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STUDIES ON DIVERSITY OF MALACOFAUNA IN LOTIC ECOSYSTEMS NEAR CHANDRAPUR, MAHARASHTRA, INDIA

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ABSTRACT:
Fresh waters have seen the largest decline in biodiversity in any ecosystem, particularly in lotic ecosystems impacted by anthropogenic activities. The increasing impact of climate change and invasive species has put further pressure on these ecosystems. Molluscans communities are good indicators for the localized conditions, which reflect the water quality. The present study aims to explore the malacofauna diversity of lotic ecosystems near Chandrapur having hot and dry climatic conditions. Bottom samples were collected for study from June - 2016 to May - 2017 from sampling sites at river Wardha, Erai and Zarpat. Nineteen molluscan species belonging to seven orders under nine families were identified. The maximum diversity was recorded in order Basommatophora including six species and minimum in order Littorinimorpha and Veneroida with only one species. The indicator species like Lymnea, Melanoid and Corbicula were numerically more in river Zarpat than other two rivers indicating gross pollution of the ecosystem.

Keywords: - Diversity, Malacofauna, Gastropods, Bivalves, Erai river, Chandrapur.

INTRODUCTION :

Freshwater ecosystems are among the most fragile and highly threatened ecosystems on the planet. These ecosystems have been constantly manipulated by humans to satisfy their needs with little or no thought to the long term effects on them (Kaufman 1992). An aquatic ecosystem is always incomplete without benthic invertebrates, as they form the basis of the tropic level (Bouchet et al., 2005). Molluscan communities constitute one of the majorities of benthic invertebrate fauna and they can live in a variety of habitats. They can be broadly grouped into three categories viz. Epifauna, Infauna and Arboreal fauna (Todd, 2001). Molluscs show a great specialization of ecological niches in freshwater environments, making them more vulnerable to modifications in their environment (Bouchet 1992, Lydeard *et al.,* 2004).

Consequently, freshwater molluscs have suffered a severe decline in diversity, distribution and abundance due to human induced alteration of habitats, pollution, siltation, deforestation, poor agricultural practices, the destruction of riparian zones and invasion by introduced species (Biggins *et al.,* 1995, Pimm *et al.,* 1995). Interestingly, molluscs especially Gastropods are common and conspicuous elements of the freshwater ecosystem. Usually they are found in the water where calcium concentration is more (Tonapi, 1980). They are the dominant grazers of algae and aquatic plants and plays an important role in an aquatic food web as well as in the processing of detritus and decaying organic matter.

Molluscs are bioindicators of freshwater pollution (Harman, 1974). They become prime model as biomonitoring agents, because of their sedentary and sessile life style, along with benefit of quick assessment of biological resources to obtain the population indices. Biological monitoring of rivers using macro invertebrate is accepted as useful tool for the assessment of water quality (Hellawell, 1986, Rosenberg and Resh, 1993).

The information available on the ecology and systematics of malacofauna particularly bivalves are woefully inadequate. Furthermore, extensive surveys of this area will almost certainly reveal the existence of many more species than are currently known. Despite the ecological

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importance of molluscs, their systemic study receives less attention and discussion. Hence, the present study was undertaken to evaluate the species richness and distribution of malacofauna, from three rivers around Chandrapur.

MATERIALS AND METHODS :

Lotic ecosystems under study

A glimpse of the map of the district at once arrests the eye by prominent river system. Of these, the river Wardha originates in Satpuda ranges in Madhya Pradesh and travels a distance of about 500 kms. till it joins the river Wainganga near Chaparala (Aashti). It flows in south easterly direction and during its course in the district; it receives Painganga on the right bank and the Erai on the left. The river Wardha after its confluence with Wainganga flows in a southernly direction under the name of Pranhita near Sironcha.

The river Erai originates from Chimur Hills in Chimur Taluka of Chandrapur District by means of two tributaries. One of the tributaries known as Chargaon Nullah originates near village Keslabodi and the another tributary known as Chandai Nullah near village Chakparsodi in Chimur Taluka and join near village Arjuni in Warora Taluka and after traveling about 90 kms. joins river Wardha near village Visapur in Chandrapur District.

The river Zarpat is formed after the confluence of Ambe Nullah and Gaontiadeo Nullah near Anchleshwar gate (Chandrapur city) which then flows along the side of the stony wall of fort flows about 3 kms before it opens in the river Erai.

Study area

The Chandrapur area is well known for coalmines, the Chandrapur Super Thermal Power Station (supposed to be largest in Asia), Maharashtra Electrosmelt limited (MEL) and the various chemical industries and so on. The industrialization, urbanization and related anthropogenic activities have resulted in increased waste discharge in the nearby rivers.

Sampling sites

Site S_1 and S_2: Site S_1 is near Ballarpur fort and S_2 at the Rajura bridge on river Wardha

Site S_3 and S_4: Site S_3 is near Bhatali village and S_4 at the Datala bridge on river Erai

Site S_5 and S_6 : Site S_5 is near Mahakali colliery area and S_6 at the Anchaleshwar Gate on river Zarpat.

Sampling method

Molluscan sampling was conducted for one year i.e. from June -2016 to May -2017. The species were collected randomly by a simple hand-picking method from all along river's marginal area, sandy and muddy substratum and preserved in 70% ethanol. All preserved specimens of malacofauna were identified based on Brandt (1974), Subba Rao (1993) Dey Ramakrishna (2007) and Molluscabase website was used to confirm the most recent taxonomic nomenclatures, Molluscabase (2022).

RESULT AND DISCUSSION :

Molluscan fauna is considered to be the most diverse and dominant benthic fauna from both the lentic and lotic ecosystems, and are primarily represented by two major classes, Gastropoda and Pelecypoda (Patil, 2003). The freshwater ecosystems in India harbour a rich diversity of molluscs, representing 212 species belonging to 21 families. Of these, 164 species were recorded from rivers and streams (Subba Rao, 1993).

In the present investigation, total 19 (Nineteen) taxa were recorded from all sampling sites during the period of study. The malacofaunal community was represented by two classes, viz., Gastropoda and Bivalvia. Class Gastropoda was represented by five orders viz., Basommatophora, Mesogastropoda Architaeni oglossa Sorbeoconcha and Littorinimorpha, seven families; nine genera and fourteen species. Class bivalvia also had two orders viz., Eulamellibranchiata and Veneroida; two families; three genera and five species (Table 1).

A similar study was conducted by Bijukumar *et al.,* (2001) on molluscan diversity of the Bharathapuzha River in Kerala and recorded thirteen species of molluscs belonging to five orders, eight families and ten genera. Amanullah and Hameed (1996) studied Kaveri River and reported 13 species of molluscs of which 8 species were gastropods and 5 bivalve species. Roy and Gupta (2010) worked on Molluscan Diversity in river Barak and its Tributaries in Assam. They recorded 16 molluscan taxa belonging to 2 classes viz., Gastropoda and Bivalvia 4 orders, 5 families and 9 genera from 12 different sites on River Barak and its tributaries like Chiri, Sonai, Rukni, Ghagra and Katakhal. Suryawanshi *et al.,* (2012) studied biodiversity of molluscs from

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Nanded region and reported 24 species of fresh water molluscs.

In a particular area, the climate and vegetation are important abiotic and biotic components which play a crucial role on distribution of malacofauna species. Various environmental factors influence the distribution and structure of gastropod assemblages (Oehlmann, et al., 2003). Rich diversity of molluscs was found during rainy season. The drought season represents dry shells in majority. The species diversity of malacofauna was highest in the river Erai near Bhatali village site with 19 species, followed by river Wardha with 18 species. However, the indicator species like Lymnea, Melanoid and Corbicula were numerically more in river Zarpat than other two rivers indicating gross pollution of the ecosystem.

Climate-related factors such as water, temperature, and precipitation, as well as physiographical factors, have a great deal of influence over an area covering several basins (Heino *et al.,* 2002).

CONCLUSION:

The freshwater molluscs play a massive role in nature and help in assessment of ecological status of the water bodies. The diversity of molluscs at different localities of lotic ecosystems in and around Chandrapur found varied significantly. During the study period, because of less contamination of water at site S_3 maximum molluscan species were recorded, whereas due to mixing of domestic and industrial discharge, site S_5 and S_6 showed depleted rate of population. The present study revealed that the molluscan fauna recorded is in the category of indigenous species with valuable biodiversity potency which need to be conserve in relation to maintain the ecological balance and their sustenance in the nature.

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Table 1. The occurrence of Malacofauna species at each Lotic Ecosystem under study

Class	Order	Family	Species	Lotic Ecosystems under study					
				Wardha		Erai		Zarpat	
				S1	S2	S3	S4	S 5	S6
Gastropoda	Basommatophora	Planorbidae	*Indoplanorbis exustus* (Deshayes, 1834)	++	++	++	++	++	--
			Gyraulus convexiusculus (T. Hutton,1849)	++	++	++	--	--	++
		physidae	*Physa acuta* (Draparnaud, 1805)	++	++	++	--	--	++
		Lymnaeidae	*Lymnea accuminata* (Lamark, 1822)	--	+-	++	++	++	++
			Lymnea(Cerasina) luteola (Lamark, 1822)	++	++	++	++	++	++
			Lymnea auricularia (Linnaeus, 1758)	++	++	++	++	++	++
	Mesogastropoda	Viviparidae	*Bellamya bengalensis* (Lamark, 1822)	++	--	++	--	--	--
			Bellamya dissimilis (Muller, 1774)	++	--	++	--	--	--
	Architaenioglossa	Ampullariidae	*Pila globosa* (Roding, 1798)	++	--	++	++	++	--
			Pila virens (Lamarck, 1822)	++	++	++	--	--	--
	Sorbeoconcha	Thiaridae	*Tarebia lineata* (Gray, 1828)	++	++	++	--	--	--
			Melanoides tuberculata (Muller, 1774)	--	++	++	++	++	++
			Melanoides Scabra (Muller, 1774)	++	++	++	++	--	++
	Littorinimorpha	Bithyniidae	*Bithynia pulchella* (Benson, 1836)	++	++	++	--	--	--
Bivalvia	Eulamellibranchiata	Uninoidae	*Lamellidens marginalis* (Lamarck, 1819)	++	++	++	++	++	--
			Lamellidens corrianus (Lea,1834)	++	++	++	++	--	--
			Parreysia corrugata (Muller, 1774)	++	--	++	--	--	--
			Parreysia favidens (Benson,1862)	++	--	++	++	--	--
	Veneroida	Corbiculidae	*Corbicula regularis* (Prime,1860)	--	--	++	++	++	++

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