



## Studies on diversity of aquatic insects in Tamasi lake, Tahsil-Bhadravati, Dist- Chandrapur (M.S) India

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ARTICLE INFO	ABSTRACT
<p>Received : 01 October 2023  Revised : 02 November 2023  Accepted : 10 November 2023</p> <p>Available online: 12 January 2024</p> <p><b>Key Words:</b>  Anthropogenic  Aquatic insect  Diversity  Tamasi lake  Plecoptera</p>	<p>Aquatic insects are found abundantly and exhibits high diversity in fresh water aquatic ecosystems. They serve as food item for the vertebrate and invertebrate predators and thus play a significant role in aquatic ecosystem. Insects responded well to a wide range of environmental disturbances and thus often are employed as proxies for water quality. The present study was carried out at Tamasi Lake, situated in Bhadravati Taluka of Chandrapur district, Maharashtra which comes under Tribal area. The year round investigation was carried out to evaluate the diversity of aquatic insects for a period of one year from June 2022 to May 2023. The present investigation shows the presence of total 28 species of aquatic insects from 5 orders and 18 families. The rich and varied diversity of aquatic insects indicate the moderate environmental condition of freshwater ecosystem under study and functioning properly.</p>

### Introduction

An ecologically significant group of organisms in freshwater systems are aquatic insects. Knowledge of the ecology and biology of aquatic insects is essential for improving the understanding of the roles of insects in water quality and biodiversity, as well as community structure and ecosystem functioning. Lakes, ponds and reservoirs, are crucial for maintaining the biological balance of flora and fauna. Aquatic insects have a high capacity for tolerance to environmental changes (Merritt *et al.*, 2008). As a result, they can accurately predict any changes in water quality. Aquatic insects are a crucial component of many food cycles (Sharma *et al.*, 2010). Due to their contribution to energy and nutrient processing through food chains as well as their role in water purification, aquatic insects serve as a connecting link between aquatic and terrestrial ecosystems. Aquatic insects respond to certain changes in water conditions and act as indicators of aquatic ecology (Choudhary and Janak, 2015). Numerous viewpoints have been used to study the ecology of aquatic insects, including species diversity, life cycle and community structure, interactions between predator and prey, detritivory,

grazing and implications for nutrient dynamics. The presence or absence of a species in an aquatic ecosystem reveals the extent of contamination (Wahizatul, *et al.*, 2011). Unlimited anthropogenic activities have a continuous effect on water quality. This affects the aquatic insects of lakes, which in turn disturbs the aquatic nutrient cycle. Aquatic insects are found to be very sensitive and moderately sensitive, and few are considered very tolerant. Ephemeroptera, Plecoptera and Trichoptera are excellent indicators because they are more sensitive to water pollution caused by natural disturbances and human anthropogenic activities (Cibik *et al.*, 2021). Species identification and their distribution patterns enriched the information regarding monitoring and conserving the ecosystem, Gulati (2012), Kumar (2014), Subramanian and Sivaramakrishnan (2007).

### Materials and Methods

Tamasi Lake is located in Bhadravati Taluka in the Chandrapur district and lies under the Tribal area. This lake consists of an earthen dam across a local nalla to the north side of Tamasi village. The cultural command area of the lake was 24.90 hectares. The

irrigation potential of this lake is 24.90 Ha. Lake water is used for agricultural purposes and fishery activities. Currently, it functions as a backup reservoir for the purpose of providing water to nearby areas for agricultural purposes. Aquatic insects were collected using D-hand nets with a mesh size of 50  $\mu$ m and dimensions of 30  $\times$  30 cm. From each sampling site, an area of 50 m was selected for sample collection. Samples were collected by considering all possible insect habitats in the basin stream. The collected sample in the net was transferred into labeled plastic containers, preserved by adding 80% ethanol and taken to the laboratory for examination. The samples were placed in white trays for sorting and screening. The aquatic insects were manually collected from the trays. Large aquatic insects were sorted by the naked eye, whereas the sorting of the smaller insects was performed under a dissecting microscope. All the sorted samples were kept in properly labeled vials containing 80% ethanol. Aquatic insects were identified using the pertinent literature of Mishra (2007).

## Results and Discussion

Aquatic insects were studied in the area of Tamasi Lake (Figs. 1 and 2). The aquatic insects studied are represented in Table 1. In the present investigation, a total of 28 species of aquatic insects from 5 orders and 18 families were recorded. Several biotic and abiotic factors are responsible for the abundance and diversity of insects. Temperature is the most important factor affecting the density of aquatic insects (Gupta & Paliwal, 2010). They are distributed in a variety of habitats with rich growth of macrophytes. Earlier studies revealed that more than 500 species of Odonata occur in India (Abhijna *et al.*, 2013). Hemiptera, an order of true bugs, undergo gradual and imperfect metamorphosis. Both the adult and larval stages involve swimming or adhering to surfaces in water. Because of how they feed, hemipterans are significant. These methods are useful for reducing the mosquito population. Previous findings indicate that, compared to other insect groups, they are more resistant to environmental extremes (Ishas & Khan, 2013).



Figure 1: Satellite image of the lake under study



Figure 2: Overall view of Tamasi Lake, Teh: Bhadravati, Dist: Chandrapur

Table 1: Diversity of Aquatic Insects in Tamsi Lake during 2022-2023

Phylum	Class	Order	Family	Genera
Arthropoda	Insecta	Ephemeroptera	Leptophlebiidae	<i>Choroterpes</i> sp.
			Caenidae	<i>Caenis</i> sp.
			Baetidae	<i>Cloeon bellum</i>
		Plecoptera	Perlidae	<i>Neoperla</i> sp.
		Trichoptera	Hydropsychidae	<i>Homoplectra</i> sp.
				<i>Leptonema</i> sp.
			Polycentropodidae	<i>Polycentropus</i> sp.
		Odonata	Stenopsychidae	<i>Stenopsysche</i> sp.
			Coenagrionidae	<i>Ceragrion</i> sp.
				<i>Pseudagrion</i> sp.
			Libellulidae	<i>Libellula</i> sp.
		Hemiptera		<i>Brachythemis</i> sp.
			Belostomatidae	<i>Appasus</i> sp.
				<i>Diplonychus</i> sp.
			Gerridae	<i>Eurymetra</i> sp.
				<i>Naboandelus</i> sp.
			Corixidae	<i>Micronecta</i> sp.
				<i>Sigara</i> sp.
			Notonectidae	<i>Anisops</i> sp.
				<i>Enithares</i> sp.
			Naucordiidae	<i>Naucoris</i> sp.
			Pleidae	<i>Macroris</i> sp.
				<i>Plea pullula</i>
			Nepidae	<i>Laccotrephes ater</i>
				<i>Ranatra parvipes</i>
			Hydrophilidae	<i>Hydrobius</i> sp.
			Dytiscidae	<i>Cybister</i> sp.
				<i>Laccophilus</i> sp.

Coleoptera, consisting of beetles and weevils, are conspicuous insects with brilliant metallic colors, patterns, and striking forms. The common names for both *Cybister* and *Hydaticus* include diving beetles.

## Conclusion

The present study revealed the presence of 28 aquatic insect species with 05 major orders and 18 families, which indicates moderate environmental conditions. The order Hemiptera was the most diverse, representing 16 species, followed by Trichoptera and Odonata, each of which had a

relatively low abundance of Plecoptera, with only one species. Some aquatic insects are sensitive to water pollution, whereas others are tolerant. The Knowledge of aquatic insects is essential for improving the understanding of the roles of aquatic insects in water quality, biodiversity, community structure and ecosystems. Therefore, ecological studies of aquatic insects are helpful for area of ecology for any decision-making.

## Conflict of interest

The authors declare that they have no conflicts of interest.

## References

- Abhijna, U.G., Rateesh, R. & Kumar, A.B., (2013). Distribution and diversity of Aquatic insects of Vellayani lake in Kerala . *Journal of Environmental Biology* ,Vol.34, no.3, pp.605-611.
- Choudhary, A. & Janakahi .(2015) . Diversity and distribution of Aquatic insect population in Lakha Banjara Lake, Sagar (M.P), India *Journal of International Academic Research for Multidisciplinary*, 3(5):367
- Cibik,J., Beracko,P., Krno,I., Lanzos, T., Navara , T & Derka ,T., 2021. The taxonomical and functional diversity of three groups of aquatic insects in rheocene karst springs are affected by different environmental factors. *Limnologica* , vol.91,pp.125913.
- Gulati, P (2012). *Handbook of Aquatic Insects*, Biogreen Books Publication, New Delhi.
- Gupta, M. & Paliwal, A. (2010). Role of aquatic insects of water quality in related to physico-chemical parameters in Yamuna river at District Firozabad(U.P). *Advanced Biomedical Research* 1(1):71-74.
- Ishas,F. & Khan , A.(2013) . Aquatic biodiversity as an ecological indicators for water quality criteria of River Yamuna in Doon valley, Uttarakhand, India. *World Journal of Fish and Marine Sciences* 5(3): 322-334.
- Kumar, A. (2014). Studies on qualitative and quantitative abundance of aquatic entomofauna in glacial fed mountainous Goriganga river of Kumaun Himalaya, Uttarakhand, India .*International Research Journal of Environment Science*, 3(4) :51-63.
- Merritt, R.W, K.W. Cummins & M.B. Berg, (2008). *An introduction to the aquatic insect of North America*.4<sup>th</sup>ed, pp:1158.
- Mishra, S.K. (2007) . Insecta- Odonata. The Director(ed.). Fauna of Madhya Pradesh (Including Chhattisgarh).State Fauna series, 15(1). Kolkata: Zoological Survey of India . pp.245-272.
- Sharma,S.,Joshi, V.,Kurde, S. & Singhvi , M.S. (2010). Biodiversity and abundance of benthic Macroinvertebrates community of Kishanpura lake, Indore (M.P) India. *Researcher* ,2(10). 57-67
- Subramanian ,K.A. & Sivaramakrishnan K.G. (2007) . *Aquatic insects of India –A Field Guide*. Ashoka Trust for Ecology and Environment (ATREE) , Bangalore,India, pp.62.
- Wahizatul AA, Luna, S H & Ahamed, A, (2011). Composition and distribution of aquatic insect communities in relation to water quality. *Journal of Sustainability Science and Management*, 6 (1): 148-155

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