



A study on aquatic insect diversity on some selected water bodies in Guwahati, Kamrup district, Assam.

Punam Deka¹, Mitali Deka² and Rezina Ahmed³

1. Bajali College, Pathsala, India
2. Bajali College, Pathsala, India
3. Department of Zoology, Cotton College State University, Guwahati, India.

Abstract

The present study has generated qualitative and quantitative data of insects from selected habitats of Guwahati, Assam which were then assessed at the family level. Abundance and diversity of aquatic insects was studied in five water bodies, (four ponds and a beel) of Guwahati during 2013 to 2014 and insects belonging to 26 genera, under 17 families and 5 orders were recorded. From this study, it was observed that the most abundant order in all the water bodies is the order Ephemeroptera, followed by Odonata, Hemiptera and Diptera. During the study period abundance of insects was comparatively higher in Dighalipukhuri.

Keywords: Aquatic insects, abundance, diversity, pond.

1. Introduction

Aquatic insects play an important role in aquatic ecosystem functioning [1]. They are an important component of invertebrate assemblages in aquatic ecosystem where they are a controlling group in food webs. At the larval stage, they constitute the principal nutritive fauna of fish [2, 7].

India is one of the mega-biodiversity countries in the world [3]. Although, the north-eastern region of India was identified as a biodiversity hotspot by the World Conservation Monitoring Centre [8], the aquatic insect fauna of this part of India is rather poorly documented compared to the studies on the diversity of aquatic insects in peninsular India, [4,5,6]. The study of aquatic insect is of a great importance as the ecological factors exert a profound importance on the aquatic organisms such as aquatic flies, fishes, water birds, plankton etc. Aquatic insects are important for several reasons, they assist in nutrient cycle, pollination of plants, dispersal of seeds, provide major food source for other taxa etc. In recent times aquatic insects are

used as biological tool and also often used to determine the water quality based on type and number of species present, because pollution status of water bodies are expressed in biological and physiochemical parameters (Lenat *et al.*, 1980).

2. Study site

Guwahati is the largest city of Assam with a population of 9, 63,429 according to 2011 census. It is said to be the gateway of North-East region. The situation of the Guwahati city is at 26°10'N latitude and 94° 49'E longitude. The average elevation of this valley is about 52 m from the mid sea level. The study site Jorpukhuri-1 and Jorpukhuri-2 are located in Uzan bazar area with 26°18'9"N latitude and 91° 75'4"E longitude, the Dighalipukhuri and Nakkatapukhuri are located in Panbazar area with 26°18'8"N latitude and 91° 74'E longitude, and Borisolabeel is located at Paltan bazar area. The mean minimum and maximum temperature of Guwahati city varies from 20°C to 37°C. The following map is showing different study sites of Guwahati area.



3. Materials and methods

During the course of study emphasis was given on the horizontal distribution of insects, not on vertical distribution. Hence bottom samplings were not done, so only insects from surface of shallow water area were collected by using pond nets. The aquatic insects initially collected in the collecting bottles containing formaldehyde 4%/ alcohol 70% and were later seen in the microscope and magnifying glass and identified with the help of books. The population of insects was expressed in terms of abundance.

$$\text{Abundance} = \frac{\text{Total no. of individual of an order}}{\text{Total no of all orders occur}}$$

4. Aim of the study

The main objective of the present study is qualitative estimation of aquatic insect diversity of some ponds in Guwahati, viz. Dighalipukhuri, Jor pukhuri-1, Jor pukhuri-2, Nakkatapukhuri and Borisolabel.

5. Result and findings

The study revealed presence of 26 genus of

aquatic insects belonging to 17 families and 5 orders (Table 1). The orders are Ephemeroptera, Odonata, Hemiptera, Coleoptera, and Diptera. Order Ephemeroptera was represented by two species *Caenis sp.* and *Cloeon sp.* under Bactidae family. It was found that in Dighalipukhuri and Jor pukhuri-1 these insects were abundant (Fig. 1). Order Odonata includes the following families Aesnidae (*Anax sp.*), Libellulidae (*Urothemis sp.*, *Erythrodiplex sp.*, and *Epicordulia sp.*), Corduliidae (*Epicordulia sp.*), Coenagrionidae (*Enallagma sp.*, *Coenagrion sp.*, and *Ischnura sp.*), and Lestidae (*Lestes sp.*). In order Hemiptera the family Gerridae was represented by *Gerris sp.*, Notonectidae was represented by *Notonecta* and *Anisopssp.*, Pleidae was represented by *Pleasp.*, Nepidae was represented by *Nepa sp.*, and family Belostomatidae was represented by *Lethoceros sp.* Order Coleoptera was represented by *Hydrovatus sp.* under Dytiscidae family whether Gyridae family was represented by *Dineutes sp.* The order Diptera was represented by family Culicidae and Chironomidae which includes *Culex sp.* and *Chironomus sp.* respectively.

Table 1: Showing the occurrence of insects in the 5 fresh water ponds in Guwahati

Insect Species	Dighali pukhuri	Jor pukhuri-1	Jor pukhuri-2	Nakkata pukhuri	Borisola beel
Ephemeroptera					
Caenis spp.	+	+	+	+	+
Cloeon spp.	-	+	-	-	-
Odonata					
Anax spp.	-	+	+	-	+
Urothemis spp.	+	+	+	+	+
Erythrodiplax spp.	-	-	-	-	-
Epicordulia spp.	+	-	-	+	+
Coenagrion spp.	-	+	+	-	-
Enallagma spp.	+	-	-	-	-
Ischnura spp.	-	-	-	-	-
Lestes spp.	-	-	-	-	-
Hemiptera					
Gerris spp.	+	+	+	+	+
Mesovelia spp.	-	+	-	+	+
Notonecta spp.	-	+	+	-	-
Anisops spp.	+	+	+	-	-
Plea spp.	-	+	+	+	-
Nepa spp.	-	+	-	+	+
Ranatra spp.	+	+	+	+	+
Lethocerus spp.	-	-	-	+	-
Coleoptera					
Hydrovatus spp.	+	+	-	+	+
Hyphydrus spp.	-	-	-	-	-
Laccophilus spp.	-	+	-	-	-
Cybster spp.	-	-	-	-	-
Haliplus spp.	+	-	-	-	-
Dineutes spp.	+	+	+	+	+
Diptera					
Culex spp.	-	+	+	-	+
Chironomous spp.	+	-	+	+	-

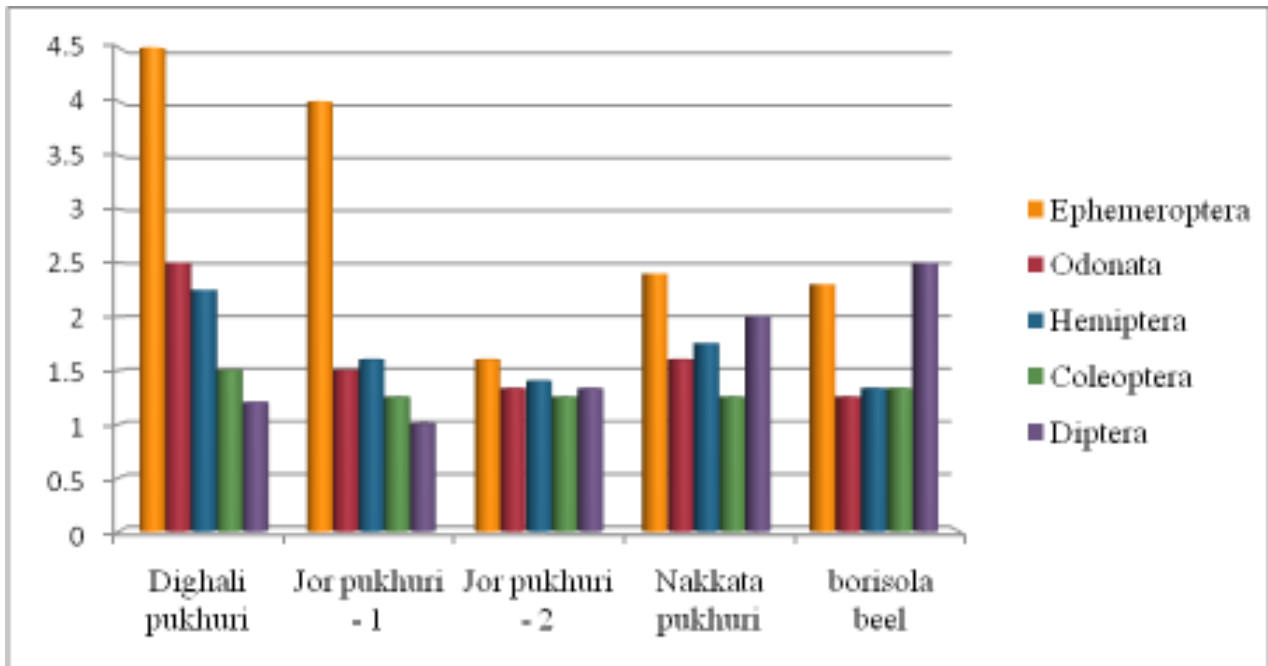


Fig. 1: Abundance of insects in the five selected water bodies of Guwahati area

6. Discussion and suggestion

In this study, insects were collected from the five study sites of Guwahati area. Twenty six different genus of insects belonging to seventeen family and five orders were recorded during the study period. Insects belonging to the 5 different orders are Ephemeroptera, Odonata, Hemiptera, Coleoptera and Diptera. The present study revealed that Ephemeropteran insects are the most abundant among the orders. The insects belonging to Odonata feed on all stages of aquatic insects, mollusks, crustaceans and algae. So, Dighalipukhuri, Jor pukhuri-1, Jor pukhuri-2 and Nakkatapukhuri have the higher density of the insects. The present study shows that Jor pukhuri-1 has maximum diversity of Hemipteran insects followed by Nakkatapukhuri. Also, the present study shows that Dighalipukhuri and Jor pukhuri-1 have higher diversity of aquatic beetles whereas Jor pukhuri-2 has only one species. This may be due to the water pollution of Jor pukhuri-2. Again in Nakkatapukhuri the diversity was less. This may be because of the local people use the pond for sewage disposal. *Culex sp.* was recorded in all the study sites. Polluted water is the birth place of culex larvae. The presence of *Chironomus* larvae in water bodies indicates pollution, because they can live in polluted water only. So, it can be concluded that all

the five selected water bodies are pollute to some extent, but Nakkatapukhuri and Borisolabeel may be considered as more polluted as the abundance of these insects are more in these two ponds.

7. Conclusion

There is scanty information on the abundance and diversity of aquatic insects in freshwater bodies in Assam. Therefore, it is imperative to make continuous investigation, censuses 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.

8. Acknowledgments

The authors would like to thank the Head of the Department of Zoology of Cotton College State University, Guwahati, Assam for providing laboratory facilities. The authors would also like to thank the anonymous references for modifying the manuscript. My sincere thanks and acknowledgement are also extended to my parents and my sisters. Over and above all I express my heartfelt thanks to Almighty God for his ever abiding grace and blessings for completion of this project work.

References

- Dunbar MJ, Warren M, Extence C, Baker L, Cadman D, Mould DJ *et al.*, 2010: Interaction between macroinvertebrates, discharge and physical habitat in upland rivers. *Aquatic Conservation and Marine and Freshwater Ecosystem*; 20:31-44.
- Minshall GW. 2003: Responses of stream benthic macroinvertebrates to fire. *Forest Ecology and Management*; 178:155-161.
- Mittermeier RA, Fonseca Da GAB, Rylands AB, Mittermeier CG. In: Mittermeier RA, Robles GP, Mittermeier CG. *Megadiversity, 1997 : Earth's Biologically Wealthiest Nations*. Edn, CEMEX, Monterrey, Mexico, 39-49.
- Sivaramakrishnan KG, Job SV. Studies on mayfly populations of Courtallam streams. *Proceedings of a Symposium on Ecology of Animal Populations, Zoological Survey of India, Calcutta, 1981, 105-116.*
- Sivaramakrishnan KG, Venkataraman K, Sridhar S, Marimuthu M. Spatial patterns of benthic macroinvertebrate distributions along river Kaveri and its tributaries (India). 1995 : *International Journal of Ecology and Environmental Sciences*; 21:141-161.
- Sivaramakrishnan KG, Morgan HJ, Vincent RH. Biological assessment of the Kaveri river catchment, South India, and using benthic macroinvertebrates 1996 : Applicability of water quality monitoring approaches developed in other countries. *International journal of Ecology and Environmental Science*; 32: 113-132.
- Tachet H, Richoux P, Bournaud M, Usseglio-Polatera P. *Invertébrés d'eau douce 2003 : systématique, biologie, écologie*. CNRS Edn, Paris, 587.
- WCMC. *Freshwater Biodiversity 1998 : A preliminary Global Assessment*. A document prepared for the 4th Meeting of the Conference of the Parties to the convention of Biological Diversity, World Conservation Monitoring Centre.

