extensive field will conducted for collection of molluscan species at specified sites near by Pandhrpur city 2010 at Gopalpur site (latitude 17° 66'N 75° 36'E longitude). The river is drained by waste water from Gopalpur nala (Figure 1- 1.2) and Malpe nala along with Lendaki. On the map of study site Pandharpur A indicates Gopalpur, B is Temple and C is the Bhima river, as referred above.

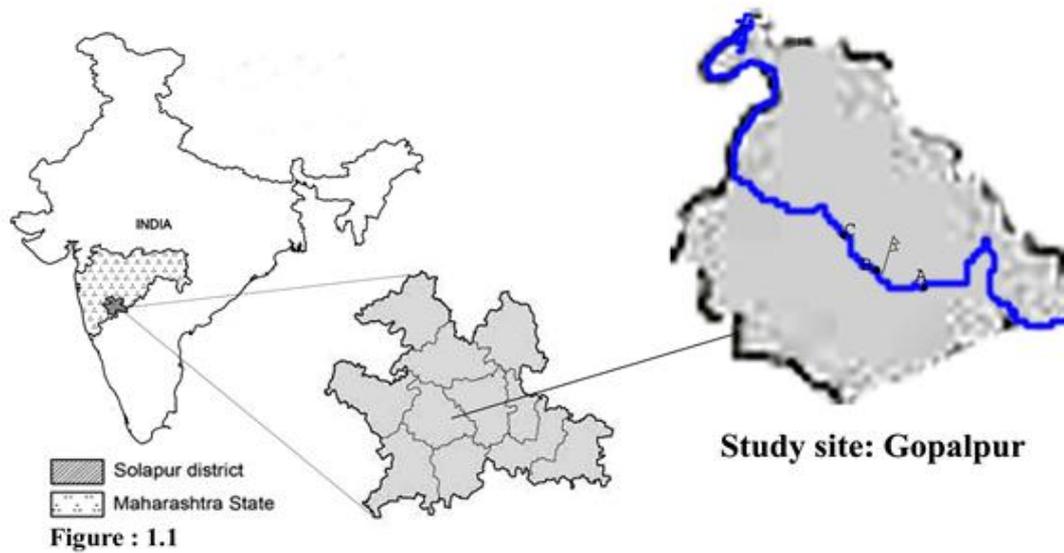


Figure : 1.3



Figure: 1.

1.1: Map of Study Site

1.2 Polluted area of Bhima river Gopalpur.

1.3 Photo of nala showing the discharge of pollutant in Bhima river Gopalpur

The collection of molluscan fauna has been done at specific duration of every month the collected organism work cleaned for remaining algal biomass and were fixed in 5% Formalin Solution. For the identification of fauna standard literature was consulted and quantitative studies were conducted through various months' observations to know the variations in pollution of Bhima river especially at specific sites.

RESULTS

Considerable season variations were noticed among the molluscan species collected from the Gopalpur site of Bhima river flowing through Pandharpur city of state Maharashtra, Class Gastropod, Pelecypoda belong to mollusca were recorded during the one year study period.(2010) The details are given are as follows. The photographs of molluscan species are given in the Table 1 and Figure 2.

Table 1. Molluscan species with classification from Bhima River at Gopalpur, Pandharpur.

Phylum	Class	Order	Family	Species
Mollusca	Gastropoda	Mesogastropoda	Viviparidae	<i>Bellamyia bengalensis</i> (Lamarck,1822) <i>Bellamyia eburnea</i> (Annandale 1921) <i>Bellamyia dissimilis</i> (Muller 1774)
			Thiaridae	<i>Taberia granifera</i> (Lamarck, 1822) <i>Taberia lineate</i> (Gray, 1828) <i>Thiara scabra</i> (Muller, 1774)
			Melonidae	<i>Melanoides tuberculata</i> (Muller, 1774)
		Basommatophora	Lymnaeidae	<i>Lymanea acuminata</i> (Lamarck,1822) <i>Lymanea luteola</i> (Lamarck,1822)
	Pelecypoda (Bivalvia)	Eulamellbrachiata	Unionidae	<i>Lamellidens corrianus</i> (Lea, 1834) <i>Lamellidens marginalis</i> (Lamarck, 1819) <i>Parreysia corugata</i> (Muller, 1774) <i>Indonaia caeruleus</i> (Prashad, 1918)
			Corbuculidae	<i>Corbicula peninsularis</i> (Prashad 1928) <i>Corbicula striatella</i> (Deshayes, 1854)

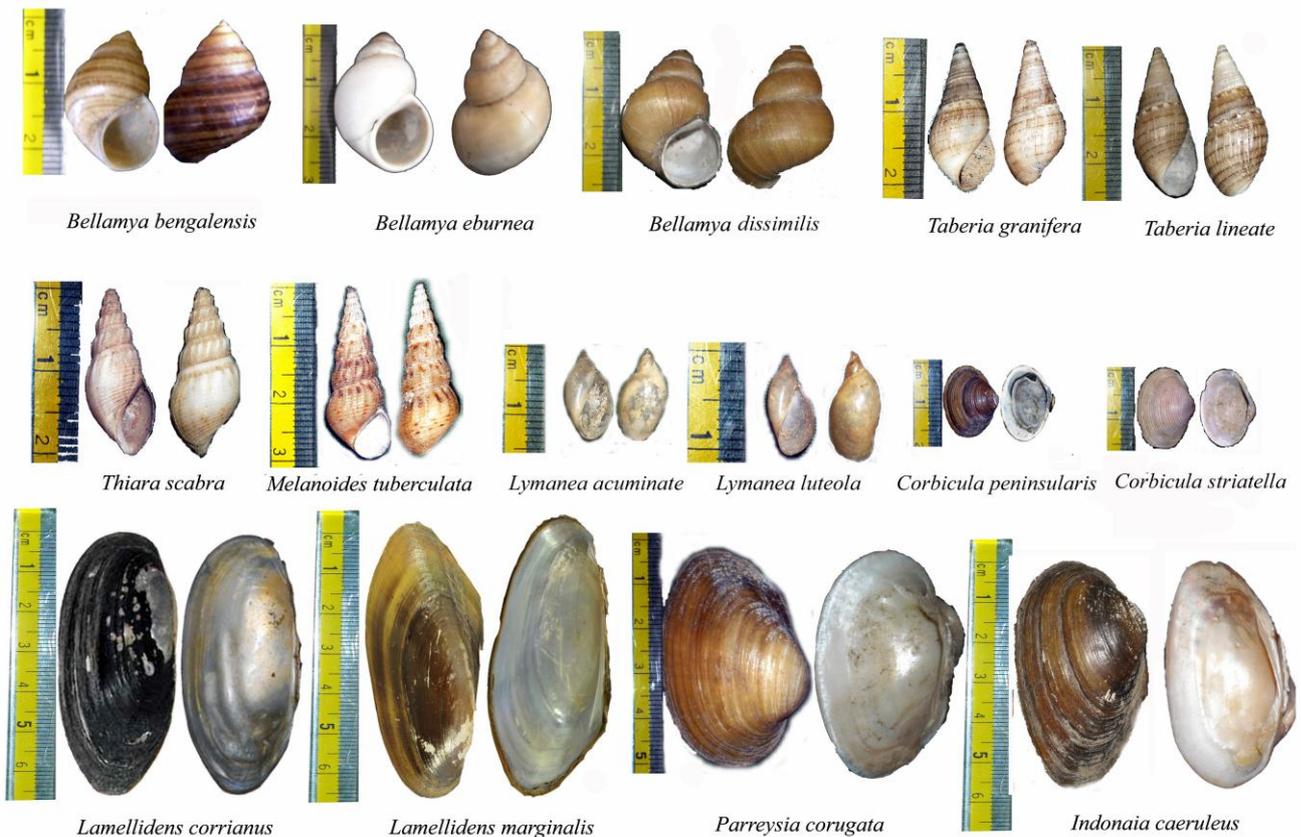


Figure 2. Molluscan species from Bhima River Gopalpur

DISCUSSION

Molluscan are considered are the most diverse and dominant benthic fauna both from lentic and lotic region which are mainly represented by the two major classes namely Gastropods and Pelecypods. (Mackie, 1998). Patil and Talmale (2005) published the checklist of the land and fresh water molluscan of Maharashtra state where he has reported 142 species of molluscan of all forms belonging to 42 genera including 23 families. Amitkumar and Roy (2009) have observed 18 Gastropod species and 7 Pelecypod species from north Bihar region of India. The authors are emphasised conservation and management of faunal diversity of the molluscan species. Dutta and Malhotra (1886) while study the seasonal variation in macro benthic fauna of Gadigarh stream from Jammu observed the predominance of molluscan fauna in the fishpond due to higher Calcium concentration. Verma and Saksena (2010) observed 11 species of the molluscans from Kalpi(Marar) river from Ramaua reservoir, Gwalior Madhya Pradesh. Rajan and Murugan (2001) while studying the diversity of molluscan fauna from Shivakshi Tamilnadu observed 4 species of molluscan at less polluted site and 2 species of molluscan at high polluted site and 5 species noticed at non polluted site of Arjuna river. In present investigation also 5 species of molluscan were observed in the polluted site of Gopalpur area of Bhima River where as remaining 10 species of molluscan observed the less polluted regions.

CONCLUSION

The municipal sewage, domestic waste, pilgrims activities, anthropogenic contributions etc. showed alarming effect on the overall community of the molluscan from Bhima river flow through Pandharpur city. This Bhima River is one of the important sources for irrigation, human consumption, miner industries, housing, holly bathing of the pilgrims etc. As the pilgrims number is increased over period of time, during all four major yatras. (Chaitree, Ashadhi, Kartiki, Magh). Continuous to contribute a significant pollution load of the Bhima river which may resulted the Bhima river into literally a polluted river from the study it can be state that overall human activities of a great threats not only to the rives but also to the macro invertebrates fauna including molluscans. It is highly essential to conserve and manage in a proper way of molluscan diversity.

ACKNOWLEDGEMENT

Authors wish to thank Prin. Dr. A. H. Manikshete, Principal, Walchand college of Arts and Science, Solapur for encouragement and providing necessary facilities for completion of research work.

REFERENCES

- Amitkumar Prabhakar and Roy S.P (2009).** Taxonomic Diversity of Shell fishes of Kosi region of north-Bihar (India). *Ecoscan*. 2(2): 149-156.
- Annandale N. (1921).** The aquatic and amphibious Mollusca of Manipur. The prosobranchia. *Records of the Indian Museum*. 22 : 538-564.
- Deshayes G.P. (1854).** Catalogue of the Conchifera or Bivalveshells in the collection of the British Museum. Part-II. *Petricoladae* (Sic.) (Cencluded); *Corbiculadae* (Sir.), Taylor and Francis (London) pp.218-234.
- Dutta S.P. and Malhotra Y.R. (1986).** Seasonal variation in macro benthic fauna of Gandigarh stream (Miran Sahib), Jamm. *Indian J. Eco*. 13: 138-145.
- Garg R.K., Rao R.J. and Saksena D.N. (2009).** Correlation of Molluscan diversity with physicochemical characteristics of water of Ramsagar reservoir, India. *Int. J. Biodiversity Conserv*. 1(6) 202-207.
- Gray J.E. (1828).** Original figures and short systematic descriptions of new and unfigured animals. *Spicilegia Zoologica* Part-I, page-2.
- Lamarck (1819).** *Hist. Natur. Anim. Sans Vert.* :79, pp41.
- Lamarck J.B.M. (1815-1822).** Histoire naturelle des animaux sans vertèbres. *Paris* Vol. 6 (2) (Suite): 232 pp. [1822]. 7: (Suite): 711 pp. [1822] <http://www.biodiversitylibrary.org/bibliography/12712>.
- Lea (1934).** *Trans. Amer. Phil. Soc.* 65:plate-9 fig. 25.
- Mackie G.L. (1998).** Applied Aquatic Ecosystem Concepts. University of Guelph Custom Course pack. 12 Chapters.
- Maharashtra Pollution Control Board (August-2005).** Environmental status Report of Pandharpur (During Ashadhi Ekadashi), Regional office Pune.
- Müller O. F. (1774).** Vermivm terrestrium et fluviatilium, seu animalium infusoriorum, helminthicorum, et testaceorum, non marinorum, succincta historia. *Volumen alterum*. - pp. I-34 [= 1-36], 1-214, [1-10]. Havnæ and Lipsiæ. (Heineck and Faber).
- Patil S.G. and Talmale S.S. (2005).** A Checklist of Land and Freshwater Mollusca of Maharashtra State. *Zoo's Print J*. 20(6): 1912-1913.
- Piola Richard F. and Emma L Johnston (2008).** Johnston Pollution reduces native diversity and increases incader dominance in marine hard-substrate communities. *Diversity Distribution*. 14:329-342.
- Prashad B. (1928).** Revision of the Asiatic species of the genus *Corbicula*-I The Indian species of *corbicula*. *Memories Indian Museum*. (Calcutta) 9: 12-27.

- Rajan M.K. and Murugan N. (2001).** Diversity of Molluscan Fauna of Arjuna river relation to pollution. Sivakashi, Tamilnadu. *J. Aqua. Bio.*16(2):5-9.
- Subba Rao N.V. and Dey (1989).** Freshwater Molluscs in Aquaculture, pp 225-232. In: *Handbook of Freshwater Molluscs of India*. Zoological Survey of India, Calcutta, 289pp.
- Subba Rao N.V. and Mitra S.C. (1975).** Freshwater molluscs in Aquaculture, pp. 225-232. In Handbook of freshwater Molluscs of India. Zoological Survey of India, Calcutta. 289 pp.
- Verma A.K. and Saksena D.N. (2010).** Impact of pollution on sewage collecting river Kalpi (Morar) Gwalior (M.P.) with special reference to water quality and Macrozoobenthic Fauna. *Asian J. Exp. Bio. Sci.* (1):155-161.