A STUDY OF MACROBENTHOS FAUNA AFTER DRAIN EFFLUENTS AT DIFFERENT GHATS OF YAMUNA RIVER AT MATHURA DISTRICT

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Abstract : A macrobenthic study was carried out at different ghats of Yamuna river at Mathura after falling down Drain effluents. **7** Ghats (Gau ghat, Swami ghat, Askunda ghat, Vishram ghat, Bangali ghat, Dhruv ghat, Mahadev ghat) were used as sampling stations for sampling of Macrobenthos from (March 2021 to April 2022). Macrobenthos from three types of phylum Arthropoda, Annelida, Mollusca were recorded. Among these three phylum, Maximum species of phylum Arthropoda were recorded at every station in summer. Maximum species density of Molluscs and Annelids were recorded at Gau ghat & Dhruv ghat may be due to shallow clean water and river soil having highest organic carbon and Minimum at Mahadev ghat and Askunda ghat may be due to dirty water, because of falling drain effluents. Annelid's species Namalyastis sp. and Mollusc's species Pila sp. were present at maximum stations from others. Arthropoda community were observed dominated from Annelids and Molluscs. Arthropodal species Caenis sp. and Chironomial sp. were dominant at maximum stations from others. Following results were determined as species richness from classes - Insecta - Arthropoda at polluted ghats (station -3,7) Oligochaeta & Hirudinea - Annelida at (station-1,6) and Gastropoda &Bivalvia - Mollusca at less polluted site (station-1,2,6).

Key words : Macrobenthos, Drain effluents, Gastropods, Species richness.

INTRODUCTION

Benthos means the organisms that are found on bottom of solid surface or on another substrata in aquatic and marine ecosystem, generally devided into Phytobenthos and Zoobenthos, and by size into Macrobenthos , Meiobenthos and Microbenthos. Some common benthos are Sea stars, Sea urchins, Sea cucumbers, Crabs, Shrimps, Oysters, Clams, Mussels, Lobster and Coral. A great role is played by benthic community that it converts the input of Detrital matter into output of benthic food for fishes and Crustaceans thus providing better survival chances for many organisms.

Macrobenthos are those benthos which are found at the bottom of a water column and can be seen by naked eyes, act as Bioindicators, Biofertilizers and Biofilters. They are small organisms ranging from 0.5 mm to 4.0 mm, also act as a food source for organisms who live in same ecosystem. Their presence tells the condition and health of water ecosystem, because they have sensitive nature to the environmental changes, it has been seen

that they act as primary food source for other organisms and maintains the dynamic of ecosystem. They have been used by many researchers for bioassessment measure. (kumar *et al*., 2017)**.** Drain effluents means the waste and dirty water which falling down in the river at Mathura district at many ghats so the water quality parameters and macrobenthos presence faces the disturbance in their occurrence. So, the present investigation was carried out to see the present condition of river Yamuna with measuring and occurrence of macrobenthos.

MATERIALS AND METHODS

7 Ghats (Gau ghat, Swami ghat, Askunda ghat, Vishram ghat, Bangali ghat, Dhruv ghat, Mahadev ghat) were selected for the present investigation to studying the presence of macrobenthos and to see the water quality. Sampling were done from (March 2021 to April 2022) monthly from these 7 sampling stations, By using net (Ekmann's dredge) or simple hand net. For removing any other particles the sample were sieved in a plastic bucket on the boat, and then samples were taken in the lab of R.B.S. College, Agra for keeping preserve in 5 % formalin. Here, the identification was done with the help of microscope as much as possible
with the help of keys specified by Ward and Whipple (1959); Needham and Needham (1962), Usinger (1971).)

RESULTS AND DISCUSSION

The aim of present investigation was to see the status of macrobenthos and connection of them with the water system. The study was helpful to determine that how can be keep safe the water quality and how much macrobenthos can live there. I did not found any literature about macrobenthic study at Mathura river Yamuna but I got literature of macrobenthic study at Agra, Allahabad, Kanpur, Delhi etc. where the results were like as my results about the presence of macrobenthos. A number of bacterial studies have done at Mathura river Yamuna. The macrofauna does not describe only the pollution load but also status of water quality. they eat the detritus food found on the bottom of river. A few no of species was recorded at every sampling station in summer due to high temperature in this season, decrease of nutrients in water. A no of water parameters affected give rise the disturbance of food web. Mollusca were present in good numbers because they are supposed adapt to changes in environment due to their hard Shell cover. Among all the macrobenthic communities insects comprises the largest diversity (mayflies, beetles, crane flies) etc. the insects form major part in water ecosystem because they eat planktons and eaten by bottom feeders. (Lal *et al*., 2023). it have been confirmed by many authors that very much alkaline water is harmful for benthos, which is caused by many types of natural causes and anthropogenic activities. Allan *et al*., 2007 and Wells, 1991).

The Simpson diversity index and Shannon diversity index show that all species were present in abundance numbers, good diversity and macrobenthos abundance was satisfactory.The results seen in the present investigation , presence of three phylums Annelida, Arthropoda, Mollusca at different sampling stations. Mainly Arthropodal species (Caenis sp, Chironomial sp,and Baetis sp.), Molluscal species (Pila sp. and Gyraulus sp.) and Annelidal species (Namalyastis sp.) were the main species which were found at the maximum stations of that study. Arthropoda has also been observed by (Sharma *et al*., 2016), in their research. Presence of different types of macrobenthos with species at different sampling stations can be seen in the following table. **(TABLE: 1).**Site (4) was the place where human activities and different types of devoting functions performs in high quantity so the occurrence of macrobenthos were less at that place (Allan and Castillo 2007). According to Arimoro *et al*., 2007 it was confirmed that oligochaetes are found in high number where high nutrients and sedimentation are present, because oligochaetes can live in different untolerating conditions and their presence is good indicator of pollution.

Gau ghat (site1) – This sampling station was on upstream of river Yamuna at mathura here was no drain effluent directly coming down and not any human activities performed, so the water quality were fresh and tolerant for the macrobenthos. Mollusca > Annelida > Arthropoda. Namalyastis species were dominant at that place.

Swami ghat (site 2) – Second sampling station was not clear as first because of falling down dirty water in it from the drain. Here the boating seen in high number. So the disturbance in water quality affects to the abundance of macrobenthos. The presence of Arthropods were seen higher then other two phylums.
Askunda ghat (site 3) – Askunda ghat is very near from swami ghat. Same type of condition was present but here the pollution condition were seen because of falling heavy drain effluents. Class Insecta .
(Ephemeroptera,Hemiptera, Diptera) were dominant all over the classes.

TABLE – 1 : Macrobenthos at different ghats of river Yamuna at Mathura (March 2021 to April 2022)

Macrobenthic taxa									
Phylum	Class	Species	Station-1	Station-2	Station-3	Station-4	Station-5	Station-6	Station-7
Annelida	Polychaeta	Namalyastis sp.	++	++	+	+	-	++	-
	Oligochaeta	Lumbricus sp.	++	-	-	++	++	++	+
	Hirudinarea	Asiaticobdella sp.	+	-	-	-	+	+	-
Arthropoda	Insecta Order- Ephemeroptera	Baetis sp.	+	+	++	+	-	+	++
		Caenis sp.	+	++	++	+	+	++	+
	Placoptera	Tetropina sp.	-	+	-	-	-	++	-
	Trichoptera	Cheumatopsyche sp.	+	-	-	+	-	-	+
	Odonata	Sinictinogomphus sp.	-	-	+	+	+	-	++
	Hemiptera	Diplonychus sp.	-	-	++	-	-	-	+
		Laccotrephes sp.	+	+	+	-	-	-	+
	Coleoptera	Hyphydrus sp.	+	+	++	+	+	+	++
		Halocharos sp.	+	+	-	++	+	+	+
	Diptera	Simulium sp.	-	-	++	-	-	+	+
		Chironomial sp.	++	-	+	++	+	+	++
	Lepidoptera	Nymphula sp.	+	+	-	-	+	-	-
Mollusca	Bivalvia	Lamellidens sp.	+	-	+	-	-	-	+
		pisidum sp.	++	++	-	-	++	++	-
	Gastropoda	Indoplanorbis sp.	++	-	-	+	+	+	-
		Gyraulus sp.	-	++	+	-	+	++	-
		Physa sp,	++	++	+	+	-	+	-
		Pila sp.	++	+	+	++	+	++	+

Vishram ghat (site 4) –This is the main ghat of river Yamuna at Mathura which used by devotes for many purposes like boating, Worship, Yamuna pujan, Chundri manorath etc. Here pollution was moderator because

many type of human activities performed there, Which affect the habitate and oocurence of benthic macroinvertebrates. Here the no of Arthropods were less but Coleopteran were observed high number, because they are pollutophobic groups.Oligochaetes were dominant.

Bangali ghat (site 5) – Sampling station (5) also used as Vishram ghat by the devotes for various functions , so the disturbance in presence of macrobenthos were seen here. Annelids species (Lumbricus sp.) and mollusks species (Pisidum sp.) were recorded here.

Dhruv ghat (site 6) - Presence of Plecoptera, Ephemeroptera, Diptera, mainly due to less pollution give rise to oxygen level high.

Mahadev ghat (site 7)- That sampling station was at the downstream of river yamuna at Mathura, ending ghat far to City.Here diversity presence was low (Molluscs and Annelids because of high pollution load or drain with dirty water. Class insecta were in high range Odonata (Gomphidae), Hemiptera (Belostommatidae) Diptera (Chironomidae), Coleoptera (Hydrophillidae) with superiority among total macrobenthic invertebrate faunal diversity.

So, the aim of present investigation was to see the status of different macrobenthos at different places (sampling stations 1-7) of river yamuna at Mathura.

Coclusions

It can be confirmed that pollution load at upper stream were less than down stream. it was found that station 3, and 7 were highly contaminated and polluted. Water of Yamuna at Mathura region used for many purposes as Irrigation, Domestic purpose, Cattle drinking etc. The results of present study revealed the composition and distribution of macrobenthic fauna inhabiting the river were not satisfactory due to human activities, waste material and drain effluents.

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