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Macrozoobenthos diversity of Khyra Mandir Taal, a wetland of district Gonda, U.P. 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 Khyra Mandir Taal of District Gonda, U.P. during July 2014 to June 2015. During the present investigation a total number of 21 genera of macrozoobenthic fauna were recorded from one year's investigation. Observations revealed that phylum mollusca acquires dominant position with 42.85% of total faunal composition while phylum annelida constitutes 33.33% and comes on second position whereas, least faunal abundance was found from phylum arthropoda which contributes 23.80%.

Keywords: Diversity, macrozoobenthos, Khyra Mandir Taal

Introduction
Wetlands are the transitional land between terrestrial and aquatic ecosystem, where the water label is usually at or near the surface or the land is covered by shallow water (Cowardin *et al*., 1979) [3]. They are rich source of primary producers. Wetlands are very productive ecosystems, which help in the regulation of biological cycles, maintenance of water quality, nutrient movement and support for food chains. Wetlands are areas where water is the primary factor controlling the environment and the associated plants and animal life (Kumar *et al*., 2015) [5]. Wetlands are important components of watersheds and provide many valuable functions to the environment and society.

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 (Thoker *et al*., 2015) [15]. 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. Macrobenthic invertebrates act as food for many aquatic birds and fishes. Different species comprises 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 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.

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. (Prakash *et al.*, 2015a, 2015b & 2015c; Verma, 2016; Verma *et al.*, 2016) [9, 10, 11, 17, 18]. Benthic diversity of lentic waterbodies were studied by many ecologists in India (Siraj *et al*., 2010) [13] 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 mind an attempt has been made to document macrozoobenthic diversity of Khyra Mandir Taal at District Gonda of U.P. Thus the present survey was conducted once in a month for a period of one year during July 2014 to June 2015 at three collection sites of Taal to find out macrozoobenthos diversity.

Materials and Methods
The sediment samples were collected monthly and dried to constant weight in an oven at 105^0-110^0C. The sand, silt and clay was determined by pipette method (Piper, 1966) [8].

The soil organic carbon and available phosphorus were estimated by Trivedy *et al*. (1987) [16]. The available nitrogen was determined by alkaline permanganate method (Subbiah and Asija, 1956) [14]. The pH was determined in 1:5 soil water suspension by pH meter.

The sediment sample were collected monthly from the bottom at three sites were collected during morning time by using Peterson Grabe mud sampler, collected samples were sieved through 0.5 mm sieve (Ankar and Elmgreen, 1976) [1] the material which retained on sieve were collected and from it benthic organisms were stored out with the help of forceps and brush and 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) [6], Borror *et al*. (1976) [2] and Pennak (1989) [7] under the light microscope. The population of organisms was counted and number of individuals of a species per sample and was expressed as number/m^2.

Results and Discussion

A total of 21 genera were found from the three sampling sites belonging to three phylum *viz*., Mollusca, Annelida and Arthropoda. Among them 9 species of molluscan community was represented by three classes *viz*., Gastropoda, Pelecypoda and Bivalvia. Gastropoda was represented by five genera followed by Class Pelecypoda (two genera) and Bivalvia (two genera). Whereas, Annelidan community was represented by two classes *viz*., Oligochaeta and Hirudinidae and Arthropodians belongs to three classes, *viz*., Insect, Crustacea and Arachnida (Table 1). The distribution of macrozoobenthos at sampling site I was maximum from all the three sites and 15 genera were recorded. The molluscan was dominant (42, 85%) followed by annelids (33.33%) and arthopodes (23.80%). At sampling site III distribution of macrozoobenthos species was similar than station I and 14 species were recoded. Sampling station II was poor than both the sites and only 12 species of macrozoobenthos were reported. Among the entire 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 in fresh water body (Khan *et al*., 2007; Roy and Gupta, 2010) [4, 12]. Environmental condition and habitat structure is being altered due to discharge of domestic sewage and constriction of buildings.

Table 1: Diversity of Macrozoobenthos of Khyra Mandir Taal

S.N.	Class/Taxa	Sampling sites		
		S1	S2	S3
Phylum- Annelida (33.33%)				
Class 1: Oligochaeta				
1	*Branchiura* sp.	+	-	+
2	*Limnodrilus* sp.	-	+	+
3	*Lumbriculus* sp.	+	+	-
4	*Nais* sp.	+	-	+
5	*Tubifex* sp.	+	+	+
Class 2: Hirudinidae				
6	*Erpobdella* sp. sp	-	+	+
7	*Glassiphonia*	+	-	+
Total		5	4	6
Phylum- Arthropoda (23.80%)				
Class 1: Insecta				
8	*Chironomus* sp.	-	+	-
9	*Hydrophilus* sp.	+	+	+
Class 2: Crustacaea				
10	*Gammarus* sp.	+	+	-
Class 3: Arachnida				
11	*Acari* sp.	+	-	+
12	*Dolomedes* sp.	+	-	+
Total		4	4	3
Phylum-Mollusca (42.85%)				
Class 1: Gastropoda				
13	*Gyraulus* sp.	+	+	-
14	*Lymnaea* sp	+	-	+
15	*Pila* sp.	-	+	+
16	*Tarebia* sp.	+	-	-
17	*Thiara* sp.	+	-	+
Class 2: Pelecypoda				
18	*Corbicula* sp.	-	+	+
19	*Promentus* sp.	+	-	-
Class 3: Bivalvia				
20	*Lamellidens* sp.	+	-	+
21	*Parreysia* sp.	-	+	-
Total		6	4	6
Grand Total		15	12	14

Conclusion

The present investigation depicted about the distribution and diversity of macrozoobenthos in Khyra Mandir Taal of district Gonda, U.P. and reported about the loss of macrozoobenthic distribution due to construction of building and discharge of domestic waste which causes habitat alterations. The study revealed about the future research prospects in this area for studying the impact of pollution on the ecology of fresh water bodies like the wetlands.

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