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ORIGINAL RESEARCH ARTICLE

Abundance of Macrobenthic Fauna and Biotic Indices Analysis of Mahendra Nath Pond, Siwan, Bihar

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ABSTRACT

The total number of benthic fauna showed definite seasonality from the Mahendra Nath pond. It started gradually increasing from October 2010 and peak population was observed in January 2011.(6049 indv/m2) then it declined gradually and reached to the minimum during July 2011 (765indv/m2) in the annual cycle.

Oligochaeta showed their definite seasonality during the study period. The total oligochaetes population was highest in December2011. (3047 indv/m2) where lowest in August 2011 (75 indv/m2*) tubifex* sp was the most dominant species present throughout the 7 December 2010 (2510 indv/m2) and minimum in august 2011 (35indv/m2).

Hirudinea of Mahendra Nath pond was represented by *glossophonia* sp and the *Helobdella* sp.

Key words: Benthic fauna**,** *glossophonia* sp, tubifex, Biotic Indices.

INTRODUCTION

The pollutants are produced not only as a by products of a man's action but also by natural ecosystem. The naturally produced pollutants are if left as it is "treated modified and made good by nature herself. The pollutants produced as by product of man action increasing with population are in fact concomitants of a technological society with a high standard of living. But pollutants as mentioned above also include the "natural" by products of human metabolic activity and that the organisms on which humans depend for food their biological waste products and from animal excreta.

Heavy input nutrients often results in increased biological production as is evidenced by algal blooms.

However excessive input of nutrients particularly through sewage leads to many undesirable changes both in the physic- chemical and biological characteristics of freshwater. It is apparent that in stressed ecosystem the fluctuation of population density of biota depends on density independent factors rather than density dependent (Odum, 1971)

As matter of fact due to various types of physic chemical changes in water characteristics the biotic component also get changed in due course of time. The non pollution forms are gradually eliminated from the system and the pollution tolerant forms become dominant. Finally the species richness and individual richness in the habitat change. Thus on the basis of studies on the dominance of a particular species and trends of change in species diversify a very clean picture appear to suggest the present status of the ecosystem from pollution view print.

Macro benthic fauna is an integral and closely associated biotic component of an aquatic ecosystem. They serve as the primary source of food for fish and higher aquatic organisms.

Many macro benthic invertebrates are sensitive to water pollution and respond to it very quickly. The use of macro benthic invertebrate as water quality indicator has been on important aspect of studies on benthos. The benthic fauna becomes very important for pollution studies because they have long life cycle. They respond to changes in physic- chemical condition, they have central position in food chain and they can be easily sorted out preserved and handled for experimental analysis. In the present research work Macro benthic fauna has been studied to assess the quality of water and to measure the pollution status of the habitat.

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MATERIALS AND METHODS

For studying macro benthic fauna collection were done my means of Ekman's dredge (523 sq.cm). The residual organism was separated and arranged group wise and expressed as individuals per square meter. The average of five samples was considered as the representative sample.

The identification of the organism were done with the help of literature of Ward and Whipple (1959) and Needham (1957) .

The Biotic index of water of Mahendra Nath Pond can be calculated by following method (After **Hilsenhoff, 1987**)

BI = ∑ (X1 * T 1) / n

Where; BI = Biotic under

XI = Number of individuals within a species

T1 = Tolerance value of Species

N = Total number of organism in the samples.

RESULTS AND DISCUSSION

The benthic macro invertebrate collected during the study period was presented in (**Table 1**). the benthic fauna consisted of mainly of oligochaeta Hirudinea ,insecta polychaeta and gastropoda.

The total number of benthic fauna showed definite seasonality from the Mahendra Nath pond. It started gradually increasing from October 2010 and peak population was observed in January 2011.(6049 indv/m2) then it declined gradually and reached to the minimum during July 2011 (765indv/m2) in the annual cycle.

Oligochaeta showed their definite seasonality during the study period. The total oligochaetes population was highest in December2011. (3047 indv/m2) where lowest in August 2011 (75 indv/m2*) tubifex* sp was the most dominant species present throughout the 7 December 2010 (2510 indv/m2) and minimum in august 2011 (35indv/m2).

Hrudinea of Mahendra Nath pond were represented by *glossophonia* sp and the *Helobdella* sp.

Insect population was represented by 5 species the maximum number (4015 indv/m2) was observed in January 2011 and the minimum in June 2011 (80indv) *Chironomus plumosus* was most dominant species.

Gastropoda constituted the major share of molluscan fauna in Mahendra Nath pond the highest number of gastropod was observed in March 2011 (2020indiv/m2) and October 2011 (2510indiv/m2) while the longest in July 2011 (indv /m2) was observed.

Oligochaetes during the present investigation have been found to have attained population maximum as individual per square meter in December of the studies period. The lower peak of oligochaeta population has been recorded in the month of august of the study period. Michael (1968) and Gupta (1976) observed the similar pattern of seasonal abundance of obigochaetes population. Ladle (1971) collected the majority of oligaochaeta in winter while Cerival and White head (1930) found largest number in summer. *Tubifex* sp was the most dominant species of Oligochaeta and was collected throughout the study period.The population density was generally higher during December 2010. In fact *tubifex* sp was a valuable pollution indicator species **(Brinkhusst** 1980). It was commonly used indicator of organic pollution.

The *chironomida* comprise most diverse and abundant family of insects throughout the study period. Among the *chironomida* most frequently observed were *chironomous plumosus*. According to **Brudin** (1951) the primary mechanism controlling the *chironomid* succession from oligotrophy to eutrophy is the annual minimal oxygen concentration while availability of food is of secondary important and becomes limiting only in ultra obigotrophic water bodies.

*Mayfly a*nd *stone fly* were found in the present investigation and presence was probably due to availability of substrate Pesek and **Heregenrader(**1976) of .

The gastropod constituted one of the dominant groups in the aquatic body of Mahendra Nath pond. The present data revealed that the gastropods were abundantly found in the month of March of the study period.

The result indicates that the *digoniostoma* sp was commonly and abundantly distributed throughout the study period. This species together with *viviparous* sp contributed maximum density in the Mahendra Nath pond.

Gastropods which are able to tolerate organic enrichment and stress water condition their presence indicated somewhat degraded water quality and considering as more facultative fauna **(Barton** 1977).

In the present investigation the biotic index varied between 1.847(Jan 2011) to 1.304 (july2011). There was no fixed fluctuation trend of biotic index variation.

According to **Hillsenhoff (**1987) table 4 tolerance value range from o for organism very intolerant of

organic wastes to 10 for organism very tolerant of organic wastes.

Following the table given by **Hilsenhoff (**1987) but were modified by Bode *et at* the pond exhibits good water quality and may be considered as possible slight organic pollution.

Table 1: Abundance of Macro Benthic Community of Mahendra Nath Pond

Phylum : Annelida	Oct	Nov	Dec	Jan	Feb	March	April	May	June	July	Aug	Sep
Class : oligochaeta												
family : aelosomatidae												
Aelosoma sp	40	37	70	40	-	-	-	-	-	-	-	-
familly :Tubificidae	540	1650	2510	1401	600	250	701	1200	450	75	35	40
Tubifex sp												
Brachiura sp												
Total	-	70	500	150	20	60	-	-	-	-	-	-
Class: Hirudinanea	580	581	582	583	584	310	701	1200	410	75	35	40
Family Glossiphomidae												
Glossophonia sp	-	-	-	-	-	20	40	60	20	-	-	20
Halobdella sp	-	-	-	-	-	-	20	40	20	-	-	-
Total						20	60	100	40	-	20	-
Phylum :Arthropoda												
Class : Insecta												
Family : Chronomidae												
Chironomous pulmonus	670	200	550	3840	2550	1145	350	40	60	190	550	40
Strictochironomous sp	450	700	40	20	-	-	-	-	20	60	120	200
Family ;Cerethridae												
Chaoborous sp	-	20	60	80	190	-	-	-	-	-	40	20
Order :Ephemeroptera												
Mayfly nymph	-	-	-	-	-	20	190	104	20	-	-	-
Order :odontata												
Stonfly nymph	-	-	20	40	80	-	-	-	-	-	20	125
Damselfly nymph	-	40	35	40	20	20	-	-	-	-	20	-
Total	1120	920	710	4015	2880	1355	474	60	80	290	775	415
Class :Gastropoda												
Family : ammniolidae												
Digomiostoma sp	40	70	30	888	540	-	-	490	201	20	20	600
Family :viviparidae												
Viviparous sp	105	85	43	194	820	1750	1530	750	520	20	60	40
Family :melonidae	-	-	80	40	150	20	-	-	-	-	-	-
Meloniastriatella	-	-	-	20	60	40	-	-	-	-	40	250
melania scapra												
Family :lyanicidae												
Lyanaea sp	60	40	-	-	-	60	105	130	40	-	-	20
Family : Planorbidae												
Gyraulus sp	-	-	-	-	20	150	20	-	-	125	190	85
Family Glessulidae												
Glessula sp												
Total	20	420	139	1162	1510	2020	2145	1161	175	230	1015	.

Table 2: Biotic Index of Mahendra Nath Pond

Oct	Nov	Dec	Jan	Feb	March	April	May	June	July	Aug	Sep
0.35	0.736	0.95	1.847	1.084	0.7832	0.7145	609	0.285	0.1304	0.2561	0.1353

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