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Diversity of aquatic insect fauna in Baghel Taal, a wetland of Bahraich district, U.P.

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Abstract
Diversity of aquatic insect fauna of Baghel taal has been studied during September, 2015 to August, 2016. The study reveals that the taal was rich in terms of diversity of aquatic insect, which was represented by 21 species of aquatic insects belonging to 6 orders and 21 families have been recorded from the six sampling sites of the Baghel Taal. The results of the present study reveals great diversity of aquatic insects in freshwater bodies of Baghel taal and suggest the possibility of using insects effectively for biomonitoring programmes

Keywords: Biodiversity, insect fauna, wetland, Baghel Taal.

Introduction
Wetlands are areas where water is the primary factor controlling the environment and the associated plants and animal life. Wetlands support vast biodiversity of flora and fauna, provide food and shelter to organisms that thrive in. They occur where the water table is at or near the surface of the land, or where the land is covered by water. Wetlands are among the world's most productive environments. Now-a-days wetland has a great ecological interest due to their socio-economic values and ecosystem services. Now wetlands are shrinking rapidly because of urbanization and industrialization. Due to urbanization and anthropogenic pressure most of the wetlands are succumbed to greater degree of biologically active nutrient accumulation. Thus due to anthropogenic activities the ecological condition of this ecosystem has been become harsh. So this water is inhabited by a number of tolerant animal species mostly belonging to phylum Arthropoda, chief being crustaceans and insects. Most of them are hardy, a character responsible for their occurrence and survival in a wide range of conditions which may not be tenable for many other animal groups. Aquatic insects are good indicators of human impact on the freshwater ecosystem (Wetzel, 1983) [10]. They are suited for use in environmental impact assessment (EIA) and have a long tradition in water quality monitoring (Bonada *et al*., 2005) act as reliable indicators.

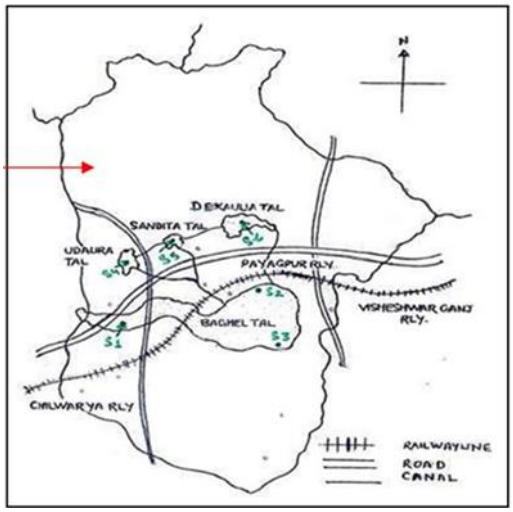
Aquatic arthropods live their life cycle in water bodies and are found in or on the surface of the lentic or lotic waters. They play important role in ecosystem functioning by virtue of their abundance, taxonomic diversity and act as primary consumers in both grazing and detritus type of food chain and in turn provide food to the higher trophic levels. At the larval stage, they constitute the principal nutritive fauna of fish and are known to play a significant role in the processing and cycling of nutrients as they belong to several feeding groups such as filter feeders, deposit collectors and predators (Resh and Rosenberg, 1984) [6].

Aquatic insects make up 3-5% of all insect species; they are taxonomically diverse and play a critical role in stability and maintenance of ecosystem, especially in nutrient dynamics. They also present striking features in periodicity of occurrence, life cycle and great adaptability to the environmentally stress condition. The presence or absence of aquatic insects can indicate whether a particular ecosystem is healthy or polluted. The changes in the physico-chemical properties of water can adversely affect the diversity, distribution and composition of aquatic insects (Majumder, 2013) [3]. The present study deals with the arthropod fauna of sediments of three different sites, which are rich in benthic population.

Study area: Baghel Taal is a large shallow perennial lentic waterbody with irregular margin and dense growth of macrophytes.

It is situated in village Baghel, Payagpur block of district Bahraich at a distance of about 1.60 km. To the south - east of Payagpur Railway station. It is about 31 km, away from Gonda, 30 km, from Baahraich and 45 km from Balrampur.

Map of U.P. Showing District Bahraich



Location of Baghel Taal in Payagpur Block of Bahraich District

It is half oval in shape with maximum diameter of 3800m and connected with three small waterbodies namely Udavra Tal, Sandita Tal and Dekaulia Tal. It receives water from three main streams, Babia nallah from north-west side, Jamvar nallah from north and Sakarpatti nallah from north-east side during rainy season. It is also a Bird sanctuary extending around 32 km with total catchment area of wetland 441.5575 acre. Out of this only 121.22 acre is water body in rainy season but in summer its area becomes reduced with maximum depth 3.6m. It is habitat of rich micro- and macro living organisms including *Nymphaea*, *Nelumbo*, Narkul, Tinna rice, vegetation as well as various annelids, molluscans, fishes and amphibians.

Materials and Methods

Aquatic insects were collected collected monthly from 6 sites (Sites S1, S2 and S3 are located in inshore region of Baghel taal where as sites S3, S4 and S6 are located in Udavra taal, Sandita taal and Dekaulia taal) during September, 2015 to August, 2016 by using dipnet (0.3 x 0.3m) having mesh size 500µ. The collected material was washed by running water through the nets two or three times to detach the insects/larvae adhered in the nets. The samples were then transferred to white trays in small quantities for handpicking aquatic insects using forceps and fine brushes. The handpicked samples were then preserved in 4% formalin and brought to the laboratory for further analysis. The collected insect fauna was examined under a dissecting microscope and identified with the help following the pertinent literature (Needham & Needham, 1962; Edmondson, 1966; Vazirani, 1970; Tonapi, 1980; Subramanian & Sivaramakrishnan, 2007) [5, 1, 9, 8, 7]. The family level identification was done according to proper insect manual.

Results and Discussion

The present investigation indicated that wetland, Baghel Taal is rich in aquatic insect fauna. During the present study a total of 21 species of aquatic insects belonging to 6 orders and 21 families have been recorded from the six sites. Among the aquatic insects collected from Baghel Taal the order Hemiptera (8 genera) was dominant and followed by order Coleoptera (4 genera), Diptera (3 genera), Ephemeroptera (3 genera), Odonta (2genera), and Lepidoptera (1 genera) The insect of the order hemiptera, diptera and coleoptera showed high species richness (Table1). The maximum diversity of insect was found in site-1 (18 species) followed by site-2 (16species), site-3 (13 species), site-5 (10 species), site-6 (9 species) and site-4 (8 species). Overall species diversity revealed that the insects belong to order Hemiptera were dominant and that of Trichoptera was the least dominant in the wetland.

Table 1: Diversity of aquatic insect fauna in different sites of Baghel Taal

Order	Genera (Family)	Study Sites					
		S-1	S-2	S-3	S-4	S-5	S-6
Coleoptera	*Hydrocanthus* sp. (Notoridae)	+	+	+	-	-	-
	Berosus larvae (Hydrophilidae)	+	+	+	-	-	-
	Hyphydrus sp. (Dytiscidae)	+	+	-	-	+	-
	Dineutus sp. (Gyrinidae)	+	-	+	+	-	+
Diptera	*Chironomus* sp larvae(Chironomidae)	+	+	+	+	+	-
	Culiconles sp. larvae(Ceratopogonidae)	+	+	+	-	-	+
	Eristalis sp. (Syrphidae)	+	+	+	-	-	-
Hemiptera	*Sigara* sp. (Corixidae)	+	+	+	-	+	+
	Hydrometra sp. (Hydrometridae)	+	+	-	+	-	+
	Mesovelia sp. (Mesoveliidae)	-	+	+	+	+	+
	Micronecta sp. (Corixidae)	+	+	-	-	+	-
	Neoplea sp. (Pleidae)	+	-	+	+	+	-

	Laccotrephes sp. (Nepidae)	-	+	-	+	-	+
	Belostoma sp. (Belostomatidae)	+	-	+	-	+	+
	Anisops sp. (Notonectidae)	+	+	-	-	+	-
Ephemeroptera	*Baetis* sp. (Baetidae)	+	+	-	-	-	+
	Leptophlebia sp. (Leptophlebiidae)	+	-	-	+	+	-
	Ameletus sp. (Siphlonuridae)	+	+	+	-	-	-
Lepidoptera	*Ostrinia* sp.(Pyralidae)	+	+	-	-	+	-
Odonata	*Ischnura.* sp.. (Coenagrionidaes)	-	+	+	+	-	-
	Tachopteryx sp.	+	-	+	-	-	+
Total Genera		18	16	13	8	10	9

In the present study, the presence of pollution sensitive groups (Ephemeroptera) especially in site-1 and site-2 indicates that inshore sites of wetland was not healthy. The presence of great number of Diptera larvae in site 1, 2 & 3 was the indication of high organic enrichment in the Baghel taal (Jakher, 1986) [2]. Most of the Dipterans inhabited in the marginal polluted zone where oxygen is often depleted.

Ephemeroptera was one of the intolerant and sensitive group and was represented by three families and each family was represented by single genera are indicator of water quality ecosystem health because of its presence in the polluted sites (Site-1 & 2) of Baghel taal (Mishra and Singh, 2016) [4].

The structure and composition of biotic community is well reflected with altering water quality and are also shown in their distribution, diversity and abundance pattern of species. Most aquatic habitats with acceptable water quality and substrate conditions support diverse macro invertebrate community. Such community responds to changing habitats and community structure such as invertebrate abundance and composition.

Present study reveals greater diversity and abundance of insects in site-1 & 2 with a possibility of pollution in marginal area and suggest effectively for stringent biomonitoring programmes. There is scanty information on the abundance and diversity of aquatic insects in freshwater bodies of eastern Uttar Pradesh. Therefore, it is imperative to make continuous investigation, census and research activities on the taxonomy and diversity of aquatic insects, so that knowledge regarding this important group can be utilized by future researchers as baseline data for further research and conservation planning.

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