



Study on diversity of Odonata (Dragonflies and Damselflies) fauna of Lohara lake, District-Chandrapur (M.S), India

Bibha Ishwar Gain ✉

IHLRSS, Department of Zoology, Sardar Patel Mahavidyalaya, Chandrapur, (M.S.) India

Rajlaxmi Ranrag Kulkarni

IHLRSS, Department of Zoology, Sardar Patel Mahavidyalaya, Chandrapur, (M.S.) India

ARTICLE INFO	ABSTRACT
<p>Received : 10 August 2023 Revised : 28 September 2023 Accepted : 12 October 2023</p> <p>Available online: 10 January 2024</p> <p>Key Words: Anisoptera Diversity Lohara Hemimetabolous Zygoptera</p>	<p>Odonates are prominent freshwater insects and play a crucial role in ecosystem functioning as biological indicator of environmental quality. The expansion of urban areas in combination with climate change places great pressure on species found in freshwater habitats. Odonata are iconic freshwater organisms due to their large body sizes and striking coloration. Odonata are hemimetabolous insects, the aquatic larva or nymph hatches from an egg, develops instars before leaving the water and emerging as the winged imago. Thermal tolerance affects Odonates physiology like life process such as growth rate, immune system and pigment. The study was carried out for 12 months from January 2022 to December 2022 in and around Lohara Lake. The objective of this study is to assess the diversity of Odonata species and the impact of temperature on two Odonates families Libellulidae and Coenagrionidae in Lohara Lake. In the present investigation, total 12 species were identified belonging to 11 genera and 2 families. Anisoptera (dragonflies) dominant over Zygoptera (damselflies). Among Anisoptera, 8 species belong to family Libellulidae and in Zygoptera, 4 species belong to family Coenagrionidae. The minimum and maximum temperature of the site was 16°C and 44°C, respectively.</p>

Introduction

The insect order Odonata includes some of the most ancient and beautiful insects that ever roamed earth (Sharma *et al.*, 2007). Globally, 5740 species of odonates are known worldwide, of which 474 species in 142 genera and 18 families exist in India. Odonates are amphibious hemimetabolous insects that have aquatic egg and larval (nymph) stages, while adults are terrestrial. The Odonata individuals are divided into three groups according to their morphology: Damselflies (Zygoptera), Anisozygoptera and Dragonflies (Anisoptera) (Meitei, 2014). Odonates are characterized by their extensive predatory habits and important role in the food chain in freshwater environments, and they are also considered excellent bioindicators of habitat quality. Odonates are responsive to changes in ecosystems, atmospheric temperature, and weather conditions, making them strong indicators of environmental changes (Tiple, 2012).

Temperature is an important environmental parameter that has a direct influence on all organisms by regulating chemical reactions and therefore the rates of metabolism and development. In Maharashtra, a total of 101 species of odonates are recorded (Kulkarni *et al.*, 2012). The diversity of different animals has been studied in the Chandrapur district, but odonates have not been properly explored. Odonata is an indicator of the rich biodiversity of an area. The presence of Odonata indicates the existence of other kinds of flora and fauna biodiversity. They inhabit near clean water ecosystems and are also indicators of water pollution. Odonates are supersensitive to environmental changes. Therefore, the present study was conducted to explore the threats to Lohara Lake caused by increasing global warming due to human impacts on species richness, diversity and conservation threats to odonates.

Corresponding author E-mail: gainbibha@gmail.com

Doi: <https://doi.org/10.36953/E.CJ.26622640>

This work is licensed under Attribution-Non Commercial 4.0 International (CC BY-NC 4.0)

© ASEA

Materials and Methods

Study area

The village of Lohara is situated 9 km from Chandrapur city of Maharashtra State on the eastern side of the State Highway (Fig. 1). A perennial reservoir, namely, Lohara, is situated near this village. This reservoir is 1 km long. Inside the forest area, various wild animals utilize the forest as a source of drinking water at night. Lohara Reservoir was previously privately owned, but now, due to the dissolution of land, the reservoir is under government control, but the right to expand has still been given to the people who utilize this reservoir as a drinking water source.

Sampling Method

The study was carried out over 12 months, from January 2022 to December 2022. The collection of

the species was performed in and around Lohara Lake. Species collection was conducted in the morning (7.00 am to 10.00 am) and evening (4.00 pm to 6.00 pm) with the help of a specially designed sweep net and handpicking method when insects were more active. Odonates were observed, captured, photographed, identified and released immediately to conserve biodiversity. Species were photographed by using a camera.

Identification

The adult specimens were identified with the help of identification keys provided by Subramanian and Babu (2020) and Andrew *et al.* (2008). The Handbook on Common Odonates of Central India and Introduction of Odonata were used. For the identification of the length of the abdomen, the wing size, color and size of the eye, and wing spot were observed.



Figure 1: Location of Study Area

Results and Discussion

During the survey period from the different sites in Lohara Lake, a total of 12 odonate species were documented and are represented in Table 1. Odonata species belong to two suborders, namely, 2 families and 11 genera of 12 species. Among the dragonflies (Anisoptera), the family Libellulidae included 8 species and damselflies (Zygoptera), and the family Coenagrionidae included 4 species in 3 genera. Anisoptera is more dominant than Zygoptera. In a similar study by Meshram *et al.* (2020), 18 species of odonates were found in the Navegaon Bandh, 12 of which belong to the Libellulidae family. Similarly, Bharamal *et al.* (2014) and Devendra Mishra *et al.* (2019) reported that 13 and 07 species, respectively, belong to the Libellulidae family. Tiple *et al.* (2008) recorded the families of 31 species of Libellulidae and 15 species of Coenagrionidae in Nagpur city.

Andrew (2013) recorded 07 species of the Coenagrionidae family in Zilpi Lake, Nagpur. In the present study, three main seasons occurred: June and July, when the heavy monsoon occurred and until October, when the monsoon was rainy; the cool winter started from November to February; and the hot dry season from March until the rains. A maximum temperature of approximately 44°C and a minimum temperature of approximately 16°C were recorded (Table 2) on a monthly average basis. Makure J *et al.* (2015) reported that Coenagrionidae and Libellulidae naiads exhibit high thermal tolerances, with Libellulidae exhibiting greater tolerance than Coenagrionidae. Thermal tolerance increased as body size increased in Libellulidae, while in Coenagrionidae, thermal tolerance was not affected by body size.

Table 1: List of identified Odonate species collected in and around Lohara Lake

S. N	Sub Order	Scientific Name	Common Name
Family: Libellulidae			
1	Anisoptera	<i>Brachythemis contaminata</i>	Ditch jewel
2		<i>Bradinopyga geminata</i>	Granite ghost
3		<i>Diplocodestriialis</i>	Ground skimmer
4		<i>Trithemis aurora</i>	Crimson marsh skimmer
5		<i>Orthetrumsabina</i>	Green marsh hawk
6		<i>Crocothemis servilia</i>	Ruddy marsh skimmer
7		<i>Acisomapanorpoides</i>	Trumpet tail
8		<i>Tholymistillarga</i>	Coral tailed cloud wing
Family: Coenagrionidae			
9	Zygoptera	<i>Ceriagrioncoromandelianum</i>	Coromandel marsh dart
10		<i>Ischnura aurora</i>	Golden dartlet
11		<i>Ischnura senegalensis</i>	Senegal golden dartlet
12		<i>Agriocnemispygmaea</i>	Pygmy dartlet

Table 2: Minimum and maximum temperatures (°C) of Lohara Lake from January 2022 to December 2022

Months	Minimum Temperature	Maximum Temperature	Average Temperature
January	16	29	22
February	19	33	26
March	24	40	32
April	29	44	36
May	31	43	37
June	29	38	33
July	24	29	26
August	24	30	26
September	24	30	26
October	21	30	25
November	16	31	23
December	17	31	24

Conclusion

Odonata are more sensitive and colorful insects. Certain anthropogenic events can cause expansion, industrial and urban pollution and riverine deforestation, resulting in the erosion of aquatic ecosystems and ultimately the loss of fresh water ecosystems worldwide. The present study recorded the odonates in and around the Lohara Lake district Chandrapur. An attempt was made to increase the diversity of the Odonates fauna and to establish a baseline inventory of Odonates in and around Lohara Lake Dragonflies, which are bioindicators of aquatic ecosystems. A total of 12 odonate species were found to belong to two suborder 2 families and 11 genera of 12 species. Among the dragonflies

(Anisoptera), the family Libellulidae included 8 species and damselflies (Zygoptera), and the family Coenagrionidae included 4 species in 3 genera. The minimum and maximum temperatures at the site were 16°C and 44°C, respectively.

Thus, the present study focused not only on the diversity of odonates at Lohara Lake in Chandrapur but also on the thermal sensitivity of Odonates due to environmental changes, which affect their life, so these findings might be helpful for future research and conservation of odonates.

Conflict of interest

The authors declare that they have no conflicts of interest.

References

- Andrew R.J. (2013). Odonates of Zilpi Lake of Nagpur (India) with a note on the emergence of the libellulid dragonfly, *Trithemis allidinervis*, *Journal on New Biological Reports* 2:177-187.
- Andrew, R.J., Subramanian K.A. & Tiple, A.D. (2008). *A handbook of common odonates of central India*. South Asian Council of Odonatology, India. The 18th International Symposium of Odonatology, Hislop College Nagpur, 1-55
- Bharamal D.L., Y.J. Koli., D.S.Korgaonkar & G.P.Bhawane (2014). Odonata fauna of Sindhudurg district, Maharashtra India, *Int. J. Curr. microbio. App. Sci* 98-104.
- Kulkarni, P.P., Babu, R., Talmale, S.Sinha, C. & Mondal, S.B. (2012). *Insecta Odonata*. In: *Fauna of Maharashtra: State Fauna Series* Zoological Survey of India, Kolkata, India, 20 (2): 397-428.
- Makure, J., Makaka Catson & Sithole, M. (2015). Assessment of upper thermal tolerance of naiads of two odonate families: Coenagrionidae and Libellulidae in lake Kariba, Zimbabwe. *Elixir International Journal* 31201-31206.
- Meitei, ABL. (2014). Odonates (Dragonflies and Damselflies) of Indian Council of Agricultural Research (ICAR), Research Complex for NEH Region Campus, Umiam, Meghalaya, India. *Journal of Entomology and Zoology Studies*, 2(5), 16-21.
- Meshram Hemraj M, Niwadange Sandeep N & Sori Jayant G. (2020). Biodiversity of odonata fauna in and around Navegaon Bandh Reservoir, District Gondia, M.S., India. *J. of Science and Engineering A7*:893-896.
- Mishra Devendra., V.K. Sharma & Asha Pal (2019). Diversity of Odonates at Sirpur, Indore, *International Journal of zoology and Applied Bioscience Volume 4, Issue1:1-4*.
- Sharma, G., Sundararaj, R. & Karibasvaraja, L.R. (2007). Species diversity of Odonata in the selected provenances of Sandal in southern India. *Zoos Print J.*, 22(7): 2765-2767.
- Subramanian, K.A. & Babu, R. (2020). *Dragonflies and Damselflies (Odonata: Insecta) of India*. In: *Indian Insects: Diversity and Science- A Festschrift for Professor C. A. Viraktamath's 75th Birthday* (Eds. Ramani, S., Mohanraj, P., Yeshwanth, H.M.). CRC Press Taylor & Francis Group, FL 29-45.
- Tiple A. D. (2012). Dragonflies and Damselflies (Odonata: Insecta) of the Achanakmar Amarkantak Biosphere Reserve, in Chhattisgarh and Madhya Pradesh, with their status in Central India. *Int. J. Biotechnol. Bio. Sci.*, 2(1): 97-102.
- Tiple A.D., Khurad A.M. & Andrew R.J. (2008): Species diversity of odonata in and around Nagpur City, Central India. *Fraseria (N.S.), Proceedings of the 18th International Symposium of Odonatology*, 45-49

Publisher's Note: The ASEA remains neutral with regard to jurisdictional claims in published maps and figures.