



ISSN : 0973-7057

Int. Database Index: 663 [www.mjl.clarivate.com](http://www.mjl.clarivate.com)

## Scenario of bottom fauna of Gaya pond, Bihar, India

Surabhi Saloni<sup>a</sup>, Lakshman Sah<sup>b\*</sup> and Rashmi<sup>c</sup>

<sup>a</sup>P.G. Department of Zoology, Magadh University, Bodh-Gaya, Bihar, India

<sup>b</sup>Department of Zoology, R.K.D College Patna, Patliputra University, Patna, Bihar, India

<sup>c</sup>Department of Zoology, College of Commerce, Patliputra University, Patna, Bihar, India

*Received : 21<sup>st</sup> December, 2019 ; Revised : 11<sup>th</sup> February, 2020*

**Abstract:** This research paper represents the concept of bottom fauna of Gaya pond Bihar. Bottom fauna were collected with the help of mushroom shaped scooping bottom samples. The bottom contents will be identified in living condition and quantitative estimation has been done by using of sample of constant volume of bottom. The total volume of organisms has been determined by standard displacement method. Zoo plankton, macro invertebrate and fishes were studied. It is seen that zooplankton community showed its peak during February and December. There was variation in the dominance of Rotifers and Copepods. Its population declined during May and represented by copepods during January and represented by various species. Altogether many species of zooplanktons have been reported from pond out of which Protozoa, Rotifer, Copepoda, Ostracoda are important. However, the information gathered from two years studies may provide insight into the ways and means of conservation and propagation of certain commercially important fishes and other organisms from pond to augment regular supply of raw materials for food and other commercial purposes so that cottage industries may run properly contributing sustainable economic wealth and giving employment to thousands of people Gaya region. Besides this, exploitation of pond resources through scientific methods on sustainable basis may provide an idea about the biology of pond ecosystem.

**Key words:** Freshwater organisms, bottom fauna, Arthropoda, Mollusca, Protozoa, Rotifera, Gaya.

### INTRODUCTION

Bottom fauna is a group of mutually adjusted living organisms in habiting in a particular area. Odum (1963)<sup>1</sup> has described it is an assemblage of population living in a prescribed area, habitat and it is an organized unit to the extent that it has characteristics additional to it individual and population components and functions as unit through coupled metabolic transformation. Thus, benthic community has specific trophic structure and energy flow

pattern with functional and compositional unity. Benthic organisms provided valuable indication of past and present water quality conditions because of their long life history and central position in the food chain Cairns (1997) claims that diversity is the numerical expression that can be used to make comparison between communities and it is the best single means, for assessing biological integrity in fresh water streams. The communities of organisms living on the bottom of a water body form an important link in the food web of fishes apart from their biological role in the mud water exchange of nutrients. A number of studies have

\*Corresponding author :

Phone : 9931022602

E-mail : lakshmansah011958@gmail.com

indicated that production of benthos was dependent upon the primary production. Never the less, species composition and dominance of benthic invertebrates were not related to the trophic status in some lakes at New Zealand, measured the total benthic production by calculating g/m<sup>2</sup> per year (dry weight) individual genera production such as *Chaoborus sp* and *Hexagenia* were also analyzed individually by applying the same method. There are evidences to suggest that seasonal changes of benthic invertebrates are profound. In some water bodies a maximum peak was observed in monsoon whereas most of the organisms occurred in maximum densities during the period of January through April in other water bodies showed an unimodal pattern of distribution during the year with a single broad peak occurring from January to March and single through during autumn (September to October). Further distribution of benthic invertebrates in a pond system was found to depend upon their morphometry. However, Michael showed the dominance of molluscs in the shore zone and oligochaetes in the middle zone of a pond. Gupta observed greater abundance of molluscs in shallower depths, whereas the oligochaetes were observed at little bit shallower regions.

Special attention has been given to the study of community structure of different water bodies in India. Important contributions are those of Jana (1973)<sup>3</sup> who studied seasonal variation in plankton of a pond in West Bengal. Many have studied the benthic community of different water bodies of India.<sup>4,5</sup> Sharma have studied molluscan fauna of Bhagalpur district. However, Bilgrami and Munshi (1985)<sup>6</sup> have studied the benthic fauna of river Ganga.

## **MATERIALS & METHODS**

The surface and subsurface water sample for physicochemical analysis were collected from sampler once in a month. The collection time is generally in the morning hour. Surface sampling were performed at two different sites were pooled together to get an average for each month of the year. For this purpose bottom fauna was collected with the help of Mushroom shaped scooping bottom sampler. The bottom content was identified in living conditions and quantitative estimation has been done by using sample of constant volume (200cc) of bottom. The total volume of organisms was determined by standard

displacement method. Samples were collected in quarterly period during (2017-2019) at every two m. depth. Upto 6 m using Ekman's dredge and taking three random hauls. The special type of hand grab sampler following the method described by Jhingran *et al.* (1969)<sup>7</sup>. Sediment samples, after collection were passed through a sieve (No.40) using liberal quantities of water in order to separate animals from the detritus. The bottom fauna was preserved in 10% formalin and then enumerated and identified.

## **RESULT AND DISCUSSION**

The Gaya pond is qualitatively and quantitatively rich in flora and fauna. The phytoplankton diversity, Periphyton diversity, Macrophytic vegetation and fish population is well known. However benthic macro-invertebrate comprised *Melania striatella tuberculata*, *Bellamya bengalensis*, *Lymnaea piscicida*, *Indoplanorbis exustus*, *Gyraulus hirsutus*, *Unio sp.* and *Lamellidens marginalis* amongst Mollusca (*Chironomus sp*) Diptera; *Ephemerella sp.* Ephemeroptera (*Laccotrephes maculatus*) Hemiptera (*Hydracarina sp*) and (*Tubifex tubifex*) Annelids *Chironomu ssp.* were throughout dominant in almost all seasons in both the sites A & B.

Altogether thirteen species of macro-invertebrate were recorded from the pond. Annelids were represented by two families that is Tubificidae and Nainidae. Three species were collected belonging to the family Tubificidae and five species were from Nainidae. *Chaoborus* is the most important group among all the benthic invertebrates collected from Site B of Gaya pond. Pond Oligochaete was represented by *Tubifex tubitex*. However, Ostracod was mainly represented by *Cypris indica*. The benthic fauna recorded were of two types that is filter feeder and deposit feeders. The filter feeders lie *Unio*, clam and other bivalves in absence of their mouth depend on the water flow carrying small organisms which can pass through the gill sieve system. The deposit feeders like snails (gastropods) with the help of their mouth consume deposited organic matter from the bottom. Freshwater mud crab was abundantly collected from bottom from bank of pond. The huge populations of mud crabs are collected for the trade and for eating purposes by the local people.

Altogether thirteen species of macro invertebrates were recorded from pond they belong to three major groups among which arthropods were dominant. Eleven molluscs

species, annelids species, were observed. The population of Annelids shows increasing trends in winter and decreasing trend in summer.

Molluscs were represented in the pond only by Gastropods. Altogether fourteen species of gastropods were recorded. The population was encountered more of gastropods were recorded. The population was encountered more in monsoon followed by winter (Table -1,3).

The community structures of benthic macro-invertebrate were recorded during summers. Bottom biota included organisms belonging to Trichoptera, Diptera, Hemiptera, Zygoptera and Mollusca. Population of the bottom biota are listed as Table 1,2 & 3.

**Table 1. Bottom fauna molluscs collected from Gaya pond.**

Sl. no.	Gastropods
1.	<i>Bellamyia bengalensis</i> (Lamarck)
2.	<i>Bellamyia bengalensis</i> F. typical (Lamarck)
3.	<i>Bellamyia dissimilis</i> (Muller)
4.	<i>Pila globosa</i> (Swainson)
5.	<i>Thiara scabra</i> (Muller)
6.	<i>Thiara tuberculata</i> (Muller)
7.	<i>Thiara lineate</i> (Gray)
8.	<i>Broia costala</i> (Rafinesque)
9.	<i>Lymnaea accuminata</i>
10.	<i>Lymnaea accuminata &amp; rufescens</i> (Gray)
11.	<i>Indoplanorbis exustus</i> (Deshayes)
12.	<i>Lamellidens marginolis</i> (Lamarck)
13.	<i>Lamellidens corrianus</i>
14.	<i>Parreysia favidens</i>

**Table 2. Macro benthic biodiversity of Gaya pond.**

Species	Site- A	Site- B
<i>Melania striatella tuberculata</i>	+	+
<i>Bellamyia bengalensis</i>	+	+
<i>Indoplanorbis exustus</i>	-	+
<i>Lymnaea piscicida</i>	-	-
<i>Lamellidens marginalis</i>	+	-
<i>Gyraulus hirsutus</i>	-	-
<i>Unio</i> sp.	-	+
<i>Tubifex tubifex</i>	+	+
<i>Chironomus</i> sp.	+	-
<i>Ephemerella</i> sp.	-	-
<i>Laccotrepes maculatus</i>	-	-
<i>Hydra carcina</i> sp.	-	-
<i>Paratelpusa spinigera</i> (Mud crab)	+	+

**Table 3. Seasonal variation in the occurrence of zooplankton at Gaya pond.**

Species	Winter	Summer	Monsoon
<b>PROTOZOA</b>			
<i>Arcella disco ides</i>	+	+	-
<i>Centropyxis aculeata</i>	-	++	+
<b>ROTIFERA</b>			
<i>Polyarthra</i> sp. <i>Platyias</i>	+	-	-
<i>Platylus monostyla</i> sp.	-	+	-
<i>Brachionus forficula</i>	-	+	-
<i>Filinia longiseta</i>	-	-	+
<i>Pompobolysulcata</i>	-	+	-
<b>COPEPODA</b>			
<i>Phyllodiatomus</i> sp.	-	-	+
<i>Spicodiatomus</i> sp.	-	-	+
<i>Mesocyclops</i> sp.	-	-	-
<i>Cyclops</i> sp.	-	+	++
<i>Diatomus</i> sp.	-	-	+
<i>Bbinediatomus indicus</i>	+	-	-
<i>Nauplius larvae</i>	++	+	++
<b>CLADOCERA</b>			
<i>Diapbanosomaexcisum</i>	++	+	++
<b>OSTRACDA</b>			
<i>Cyprissp.</i>	-	-	+

## CONCLUSION

It is seen that water of Gaya pond is clear and semitransparent. During the present investigation pH was recorded slightly acidic which fluctuates between 5.5 and 7.5. The presence of rich biodiversity which constitute the zooplankton, Macrophytes along with macro invertebrates that is Molluscs as well as fish population represent significant potentially of biodiversity. However, zooplankton showed maximum density during summer as also observed by Michael in freshwater ponds. Summer increase may be favourable water condition and high phytoplanktonic density upon which they depend for their food. Among macro invertebrates arthropods were the most dominant group followed by molluscs and annelids as also reported by Singh and Roy (1992)<sup>8</sup> in the pond. Nutrients are the major biotic component influencing density and diversity of aquatic plants and animals. The nutrients absorbed by plants are utilized by themselves and are also transferred to the other trophic levels. Thus, bottom biota included organisms belonging to different orders, classes and phyla of the animal kingdom, which are beneficial for

the proper growth of fishes and it is the essential for our society. A good bottom is one that provides correct soil from the point of view of pond productivity. The flora and fauna are useful for fish feeding.

#### ACKNOWLEDGEMENT

Authors are grateful to all persons who helped by providing the data of bottom fauns of Gaya ponds during research work and moral support.

#### REFERENCES

1. **Odum, E.P. 1963.** "Ecology" Modern Biol. Ser. Hott. Rinehart and Winston, New York and London, pp. 152.
2. **Cairns, J. Jr, Lanza, G.R. and Parkar, B.C. 1972.** Pollution related structural and functional changes in aquatic communities with emphasis on freshwater algae and protozoa. *Proc. Acad. Nat. Sci. Phil.* **124(4-6):** 79-127.
3. **Jana, B.B. 1973.** Seasonal periodicity of plankton in freshwater pond in West Bengal, India. *In. Rev. Hydrobiol.* **58:** 127-143.
4. **Abraham, M. 1976.** Studies on the bottom macro fauna of Bhavanisagar Reservoir (Tamil Nadu). *J. Inland Fish. Soc. India.* **11(2):** 41-48.
5. **Ahmad, I. 1998.** Seasonal variation in some physio-chemical properties of a pond with special reference to its productivity. Ph.D. thesis. B.R.A. Bihar Univesity, Muzaffarpur (Bihar)

6. **Bilgrami, K.S. and J.S. Dutta Munshi. 1985.** Ecology of river Ganga (Impact of human activities and conservation of aquatic biota (Patna to Farakka). Final Technical Report. Pp. 85. Submitted to Doen, New Delhi.
7. **Jhingran, V.G. and Tripathi, S.D. 1969.** A review of the measures adopted for the development of the fisheries of reservoirs in India. *Proc. Sea, Eco. Fish Fresh. Resv. Nov.* 27-29. CIFRI. Barrackpore, p.537-551.
8. **Singh, R. and Mushi, J.S.D. 1992.** Molluscan diversity and role of certain abiotic factors on the diversity of gastropoda *Pila globosa* and *Bellamya bengalensis* in a tank of Jamalpur, Bihar. *J. Freshwater Biol.* **4(2):**135-140.

#### ADDITIONAL REFERENCES

9. **Jyoti, N. 2003.** Monthly Fishery Journal April.
10. **Nasar, S.A.K. and Munsu, J.S.D. 1974.** Seasonal variation in physio-chemical and biological properties of a tropical shallow pond. *Jap. J. Ecol.* **43:** 291-308.
11. **Smith, R.L. 1965.** Ecology and Fish biology. Harper & Bow. New York, pp.686.
12. **Tonapi, G.T. 1971.** Studies on freshwater and amphibious Mollusc of Poona with notes of their distribution. Part II. *J. Bomb. Nat. Hist. Soc.* **68:** 115-176.
13. **V.G. Jhingran. 2009.** Fish & Fisheries of India.