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Journal of Threatened Taxa

Building evidence for conservation globally

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ISSN 0974-7907 (Online) | ISSN 0974-7893 (Print)

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26 May 2020 | Vol. 12 | No. 8 | Pages: 15955–15961
DOI: 10.11609/jott.5236.12.8.15955-15961

Journal of Threatened Taxa

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Journal of Threatened Taxa | www.threatenedtaxa.org | 26 May 2020 | 12(8): 15955–15961
ISSN 0974-7907 (Online) | ISSN 0974-7893 (Print)
DOI: https://doi.org/10.11609/jott.5236.12.8.15955-15961
#5236 | Received 11 July 2019 | Final received 30 April 2020 | Finally accepted 05 May 2020

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NOTE

Records of dragonflies and damselflies (Insecta: Odonata) of Dipang Lake, with two new records to Nepal

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Odonata is an order of insects that comprises dragonflies (Anisoptera) and damselflies (Zygoptera). They are carnivorous in nature. They can be taken as an excellent biological indicator of environmental conditions (Corbet 1993) and also play an important role in the ecology of wetlands (Chovanec & Waringer 2005). Many species of Odonata inhabiting agro-ecosystems play a crucial role in controlling pest populations (Tiple et al. 2008). Since they are primarily aquatic, their life history is closely linked to specific aquatic habitats (Andrew et al. 2009). Worldwide, 6,324 species of Odonata are known (World Odonata List 2020). Nepal, being rich in water resources, serves as an excellent habitat for Odonata. The earliest record of dragonflies was carried out by Selys (1854) in Nepal. Since then, there have been various other researchers who had carried out studies, including Vick (1989) who listed out 172 species with altitudinal distribution for the first time in Nepal. In recent times, Thapa (2015) enlisted 195 species from 87 genera belonging to 18 families while Conniff (2020) states that 183 different species of Odonates are recorded from Nepal till date in accordance with the modern classification.

Dipang Lake is one of the eight lakes in Pokhara Metropolitan Municipality located in Lekhnath covering a total catchment area of 2.39km^2 and total water body area of 0.14km^2 (MoFE 2018). Most of its area is covered by swampland and the lake itself, while the tributaries too serve as an excellent abode for Odonata. Khatre and Kusunde rivers are its major sources with Kahur, Kaure and Deurali rivers as other tributary streams (MoFE 2018). The lake, however, seems to have passed its glory days because of its drying water sources. Human encroachment though seems low and constant, siltation is medium and constant, pollution is medium but increasing and the number of invasive species like water hyacinth, parthenium, morning glory, *Lantana camara*, etc. is high and increasing (MoFE 2018). Conservation efforts though, have been undergone by NGOs like CODEFUND.

Not many studies on Odonata have been performed from this lake, however, Karen Conniff, who has been working extensively on the Odonata of Nepal, has been recording several of them in Pokhara on her blog "Nepal Odonata". This study was conducted to explore the Odonata species exclusively from Dipang Lake.

The research was carried under the biodiversity project of the Conservation Development Foundation (CODEFUND), Koteshwor, Kathmandu, Nepal. The surveys were carried out during April and May of 2019

Editor: K.A. Subramanian, Zoological Survey of India, Chennai, India. **Date of publication:** 26 May 2020 (online & print)

Citation: Sajan, K.C. & J.B. Gurung (2020). Records of dragonflies and damselflies (Insecta: Odonata) of Dipang Lake, with two new records to Nepal. *Journal of Threatened Taxa* 12(8): 15955–15961. https://doi.org/10.11609/jott.5236.12.8.15955-15961

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Funding: Conservation Development Foundation (CODEFUND), Koteshwor, Kathmandu, Nepal.

Competing interests: The authors declare no competing interests.

Acknowledgements: The authors are grateful to the Conservation Development Foundation (CODEFUND), Koteshwor, Kathmandu, Nepal for funding this research. They would also like to thank Ms. Karen Conniff for her help regarding the identification of some species.

in the locality of Dipang Lake, Lekhnath, Kaski (28.180^{0}N & 84.066^{0}E, 670–700 m) (Figure 1). Different areas of the lake including the swampland, inlet, outlet and the peripheries were extensively explored. The sightings were recorded capturing photos in the Sony Cyber-Shot DSC-HX90V 18.2MP camera. The GPS details of the locations and the dates were recorded on the photos themselves. The number of individuals seen was recorded in a notebook to analyze their local status. During this study, no species of Odonata were harmed. The records were photographed from a proper distance and were identified from the photographs using Karen Conniff's blog "Nepal Odonata", "Odonata of India" website and Andrew et al. (2009). Moreover, some species were identified by Karen Conniff herself.

Local status of Odonata species are categorized as; rare—only one individual recorded, uncommon—only two individuals recorded, less common—only 3–5 individuals recorded, rather common—individuals recorded 6–10 in number, common—individuals recorded 11–50 in number, and quite common—individuals recorded more than 50 in number.

A total of 28 species of Odonates including 17 species of Anisoptera (Dragonflies) and 11 species of Zygoptera (damselflies) were recorded (Table 1). Libellulidae with 16 species was the most dominant family among the Anisoptera followed by Gomphidae (one sp.). Among Zygoptera, eight species recorded belong to the family Coenagrionidae, one species to Platycnemididae, one species to Calopterygidae, and one species to Chlorocyphidae (Figure 2). Among Anisoptera, *Neurothemis tullia* was found to be the commonest of all while *Pantala flavescens*, *Rhyothemis variegata*, and *Tramea virginia* were found to be rare. Similarly, among Zygoptera, *Ceriagrion coromandelianum* was the most dominant species encountered. Likewise, *Aciagrion approximans* (Selys, 1876) also known as The Indian Violet Dartlet and *Ceriagrion cerinorubellum* (Brauer, 1865) also known as the Orange-tailed Marsh Dart had not been reported from Nepal before this research and is, thus, taken as species new to Nepal. This particular record for *Aciagrion approximans*, however, also appears

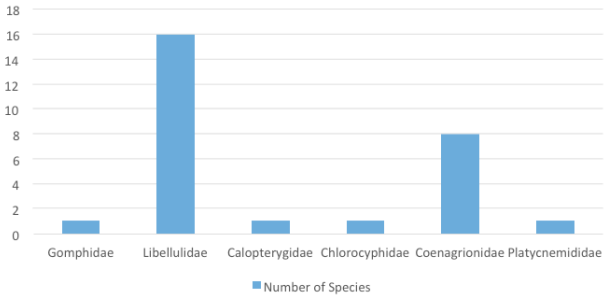

Figure 2. Family-wise composition of the observed species.

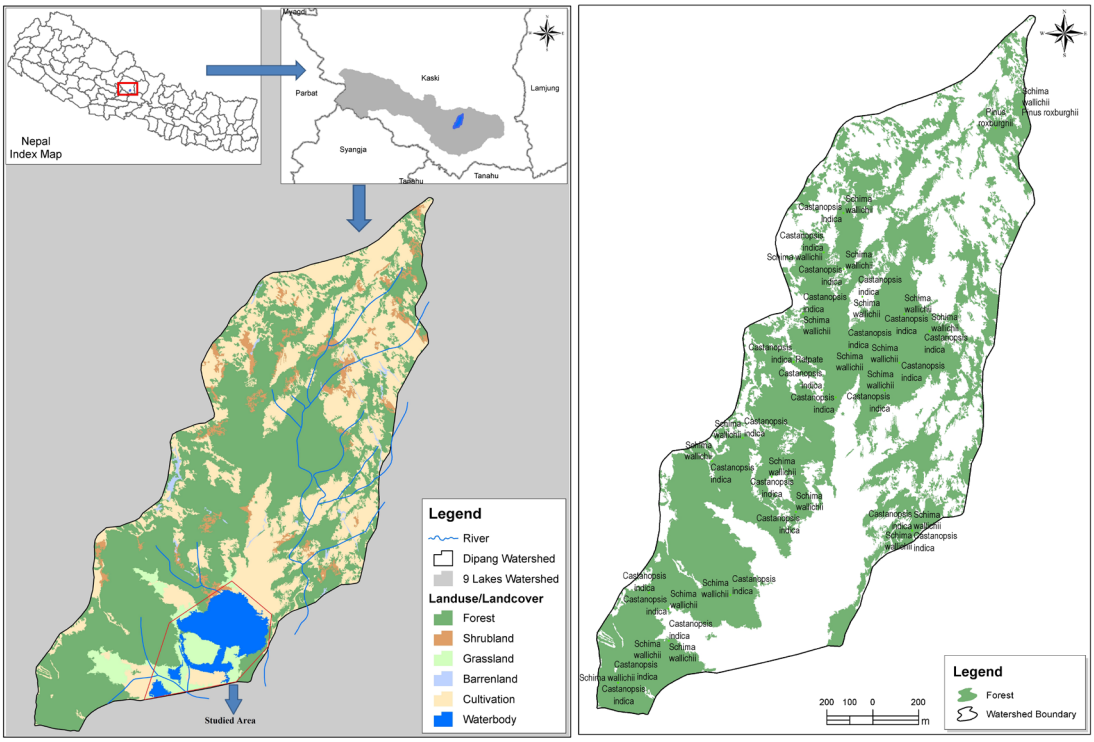

Figure 1. Study area - locality of Dipang Lake, Lekhnath, Kaski, Nepal.

Table 1. List of the observed species and their local and IUCN Red List status.

	Common name	Scientific name	Author	Local status	IUCN Red List status
Family: Gomphidae					
1.	Common Clubtail	*Ictinogomphus rapax*	(Rambur, 1842)	Rather Common (6)	Least Concern
Family: Libellulidae					
2.	Trumpet Tail	*Acisoma panorpoides*	Rambur, 1842	Common (10+)	Least Concern
3.	Little Blue Marsh Hawk	*Brachydiplax sobrina*	(Rambur, 1842)	Less Common (3)	Least Concern
4.	Ditch Jewel	*Brachythemis contaminata*	(Fabricius, 1793)	Common (10+)	Least Concern
5.	Scarlet Skimmer	*Crocothemis servilia*	(Drury, 1770)	Common (10+)	Least Concern
6.	Fulvous Forest Skimmer	*Neurothemis fulvia*	(Drury, 1773)	Common (10+)	Least Concern
7.	Paddyfield Parasol	*Neurothemis intermedia*	(Rambur, 1842)	Common (10+)	Least Concern
8.	Pied Paddy Skimmer	*Neurothemis tullia*	(Drury, 1773)	Quite Common (50+)	Least Concern
9.	Tricolored Marsh Hawk	*Orthetrum luzonicum*	(Brauer, 1868)	Common (10+)	Least Concern
10.	Crimson-tailed Marsh Hawk	*Orthetrum pruinosum*	(Burmeister, 1839)	Common (10+)	Least Concern
11.	Green Marsh Hawk	*Orthetrum sabina*	(Drury, 1770)	Common (10+)	Least Concern
12.	Blue-tailed Yellow Skimmer	*Palpopleura sexmaculata*	(Fabricius, 1787)	Less Common (3)	Least Concern
13.	Wandering Glider	*Pantala flavescens*	(Fabricius, 1798)	Rare (1)	Least Concern
14.	Lesser Blue Wing	*Rhyothemis triangularis*	Kirby, 1889	Uncommon (2)	Least Concern
15.	Common Picturewing	*Rhyothemis variegata*	(Linnaeus, 1763)	Rare (1)	Least Concern
16.	Saddlebag Glider	*Tramea virginia*	(Rambur, 1842)	Rare (1)	Least Concern
17.	Black Stream Glider	*Trithemis festiva*	(Rambur, 1842)	Uncommon (2)	Least Concern
Family: Calopterygidae					
18.	Clear-winged Forest Glory	*Vestalis gracilis*	Rambur, 1842	Rather Common (8)	Least Concern
Family: Chlorocyphidae					
19.	River Heliodore	*Libellago lineata*	(Burmeister, 1839)	Rare (1)	Least Concern
Family: Coenagrionidae					
20.	Indian Violet Dartlet	*Aciagrion approximans**	(Selys, 1876)	Rather Common (6)	Least Concern
21	NA	*Agriocnemis clauseni*	Fraser, 1922	Rare (1)	Least Concern
22.	Pygmy Dartlet	*Agriocnemis pygmaea*	(Rambur, 1842)	Rather Common (7)	Least Concern
23.	Orange-tailed Marsh Dart	*Ceriagrion cerinorubellum**	(Brauer, 1865)	Rather Common (6)	Least Concern
24.	Coromandel Marsh Dart	*Ceriagrion coromandelianum*	(Fabricius, 1798)	Common (10+)	Least Concern
25.	Western Golden Dartlet	*Ischnura rubilio*	Selys, 1876	Less Common (4)	Least Concern
26.	Ruby Dartlet	*Ischnura rufostigma*	Selys, 1876	Less Common (5)	Least Concern
27.	Three-lined Dart	*Pseudagrion decorum*	(Rambur, 1842)	Less Common (3)	Least Concern
Family: Platycnemididae					
28.	Black Marsh Dart	*Onychargia atrocyana*	Selys, 1865	Less Common (4)	Least Concern

* Species new to Nepal

in the additions made to the checklist of Odonata of Nepal (Conniff et al. 2020).

These records and the local status, however, is representative to the studied months only, i.e., April and May. Several other species could show up during other seasons and the local status of the species recorded during the study period could change year-round.

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Image 1. *Ictinogomphus rapax* (Rambur, 1842)

Image 2. *Acisoma panorpoides* Rambur, 1842 ♂

Image 3. *Acisoma panorpoides* Rambur, 1842 ♀

Image 4. *Brachydiplax sobrina* (Rambur, 1842)

Image 5. *Brachythemis contaminata* (Fabricius, 1793) ♂

Image 6. *Brachythemis contaminata* (Fabricius, 1793) ♀

Image 7. *Crocothemis servilia* (Drury, 1770) ♂

Image 8. *Neurothemis fulvia* (Drury, 1773) ♂

Image 9. *Neurothemis intermedia* (Rambur, 1842)

Image 10. *Neurothemis tullia* (Drury, 1773)♂

Image 11. *Neurothemis tullia* (Drury, 1773) ♀

Image 12. *Orthetrum luzonicum* (Brauer, 1868)♂

Image 13. *Orthetrum luzonicum* (Brauer, 1868) ♀

Image 14. *Orthetrum pruinosum* (Burmeister, 1839) ♂

Image 15. *Orthetrum pruinosum* (Burmeister, 1839) ♀

Image 16. *Orthetrum sabina* (Drury, 1770)

Image 17. *Palpopleura sexmaculata* (Fabricius, 1787) ♂

Image 18. *Palpopleura sexmaculata* (Fabricius, 1787) ♀

Image 19. *Pantala flavescens* (Fabricius, 1798)

Image 20. *Rhyothemis triangularis* Kirby, 1889

Image 21. *Rhyothemis variegata* (Linnaeus, 1763) ♂

Image 22. *Tramea virginia* (Rambur, 1842)

Image 23. *Trithemis festiva* (Rambur, 1842)

Image 24. *Vestalis gracilis* Rambur, 1842

Image 25. *Libellago lineata* (Burmeister, 1839)

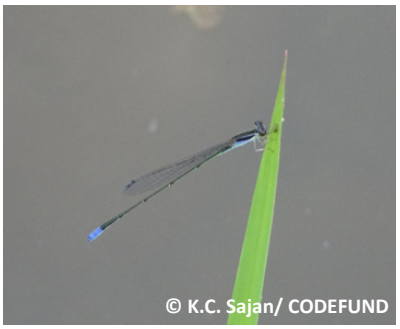

Image 26. *Aciagrion approximans* (Selys, 1876)

Image 27. *Agriocnemis clauseni* Fraser, 1922 ♀

Image 28. *Agriocnemis pygmaea* (Rambur, 1842)

Image 29. *Agriocnemis pygmaea* (Rambur, 1842)

Image 30. *Ceriagrion cerinorubellum* (Brauer, 1865)

Image 31. *Ceriagrion coromandelianum* (Fabricius, 1798)

Image 32. *Ischnura rubilio* Selys, 1876

Image 33. *Ischnura rufostigma* Selys, 1876

Image 34. *Pseudagrion decorum* (Rambur, 1842)

Image 36. *Onychargia atrocyana* Selys, 1865

Image 37. *Orthetrum sabina* (Drury, 1770) feeding on one of the Sapphire (*Heliophorus* sp.) butterflies.

Image 35. A dragonfly naiad taken out of the water

Image 38. *Ceriagrion cerinorubellum* (Brauer, 1865), a damselfly new to Nepal, feeding on a Leafhopper (*Atkinsoniella* sp.).

Image 39. Top to bottom: *Crocothemis servilia* (Drury, 1770) ♂, *Neurothemis fulvia* (Drury, 1773) ♂ and *Orthetrum pruinosum* (Burmeister, 1839) ♂ on a same perch.

Image 40. Glimpses of the lake. © K.C. Sajan.

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ISSN 0974-7907 (Online) | ISSN 0974-7893 (Print)

May 2020 | Vol. 12 | No. 8 | Pages: 15767–15966
Date of Publication: 26 May 2020 (Online & Print)
DOI: 10.11609/jott.2020.12.8.15767-15966

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