MACROZOOBENTHOS DIVERSITY OF SAI RIVER AT RAEBARELI, INDIA

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ABSTRACT

Macrozoobenthos are the best indicators of the stress in the aquatic ecosystem. Distribution of macrozoobenthos is determined by a number of factors such as physical nature of the substratum, depth, nutritive content of the water body. Present study was conducted to assess the diversity of macrozoobenthos of Sai River, Raebareli, Uttar Pradesh during July 2020 to June 2021. During the present investigation, a total number of 24 genera of macrozoobenthic fauna were recorded from one year of investigation. Observations revealed that phylum Mollusca acquires dominant position with 45.83% of total faunal composition while phylum Annelida constitutes 29.16% and comes on second position whereas, least faunal abundance was found from phylum Arthropoda which contributes about 25%.

Keywords: Diversity, Macrozoobenthos, Sai River.

INTRODUCTION

India is endowed with vast freshwater consisting 45,000 km of rivers, 26,334 km of canals, 2.36 million hectares of ponds and tanks, 2.05 million hectares of reservoirs and 5,82,86,000 hectares of wetlands (Rani and Kumar, 2020).

River ecosystems (rivers capes) encompass ecological, social and economic processes (ecosystem functions) that interconnect organisms (ecosystem structure) including humans and helpful in maintaining the biodiversity. The genetic diversity acts as a buffer for biodiversity (Ashok, 2017) which helps in maintaining the ecological balance. The biodiversity has different levels, values and challenges (Ashok, 2016; Arya, 2021). There is a necessity of ecological balance for widespread biodiversity and the biodiversity loss has ecological impact (Verma 2017, 2018a; Kumar and Verma, 2017). The ecological balance is an indispensable need for human survival (Verma, 2018b). The climate change has a huge impact on biodiversity, sustainable development (Prakash and Srivastava, 2019; Prakash, 2021; Verma, 2021) and farmers' practice (Mandal and Singh, 2020). The river water is useful both

for sustainable and unsustainable agriculture but pollution not only badly affect the agriculture but also aquatic biota (Kalalet *al.*, 2021; Goswami *et al.*, 2021). The unsustainable agriculture has multiple effects (Verma, 2018a). In general, rivers have good aquatic resources (Chakraborty *et al.*, 2021a, 2021b).

Macrozoobenthos being diverse in nature, react strongly and often predictably to human influences in aquatic ecosystem. They act as a viable tool for biological monitoring of freshwater ecosystems as they have wide range of sensitivities to change in both water quality and habitats (Thokeret *al.*, 2015). Macrozoobenthos form the basis of the trophic level and any negative effect caused by pollution in the community structure can in turn affect trophic relationships. Macroinvertebrates act as food for many aquatic birds and fishes. Different species comprise distinct functional groups that provide ecological integrity. In some cases, these functional groups may be represented by only a few species, so that any loss of species diversity could be detrimental to continued ecosystem functioning. Thus, it is increasingly becoming

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important to protect macrozoobenthic communities owing to their immense importance in their natural habitats.

The macrozoobenthos of freshwater wetlands provide significant support to the aquatic food web and contribute to ecosystem stability through sustenance of cultivatable fish, aquatic birds and other aquatic life. Their composition, abundance and distribution pattern acts as an ecosystem index, thereby indicating trophic structure, water quality and eutrophication level of the water bodies (Singh and Prakash, 2021).

A review of literature revealed that many researchers have studied on various waterbodies of Uttar Pradesh with respect to limnology and biodiversity of fishes in U.P. (Verma, 2016a, 2016b, 2020; Prakash *et al.*, 2020; Prakash, 2020a, 2020b; Rani and Kumar, 2020; Sanjay and Prakash, 2020; Sugumaran *et al.*, 2020). Benthic diversity of lentic waterbodies were studied by many ecologists in India (Siraj *et al.*, 2010; Verma and Prakash, 2018; Prakash, 2020c) and there is a need to obtain biological information on the lotic water body which are under pressure due to population growth and urbanization. Keeping this in mind, an attempt has been made to document macrozoobenthic diversity of Sai River at Raebareli. The present survey was conducted once in a month for a period of one year during July 2020 to June 2021 on three collection sites of Raebareli district of, U.P. to find out macrozoobenthos diversity.

MATERIALS AND METHODS

Study area: The study area, Raebareli (80° 41' to 81° 34' N, altitude and 25° 43' 48" to 26° 20' 18" E longitude) district is situated in south region of U.P. Sai river is the main river traversing in this area and plays a vital role in the topography.

The river Sai originates at the sprawling pond on the hilltop at Parsoi, a village in the Hardoi district. It separates the region of Lucknow from Unnao. The river flows south by Raebareli, comes into the region of Pratapgarh and Jaunpur through the west, then turns east and touches the Ghuisarnath Dham. From there it touches another Chandika Dham. Most of the districts of Uttar Pradesh are situated on the banks of the Sai River. Shani Dev Dham is located on banks of the Sai River at Parsadapur.

The sediment samples were collected monthly and dried to constant weight in an oven at 105°-110°C. The sand, silt and clay were determined by pipette method (Piper, 1966). The soil organic carbon and available phosphorus were estimated by Trivedy *et al.* (1987). The available nitrogen was determined by alkaline permanganate method (Subbiah and Asija, 1956). The pH was determined in 1:5 soil water suspension by pH meter.

The sediment samples were collected monthly from the bottom at three stations during morning time by using Peterson Grabe mud sampler. The collected samples were sieved through 0.5 mm sieve (Ankar and Elmgreen, 1976). The materials which retained on sieve were collected and from it benthic organisms were stored out with the help of forceps and brushes. These were collected in narrow mouthed plastic bottle, containing 4% formalin and 70% alcohol as preservative depending upon the type of organisms to be preserved. The soft-bodied organisms were preserved in 70% alcohol while the shelled organisms like mollusks in 4% formalin. All macro fauna of bottle were identified with the help of available key and manuals Neetham and Needham (1962), Borror *et al.* (1976) and Pennak (1989) under the light microscope. The population of organisms was counted and number of individuals of a species per sample and was expressed as number/m².

RESULTS AND DISCUSSION

A total of 24 genera were found from the three sampling sites belonging to three phyla viz., Mollusca, Annelida and Arthropoda. All these are eucoelomate phyla (Verma and Prakash, 2020). Among them 11 species of molluscan community was represented by three classes viz., Gastropoda, Pelecypoda and Bivalvia. Gastropoda was represented by six genera followed by Class Pelecypoda (three genera) and Bivalvia (two genera). Whereas, Annelidan community was represented by two classes viz., Oligochaeta and Hirudinidae and Arthropodians belongs to three classes, viz., Insecta, Crustacea and Arachnida (Table 1). The distribution of macrozoobenthos at sampling site I was maximum from all the three stations and 18 genera were recorded. Phylum Mollusca was in dominated condition than Annelida and Arthropoda. At sampling site III distribution of macrozoobenthos species was almost similar as station I and 16 species were recorded. Sampling station III lies in city and here

diversity of macrozoobenthic fauna was poor than both the stations and only 13 species were reported. Among all, the phylum Mollusca was in dominant position followed by Annelida and Arthropoda. In Mollusca, gastropods were dominant than Pelecypoda and Bivalvia. Some worker also reported that molluscan

communities were dominant at River (Khan *et al.*, 2007; Roy and Gupta, 2010). Riverine condition and habitat structure is being altered due to discharge of domestic sewage and constriction of buildings and dam.

Table 1: Diversity of macrozoobenthos in Sai River at Raebareli, U.P.

S. No.	Class/Taxa	Sampling sites		
		S1	S2	S3
Phylum- Annelida (29.16%)				
Class 1: Oligochaeta				
1.	<i>Branchiurasp.</i>	+	-	+
2.	<i>Limnodrilus sp.</i>	-	+	+
3.	<i>Lumbriculus sp.</i>	+	+	-
4.	<i>Tubifexsp.</i>	+	-	+
5.	<i>Nais sp.</i>	+	+	+
Class 2: Hirudinidae				
6.	<i>Glassiphoniasp</i>	-	+	+
7.	<i>Erpobdella sp.</i>	+	-	+
Total		5	4	6
Phylum-Arthropoda (25.00%)				
Class 1: Insecta				
8.	<i>Caenis sp.</i>	+	+	-
9.	<i>Chironomussp.</i>	-	+	-
10.	<i>Hydrophilus sp.</i>	+	+	+
Class 2: Crustacea				
11.	<i>Gammarus sp.</i>	+	+	-
Class 3: Arachnida				
12.	<i>Dolomedessp.</i>	+	-	+
13.	<i>Acari sp. (Water mites)</i>	+	-	+
Total		5	4	3
Phylum- Mollusca (45.83%)				
Class 1: Gastropoda				
14.	<i>Lymnaea sp.</i>	+	+	-
15.	<i>Pilasp.</i>	+	-	+
16.	<i>Thiara sp.</i>	-	+	+

17.	<i>Gyraulus sp.</i>	+	-	+
18.	<i>Tarebiasp.</i>	+	-	+
19.	<i>Bellamyasp.</i>	+	+	-
Class 2: Pelecypoda				
20.	<i>Corbicula sp.</i>	-	+	+
21.	<i>Planorbula sp.</i>	+	-	+
22.	<i>Promentus sp.</i>	+	-	-
Class 3: Bivalvia				
23.	<i>Lamellidens sp.</i>	+	-	+
24.	<i>Parreysia sp.</i>	-	+	-
Total		8	5	7
Grand Total		18	13	16

CONCLUSION

The present investigation depicted about the distribution and diversity of macrozoobenthos in the three sites of Sai river at Raebareli and reported about the loss of macrozoobenthic distribution in the city site and downstream due to construction of building which causes habitat alterations. During the study, it was observed that at sampling site I, the diversity of macrozoobenthos fauna was highest than II and III. Riverine condition and habitat structure is being altered due to intake of domestic sewage water and shows that in near future ecology this river will be much affected. The study revealed about the future research prospects in this area for studying the impact of pollution on the ecology of River Sai.

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