

Short Communication

A study on the selected invertebrate fauna in Tal Chhapar Wildlife sanctuary of Churu district, Rajasthan, India

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Abstract

The current study deals with the inventory of invertebrate fauna in Tal Chhapar Wildlife Sanctuary (TWS) carried out from 2015-2017 following visual encounter search for selected invertebrate classes namely Odonata (dragonflies and damselflies), Arachnida (spiders) and Lepidoptera (butterflies and moths). The study resulted in documentation of 9 species of Odonata (6 dragonflies and 3 damselflies), 13 species of spiders and 24 species of Lepidoptera (19 butterflies and 5 moths). Libellulidae was found to be the most dominant family among Odonates. Similarly Lycosidae family had the highest species count among spiders. In the Lepidoptera group, Lycaenidae family showed the highest species richness. This study provides comprehensive information about the invertebrate fauna of TWS, especially covering those groups which were earlier not documented. This information can be used for effective management and conservation strategies.

Keywords: Invertebrate, inventory, visual encounter search, conservation, species richness.

Introduction

Invertebrates are a major component of faunal biodiversity. This group is one of the most diverse and structures a key constituent in terrestrial ecosystem¹. They are known to be important indicators of environmental health and change. These organisms help in organizing grassland community networks by means of activities such as pollination and nutrient cycling². They additionally assume a crucial job in processes like soil configuration, plant production, natural disintegration and also keep a check on populations of other organisms through predation and parasitism^{3,4}. Invertebrates are a part of almost every food chain, and also are a food source for many vertebrates⁵. The organization of these invertebrate communities is greatly influenced by plant community composition along with the abiotic factors like temperature and water availability⁶.

Regardless of such ecological importance, terrestrial invertebrate species are generally ignored during the Environmental Impact Assessment (EIA) studies⁷. They are generally not represented in inventories neither are they considered in local-scale conservation or management activities. Since these invertebrates are so abundantly present that even a small sampling effort can lead to a great number of species which becomes one of a major drawback while dealing with them and this is the reason that so many invertebrate taxa are still not described and also very few experts are there to identify them.

Tal Chhapar wildlife Sanctuary, located in Churu district of Rajasthan. The biodiversity status of this area is largely based

on its flora and vertebrate fauna, while the invertebrates are not well documented apart from a Conservation Area Series Report, 2009 by Zoological Survey of India (ZSI)⁸. Multi taxa studies and quantified surveys are necessary in this area for providing future baseline data for monitoring programmes.

Since these grassland ecosystems congregate resources, they provide critical habitat for both resident and transient species, thus gaining huge interest for monitoring programmes. Also, the invertebrate assemblages act as a powerful indicator of the status of grassland ecosystems as they use grasslands for all or part of their life cycles. Keeping in mind to improve upon the current knowledge of invertebrate diversity of TWS, this study was undertaken to assess the selected invertebrate fauna specially covering those groups which were not surveyed by ZSI. This study will help us to update the existing checklist of invertebrate fauna of TWS which will eventually bridge the knowledge gaps in baseline data and also it will be relevant for and application to conservation in the surrounding Thar Desert areas.

Materials and methods

Study area: Tal Chhapar Wildlife Sanctuary (27°48'38''N and 74°26'88''E) located in Sujangarh Tehsil of Churu district, Rajasthan, encompasses an area of about 7 ha. This area falls under the biogeographic zone 3A-Thar Desert⁹. Further the vegetation of this area is described as Northern tropical thorn forest (6B) and sub-divided as desert thorn forest (6B/C1)¹⁰. Precipitation in this region is very unpredictable with a great deviation in average yearly rainfall. This region has a well

defined distinct summer (March-May), monsoon (June-September), post-monsoon (October and November) and winter (December-February)^{11,12}. The climate of this region is dry with large variation in temperature with highest temperature reaching up to 50°C in May-June and the lowest falling down to 10°C in December-January. ‘Taal’ means plain and this saline plain land is one of the finest savannah grassland habitats in India which changes into a wetland during monsoon and hence it is a unique ecosystem in the Indian sub-continent.

Target Taxa: Not all invertebrate groups were targeted for inclusion in the survey because of the immense diversity and abundance of invertebrates and also lack of time, funds and expertise available for identification of different groups upto species level. Only those groups which were previously not observed or studied by ZSI and for whom expertise to identification is available were studied. Target taxa includes Arachnida, Odonata and Lepidoptera (Butterflies and Moths).

Methodology: Faunistic survey was carried out from June 2015 to May 2017 in the Tal Chhappar Wildlife Sanctuary and its surrounding area within one km range following visual encounter search. During the study all possible microhabitats were searched for different faunal groups (spiders, dragonflies, damselflies, butterflies and moths). Faunal groups were examined in the field, identified and photographed wherever possible. Selected faunal elements particularly spiders and moths which could not be identified in the field were collected and preserved for further microscopic examination in the laboratory. Moths were preserved following dry preservation method and spiders were preserved in 70% alcohol. Identification of different faunal groups was done with the help of referred manuals; Spiders- Tikader^{13,14}; Tikader and Biswas¹⁵, Sebastian and Peter¹⁶; World Spider Catalogue¹⁷, Lepidoptera- Bell and Scott¹⁸, Hampson¹⁹⁻²², Kehimkar²³, Kunte et al²⁴, Odonata- Fraser²⁵⁻²⁷; Mitra²⁸; Subramanian²⁹.

Results and discussion

All the groups examined in the present study showed a great diversity wherein highest species richness was observed in Lepidoptera group followed by Arachnida and Odonata (Figure-1). The present study reports 9 species of Odonata (6 species of dragonflies under suborder Anisoptera and 3 species of damselflies under the suborder Zygoptera), 13 species of spiders and 24 species of Lepidoptera (19 species of butterflies and 5 species of moths) (Table-1, Figure-5). Among Odonates, the highest species richness was found for the family Libellulidae (5 spp.) followed by Coenagrionidae (3 spp.) and Aeshnidae (1 spp.) (Figure-2). Similarly, among Arachnids, Lycosidae (3 spp.) family showed the maximum species richness followed by Salticidae (2 spp.) and Araneidae (2 spp.) (Figure-3). Lepidoptera group showed the maximum species richness with Lycaenidae (9 spp.) being the most dominant family followed by Pieridae (7 spp.) and Noctuidae (3 spp.) (Figure-4). Greater species diversity in grasslands can be attributed to the greater

food availability that facilitates numerous larvae developing on grasses and also availability of vast microhabitats that supports many insect species³⁰. All the taxa studied were also assessed according to the International Union for conservation of Nature (IUCN) Red List criteria, but none of the species sampled at TWS are considered as threatened. This result is not unexpected and is unlikely to change with further surveys as well since the majority of invertebrate species are yet to be assessed in terms of red data species. The already reported invertebrate diversity of TWS by Zoological Survey of India includes 7 species of plant and soil nematodes, 9 species of Scarabaeid beetles, 7 species of termites (Order Isoptera), 4 species of ants of family Formicidae, 1 species of bug (Order Hemiptera) and 2 species of scorpions belonging to family Buthidae⁸. We look forward to report many more species from the area in future through more systematic and rigorous surveys which will no doubt help to understand overall species diversity. Studying these ecosystems will also help in developing a more ecologically educated audience and thus ultimately serving conservation by effecting conservation policies³¹.

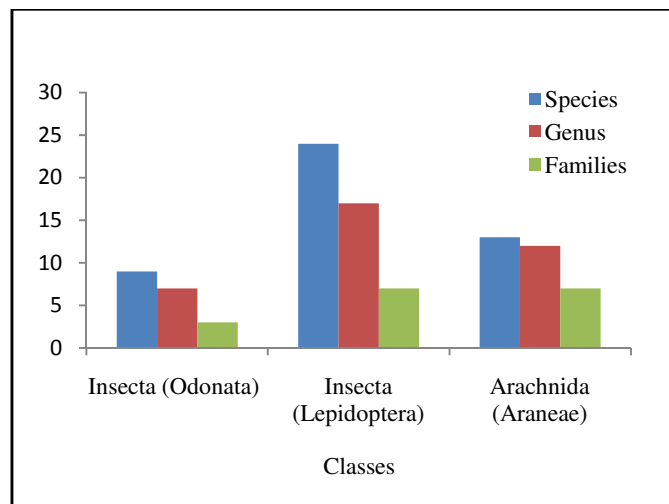


Figure-1: Composition of major classes.

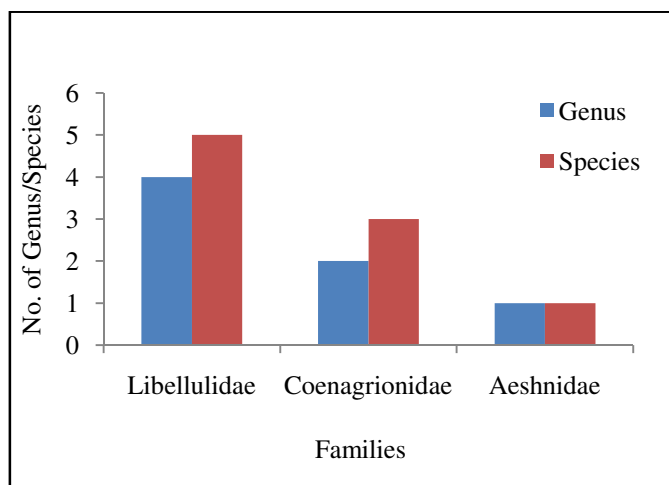


Figure-2: Family wise composition of Odonates.

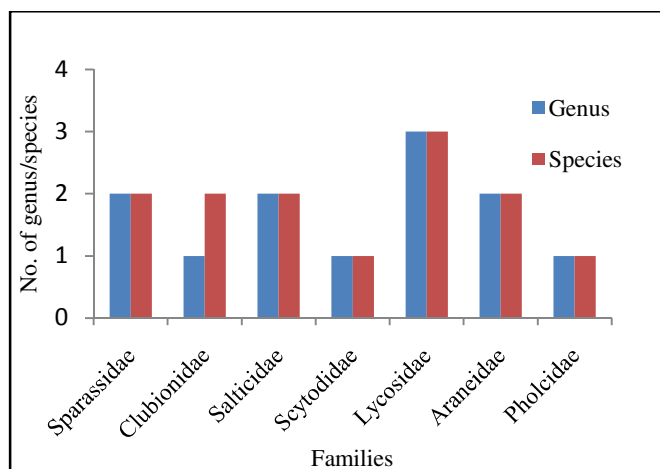


Figure-3: Family wise composition of Arachnids.

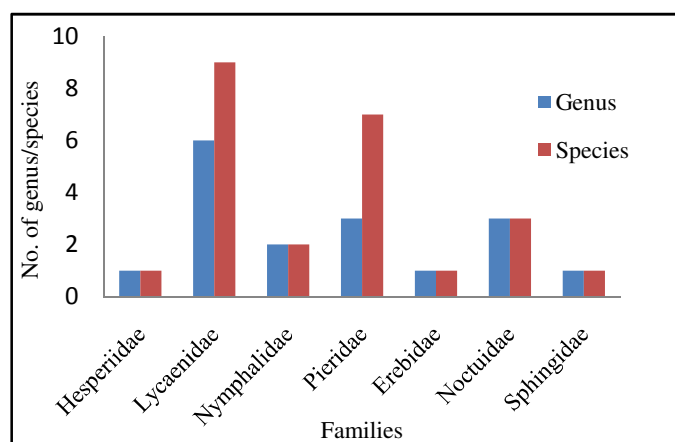


Figure-4: Family wise composition of Lepidoptera.

Conclusion

The present study provides comprehensive information about the invertebrate fauna of TWS. This information can be used for effective management and conservation strategies. Since the Chhappar village area is undergoing rapid urbanization, hence it becomes even more necessary to document the existing invertebrate faunal diversity before it experiences a downfall. In addition, this study also suggests that these grassland habitats should be given a conservation priority so that to promote diversity of insects.

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Table-1: Invertebrate species recorded at Tal Chhappar Wildlife Sanctuary.

Class- Arachnida, Order- Araneae (Spiders)	Family- Araneidae	<i>Cyrtophora citricola</i> <i>Neoscona muckerjei</i>			
	Family-Clubionidae	<i>Clubiona drassodes</i> <i>Clubiona sp.</i>			
		Family- Lycosidae	<i>Hippasa pisaurina</i> <i>Lycosa iranii</i> <i>Pardosa birmanica</i>		
	Family- Pholcidae		<i>Pholcus phalangioides</i>		
	Family- Salticidae		<i>Hyllus semicupreus</i> <i>Plexipus paykulli</i>		
		Family- Scytodidae	<i>Scytodes sp.</i>		
	Family-Sparassidae	<i>Heteropoda sp.</i> <i>Olios sp.</i>			
		Family-Aeshnidae	<i>Anax guttatus</i>		
Class- Insecta, Order- Odonata (Damsel and Dragonflies)	Family- Coenagrionidae	<i>Ischnura aurora</i> <i>Ischnura senegalensis</i> <i>Rhodischnura nursei</i>			
		Family-Libellulidae	<i>Bradinopyga geminata</i> <i>Crocothemis servilia</i> <i>Orthetrum glaucum</i> <i>Orthetrum sabina</i> <i>Pantala flavescens</i>		
			Class- Insecta, Order- Lepidoptera (Butterflies)	Family-Hesperiidae	<i>Spialia galba</i>
	Family-Lycaenidae			<i>Azanus ubaldus</i> <i>Azanus uranus</i> <i>Chilades trochylus</i> <i>Chilades pandava</i> <i>Euchrysops cnejus</i> <i>Lampides boeticus</i> <i>Tarucus callinara</i> <i>Tarucus nara</i> <i>Zizeeria karsandra</i>	
				Family- Nymphalidae	<i>Junonia orithya</i> <i>Danaus chrysippus</i>
		Family-Pieridae			<i>Belenois aurota</i> <i>Colotis amata</i> <i>Colotis danae</i> <i>Colotis etrida</i> <i>Colotis fausta</i> <i>Colotis phisadia</i> <i>Pieris canidia</i>
				Class- Insecta, Order- Lepidoptera (Moths)	Family-Erebidae
Family-Noctuidae					<i>Helicoverpa armigera</i> <i>Mythimna loreyi</i> <i>Trichoplusia orichalcea</i>
					Family-Sphingidae



Figure-5: Invertebrate diversity of TWS. ABC- Odonata; A-Dragonfly (*Orthetrum sabina*), B- Dragonfly (*Crocothemis servilia*), C- Dragonfly (*Bradinopyga geminata*), DEFGHI- Lepidoptera; D-Butterfly (*Colotis amata*), E- Butterfly (*Tarucus nara*), F- Butterfly (*Junonia orithya*), G-Moth (*Utetheisa pulchella*), H- Moth (*Agrius convolvuli*), I- Moth (*Helicoverpa armigera*), JK- Arachnida; J-Spider (*Neoscona mukerjei*), K- Spider (*Pholcus phalangioides*)

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