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Diversity and distribution of benthic macro invertebrates in a pond of Madhepura District

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Abstract- Benthic macro-invertebrates are small aquatic animals and larval stage of insects (Environmental protection agency-2016) which are diverse faunal groups living in fresh water system. These fauna remain attached with logs, aquatic plants or stones or remain buried in bottom sediment. Diversity and distribution of benthic macro-invertebrate was studied in two ponds of Madhepura district. Pond-1 is known as Puraini pokhar situated in Godhi tola of Puraini block under Madhepura district and Pond-2 known as Baghmara pokhar situated 5 km away from district headquarter of Madhepura. In total, 23 species of benthic macro-invertebrates were recorded from two ponds out of which 19 species were recorded in Pond-1 and 13 species in Pond-2 belonging to 5 groups- Oligochaeta, Hirudinea, Insecta, Pelecypoda and Gastropoda. Gastropoda was most dominant represented by 8 species in Pond-1 and 6 species in Pond-2 followed by Insecta in Pond-1 and Oligochaeta in Pond-2. Abundance of benthic fauna varies in between 1364 individual/m² and 4413 individual/m² in Pond-1 and in Pond-2, abundance of benthic fauna varied in between 1148 individual/m² to 5154 individual/m². Maximum abundance was recorded in the month of December in both ponds and minimum abundance in pond-1 was recorded in July and in pond-2 in the month of September. The abundance of benthic macro-invertebrate was higher in Pond-2 probably due to discharge of domestic sewage.

Key words: Benthic macro-invertebrates, Abundance, Diversity and distribution.

INTRODUCTION

Benthic macro-invertebrates are small aquatic animals and larval stage of insects (Environmental protection agency-2016) which are diverse faunal groups living in fresh water system.¹ These fauna remain attached with logs, aquatic plants or stones or remain buried in bottom sediment. Diversity and distribution of macrobenthos depends on settlement of pelagic larval forms of different species, affinity to suitable substratum and also the degree of stress effect caused by strong waves and tide currents.²

Physicochemical characters of water body and environmental resources strongly influence diversity and distribution of macrobenthos.³ Macrobenthos are indicators of biological conditions of water bodies as they remain under water in most of their lifetime and differ their tolerance to pollution. Diversity and distribution of macroinvertebrates mainly depends on the availability of microhabitats and food resources. A number of studies documented how macroinvertebrates assemblages respond to environmental variables and which variables best explain their distribution and abundance.

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The present study was conducted in two perennial ponds of Madhepura district. The heavy rainfall is the main source of water in studied ponds. One of the pond known as Puraini pokhar is situated in Godhitola of Puraini block under Madhepura district and other pond known as Baghmara pokhar is situated 5 km away from district headquarter of Madhepura. Macro-invertebrates were collected from both ponds of regular intervals.

MATERIAL & METHODS

Macrobenthos were collected at regular intervals from both ponds using Vanveen grab of 0.6m² surface area. Sediment samples were also collected and kept in polythene bags. All samples were labelled and brought to laboratory. Sediment samples were diluted with water and passed through a sieve of 0.5mm mesh size to collect benthos.⁴ Benthos were kept in enamel trays with water for sorting.

Samples were pinned, dried and examined under stereoscopic microscope. Samples were identified up to genus/species using standard taxonomic key.⁵⁻⁷

Benthic macro-invertebrates was calculated in the term of individual/m².

$$N=n/ah$$

Where, N= No. of benthic organism/m²
 n= No. of benthic organism/sample
 a= Area of mud sample
 h= No. of hauls taken

RESULT

A mixed and balanced population of diversified fresh water fauna constituted the benthic population of the investigated ponds. In total, 19 species and 13 species of benthic macro-invertebrate fauna were recorded in Pond-1 and Pond-2 respectively (Figure 1 and 4). Benthic communities were comprised of 5 groups, like Oligochaeta, Hirudinea, Insecta, Pelecypoda and Gastropoda. Of these, Hirudineria was recorded only in Pond-1. Abundance of benthic fauna varies in between 1364 individual/m² and 4413 individual/m² in Pond-1 and in Pond-2, abundance of benthic fauna varied in between 1148 individual/m² to 5154 individual/m².

The abundance of benthic macro-invertebrate in Pond 1 is recorded in Figure 1 and that of Pond 2 in Figure 4.

Out of 19 species of benthic invertebrates recorded in Pond-1, 8 species belonging to Gastropoda followed by 2 bottom larvae and 3 nymphs of Insecta, 3 Oligochaeta, 2 Pelycepodata and 1 Hirudinea (Figure 2).

Relative composition of benthic fauna shows dominance of Gastropoda constituting 45.61% of total benthic macro fauna followed by Oligochaeta 26.69%, Insecta 22.60%, Pelycepodata 2.16% and Hirudinea 0.75 % (Figure 3). Among benthic community, Hirudinea and Pelycepodata represented only negligible fractions.

Of the 13 species of benthic invertebrate recorded in Pond-2, 6 species belonging to Gastropoda, 4 Oligochaeta, 2 Insecta and only one Pelycepodata (Figure 5). Leeches were not found in this pond. Relative composition of benthos shows dominance of Oligochaeta contributing 41.04% followed by Insecta 36.32%, Gastropoda 21.72% and Pelycepodata 0.93% (Figure 6).



Fig. 1-Total Benthic macro-invertebrates abundance in Pond-1.

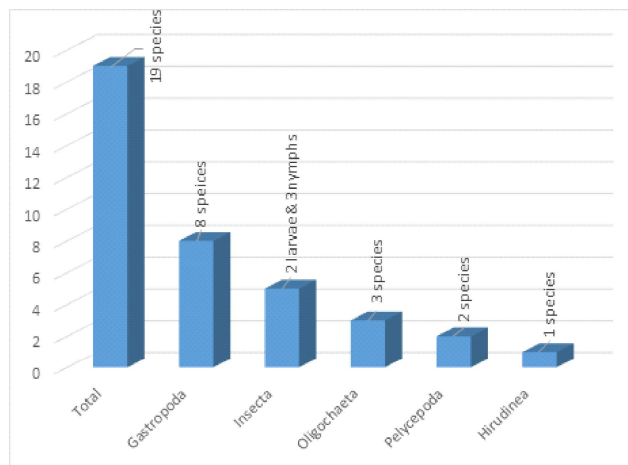


Fig. 2- Number of species of benthic macro fauna in Pond-1.

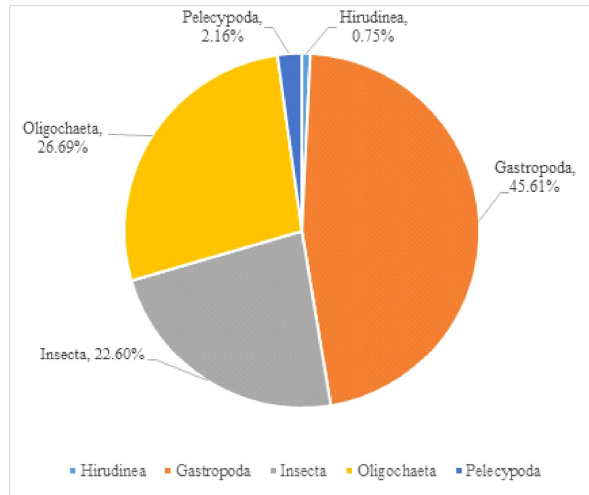


Fig. 3- Relative composition of benthic invertebrates in Pond-1

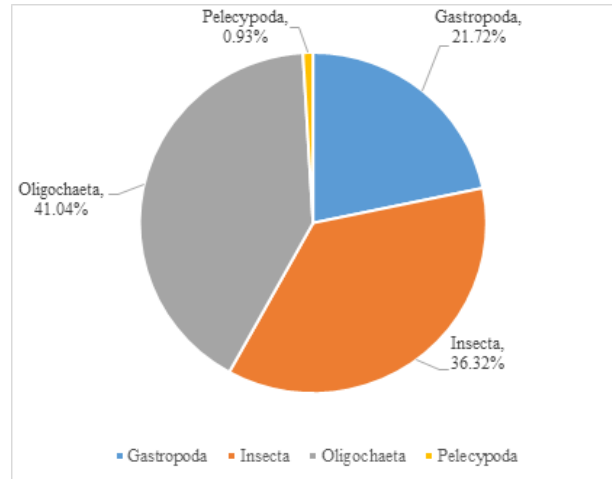


Fig. 6- Relative composition of benthic invertebrates in Pond-4.

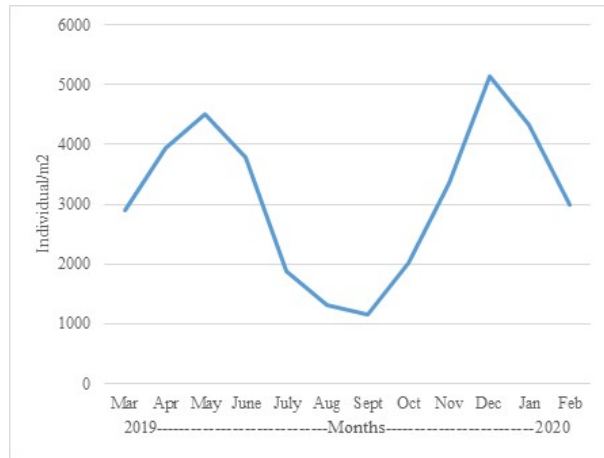


Fig. 4- Total Benthic macro-invertebrates abundance in Pond-2.

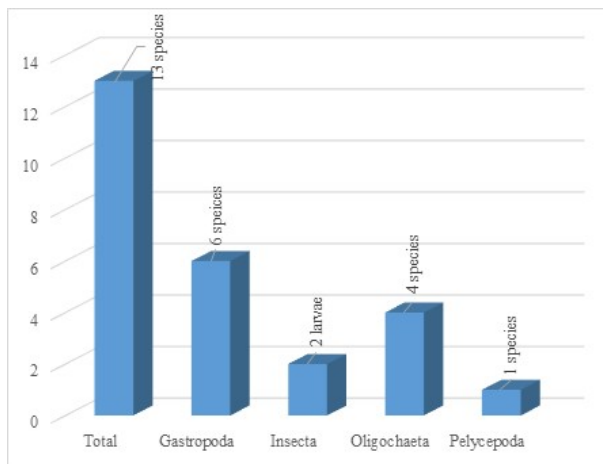


Fig. 5- Number of species of benthic macro fauna in Pond-2.

DISCUSSION & CONCLUSION

In total, 23 species of benthic macro-invertebrates were recorded from two ponds out of which 19 species were recorded in Pond-1 and 13 species in Pond-2 belonging to 5 groups- Oligochaeta, Hirudinea, Insecta, Pelecypoda and Gastropoda. Gastropoda was most dominant represented by 8 species in Pond-1 and 6 species in Pond-2 followed by Insecta in Pond-1 and Oligochaeta in Pond-2. Abundance of benthic fauna varies in between 1364 individual/m² and 4413 individual/m² in Pond-1 and in Pond-2, abundance of benthic fauna varied in between 1148 individual/m² to 5154 individual/m². Maximum abundance was recorded in the month of December in both ponds and minimum abundance in pond-1 was recorded in July and in pond-2 in the month of September. The abundance of benthic macro-invertebrate was higher in Pond-2 probably due to discharge of domestic sewage which causes accumulation of huge amount of organic material which support growth of benthic fauna.^{8,9} During present study, benthic fauna population did not differ considerably in between two ponds but contribution of different groups varied significantly. The earlier studies has reported that Oligochaeta, Insecta and Molusca constitute bulk of bottom fauna in ponds, lakes and reservoirs of tropical and sub-tropical regions.¹⁰⁻¹²

REFERENCES

1. Obade V. D., Moore R. 2018. Synthesizing water quality indicators from standardized geospatial information to remedy water security challenges: a review. *Environ Int.* 119: 220-231.

Biospectra : Vol. 18(2), September, 2023

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2. **Kumar P. S. and Khan A. B. 2013.** The distribution and diversity of benthic macro-invertebrate fauna in Pondicherry mangroves. *Ind. Aquat. Biosyst.* **9(1):** 3-18.
3. **Buss. D. F., Baptista D. F., Silveira M. P., Neissimian J. L., Dorville L. F. M. 2002.** Influence of water chemistry and environmental degradation on macro-invertebrate assemblages in a river basin in South-East Brazil. *Hydrobiologia.* **481(1/3):** 125-136.
4. **George A. D. I., Abowei J. F. N. and Daka E. R. 2009.** Benthic macro- invertebrate fauna and physico-chemical parameters in Okpoka Creek sediments, Niger Delta, Nigerian. *Int. J. Anim. Vet. Adv.* **1:** 59-65.
5. **Tonapi G. T. 1980.** *Freshwater Animals of India.* Oxford & IBH, New Delhi. Pp. 341.
6. **Ward H. B. and Whipple C. C. 1959.** *Freshwater Biology.* 2nd ed. John Willy and Sons Inc., New York, London, pp. 1248.
7. **Pennak R. W. 1978.** *Freshwater Invertebrates of the United States.* John Wiley & Sons Inc., New York, pp. 626.
8. **Ahmad K. K., Haldar G. C., Hossain M. M. and Paul S. K. 1991.** Macrobenthic fauna of Kaptai Lake (Bangladesh). *Ind. J. Fish.,* **38(3):** 173-176.
9. **Sakalin C., Md. M. R. and Masuma A. 2015.** Composition and abundance of benthic macro-invertebrates in freshwater earthen ponds of Noakhali district, Bangladesh. *American Journal of Bioscience and Bioengineering.* **3(5):** 50-56.
10. **Gupta P. K. and Pant M. C. 1986.** Analysis of the inshore macrozoobenthic community in Lake Nainital, Uttar Pradesh, India, *Int. Revue ges Hydrobiol.* **71(1):** 115-125.
11. **Kaushal D. K. and Tyagi A. P. 1989.** Observations on the bathymetric distribution of benthos in Gobindsagar reservoir, Himachal Pradesh. *J. Inland Fish. Soc., India.* **21(1):** 37-46.
12. **Khan R. A. 2002.** Diversity of freshwater macro-invertebrate communities associated with macrophytes. *Rec. Zool. Sur., India.* **100(1-2):** 211-228.
