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RESEARCH ARTICLE

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An Observation on Odonata Fauna of Gandheswari River Bank and Adjoining Fields and Cultivated Lands in Bankura District of West Bengal, India

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ABSTRACT

The present investigation was undertaken as a pilot study to examine the diversity and occurrence of dragonflies and damselflies belonging to the order Odonata from Gandheswari River Bank and adjoining fields and cultivated lands in Bankura District of West Bengal, India during January 2014 to December 2014. A combination of direct search and opportunistic sighting methods were applied during the present study to record 58 different Odonata species comprising of 39 dragonflies and 19 damselflies. Among the dragonflies the most diverse family was Libellulidae represented by 30 species while among damselflies Coenagrionidae was recorded as the most diverse family represented by 13 species. However, increasing pollution in River Gandheswari, conversion of land use pattern along with increasing urbanization is causing fragmentation, degradation and loss of habitat types, may be / are affecting biodiversity and needs serious attention from the concerned authorities most urgently. The present study was the first attempt to make a checklist of Odonates from Gandheswari River bank and adjoining regions and further investigations are needed to portray a comprehensive picture of Odonate diversity from this region.

Key words: Bankura, damselfly, dragonfly, Gandheswari River, Odonates

INTRODUCTION

Odonates represented by dragonflies and damselflies are insect which made their first appearance about 250 million years ago in the Carboniferous era [1]. Worldwide almost 5,952 different species of Odonates have been recorded of which India contributes with 475 species [2, 3]. Dragonflies are known for their flying abilities, even at higher altitudes and dominates among the terrestrial insects in their adult life stages, flying elegantly over rivers, streams, ponds, forest, meadows and croplands. However, the larval form of Odonates are all aquatic, and they have been recorded to act as voracious predators and hence have been proposed as bio-control agents [4]. Moreover, as they lay eggs only in or around freshwater sources their presence have been believed as a significant indicator of ecological stability [4, 5]. Several studies from different parts of India have already documented the diversity and abundance of Odonates [6-31]. Considerable amount of study have been already done by several researchers to portray the diversity and ecology of Odonates from West Bengal [6-8, 32, 33].

The present study location encompasses heterogeneous habitat patches, however, like most other parts of the country the present study location is also suffering from habitat alteration and degradation [34]. The current investigation

was initiated with the objective to prepare a checklist of Odonates as a part of biodiversity profiling from the present study location with an eye to identify the major causes of Odonate diversity depletion.

MATERIALS AND METHODS

Study area: Bankura District has an estimated area of 6,882 square kilometer with 31,92,695 inhabitants as per 2001 census report. The district headquarters are situated at Bankura from where it derives its name. Bankura District is traversed and drained by rainwater-fed rivers which include Darakeswar, Damodar, Kangsabati, Silabati and Gandheswari. River Gandheswari is a tributary of River Darakeswar which travels 33 km from its origin in Chatna to ultimately merge in River Darakeswar at Bankura. The present study was undertaken in-between and around the Northern (23º14′57.09″N; 87º04′32.83″E) and Southern (23º14′12.61″N; 87º04′36.53″E) banks of River Gandheswari near Junbedia of Bankura (Figure 1).

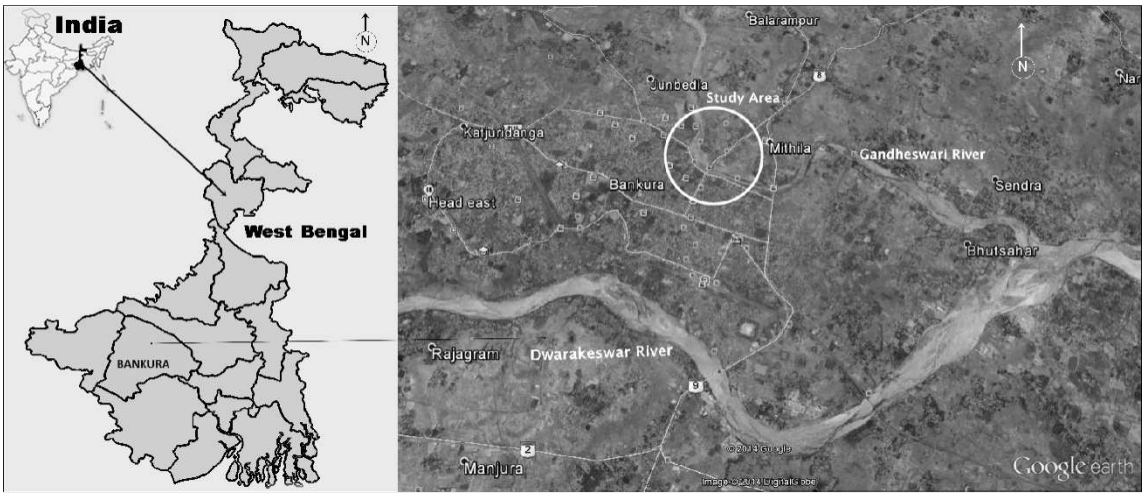


Fig. 1: Map showing the location of study area from Bankura, West Bengal, India

Methodology: A combination of direct search technique [35] and opportunistic sighting methods were applied during the present study (January 2014 to December 2014) to record Odonate diversity and abundance. Observations were made biweekly throughout the year covering each study site at least twice a month involving different habitat types of Odonate colonization. The Odonates were identified using suitable field guides [2, 6-8, 24, 25, 33].

RESULTS AND DISCUSSION

A total of 58 different Odonate species were found to occur in Gandheswari river bank and adjoining fields and cultivated lands. However, there were hint of habitat preference among the Odonates recorded, based on their presence/absence and relative density which has been depicted in Table 1. Out of the 58 Odonates, dragonflies (Anisoptera) represented with 39 species, while damselflies (Zygoptera) contributed with 19 species. The most diverse dragonfly family was Libellulidae (31 species, 23 genera) followed by Gomphidae (4 species, 4 genera) and Aeshnidae (4 species, 3 genera). Damselflies were represented by four different families, the most diverse being Coenagrionidae (13 species, 7 genera) followed by Platycnemididae (3 species, 1 genus), Protoneuridae (2 species, 2 genera) and Calopterygidae (1 species, 1 genus). Various researchers from different parts of India have already reported Libellulidae as the most dominant dragonfly family and the present findings corroborate well with those findings [26, 28, 30]. So far, as the damselflies were concerned Coenagrionidae was recorded as the most dominant family in the present study and this was due to the fact that the members of this family are the largest among Zygopterans [36]. The present study revealed higher diversity of dragonflies (32 species) for open field and cultivated land over Gandheswari River bank (26 species). However, for damselflies exact opposite results were obtained where Gandheswari River bank showed higher diversity (18 species) over open field and cultivated land (12 species). These findings are in conformation with those made by [6, 24], who have reported that aquatic vegetation could favour Zygoptera over Anisoptera. Also, Anisoptara are well known for high dispersal ability [37 – 40], while, Zygoptera with limited dispersal ability [41] were more confined nearer to their breeding places. Ground skimmer (*Diplacodes trivialis*), Green marsh hawk (*Orthetrum sabina*) and Wandering glider (*Pantala flavescens*) were recorded as the most abundant dragonflies occupying both the habitat types all throughout the year except *Pantala flavescens* which was absent during the colder months of the year. While, Blue darner (*Anax immaculiforns*), Parakeet darner (*Gynacantha bayadera*), Deccan bowtail (*Macrogomphus annulatus*), Giant green

clubtail (*Megalogomphus* sp.), Amber-winged marsh glider (*Hydrobasileus croceus*), Asiatic bloodtail (*Lathrecista asiatica*) and Brown dusk hawk (*Zyxomma petiolatum*) were the dragonflies encountered least during the present study. Among damselflies recorded during the present study Pygmy dartlet (*Agriocnemis pygmaea*), Coromandel marsh dart (*Ceriagrion coromandelianum*) and Black marsh dart (*Onychargia atrocyana*) were found to be the most abundant occupying both the habitat types all throughout the year except *Onychargia atrocyana* which was absent during the colder months of the year. Damselflies encountered least in the present study both season and site wise included Milky dartlet (*Agriocnemsis lacteola*), Saffron-faced blue dart (*Pseudagrion rubriceps*), Pied bush dart (*Copera ciliate*) and Coorg bambootail (*Caconeura ramburi*). Overall, monsoon months with heavier rainfalls supported maximum Odonata diversity, while summer months supported intermediate Odonata diversity and colder months resulted in lowest Odonata diversity and these findings corroborate well with those of Dayakrishna and Arya [42]. So far as the conservation status of the Odonata species found during the present study were concerned all the species belonged to the IUCN Least Concern category except Black marsh skimmer (*Indothemis carnatica*) which is categorized as Near Threatened and Coorg bambootail (*Caconeura ramburi*) which falls under Data Deficient category of IUCN Red List of Threatened Species. However, habitat destruction in the form of deforestation, sand lifting from the riverbed and indiscriminate pollution are altogether exerting negative influence on Odonate diversity and these findings corroborate well with findings made by other researchers [43-45].

Table 1: List of dragonfly (Anisoptera) species along with their relative abundance as recorded from Gandeshwari River bank (Site I) and adjoining field and agricultural lands (Site II) during the present study (NR = Not Recorded)

Family	Common name	Scientific name	Site I	Site II
Aeshnidae	Rusty darner	*Anaciaeschna jaspidea*	NR	+ +
	Blue-tailed green darner	*Anax guttatus*	+ + +	+
	Blue darner	*A. immaculiforns*	+	NR
	Parakeet darner	*Gynacantha bayadera*	+	NR
Gomphidae	Common clubtail	*Ictinogomphus rapax*	+ + +	+ +
	Deccan bowtail	*Macrogomphus annulatus*	NR	+
	Giant green clubtail	*Megalogomphus sp.*	+	NR
	Common hooktail	*Paragomphus lineatus*	+ +	+ +
Libellulidae	Trumpet tail	*Acisoma panorpoides*	+ +	+
	Scarlet marsh hawk	*Aethriamantha brevipennis*	+	+ +
	Emarald-flanked marsh hawk	*B. farinosa*	NR	+ + +
	Little blue marsh hawk	*Brachydiplax sobrina*	+ + +	+
	Ditch jewel	*Brachythemis contaminate*	+ + +	+
	Granite ghost	*Bradinopyga geminate*	NR	+
	Emerald-banded skimmer	*Cratilla lineate*	+	+ +
	Ruddy marsh skimmer	*Crocothemis servilia*	+ +	+ +
	Black-tipped ground skimmer	*Diplacodes nebulosa*	+	NR
	Ground skimmer	*D. trivialis*	+ + + +	+ + + +
	Common torrent hawk	*Epophthalmia vittata*	NR	+
	Amber-winged marsh glider	*Hydrobasileus croceus*	+	NR
	Black marsh skimmer	*Indothemis carnatica*	+	NR
	Asiatic bloodtail	*Lathrecista asiatica*	NR	+
	Fulvous-forest skimmer	*Neurothemis fulvia*	NR	+ +
	Pied paddy skimmer	*N. tullia*	NR	+ +
	Blue marsh hawk	*Orthetrum glucum*	+ +	+
	Tricoloured marsh hawk	*O. luzonicum*	NR	+
	Crimson-tailed marsh hawk	*O. pruinosum*	+ +	+ +
	Green marsh hawk	*O. sabina*	+ + + +	+ + + +
	Wandering glider	*Pantala flavescens*	+ + + +	+ + +
	Yellow-tailed ashy skimmer	*Potamarcha congener*	+ +	+
	Rufous marsh glider	*Rhodothemis rufa*	+	+
	Common picture wing	*Rhyothemis variegata*	NR	+ +
	Crimson marsh glider	*Trithemis aurora*	+ +	NR
	Black stream glider	*T. festiva*	+ +	NR
	Long-legged marsh glider	*T. pallidinervis*	+ + +	+
	Coral-tailed cloud wing	*Tholymis tillarga*	NR	+ + +
	Red marsh totter	*Tramea basilaris*	+ + +	+
	Greater crimson glider	*Urothemis signata*	NR	+
	Brown dusk hawk	*Zyxomma petiolatum*	NR	+

Table 2: List of damselfly (Zygoptera) species along with their relative abundance as recorded from Gandeshwari River bank (Site I) and adjoining field and agricultural lands (Site II) during the present study (NR = Not Recorded)

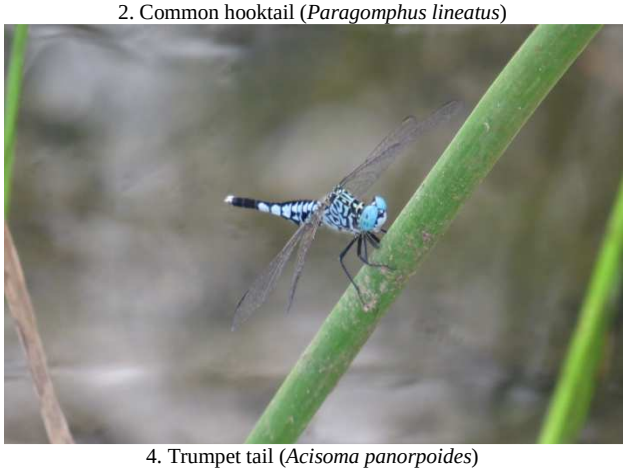
Family	Common name	Scientific name	Site I	Site II
Coenagrionidae	Milky dartlet	*Agriocnemsis lacteola*	+	NR
	Pygmy dartlet	*A. pygmaea*	+ + + +	+ +
	Green-striped slender dartlet	*Aciagrion occidentale*	+ +	+ +
	Orange-tailed marsh dart	*Ceriagrion cerinorube*	+ +	+
	Coromandel marsh dart	*C. coromandelianum*	+ + +	+ + + +
	Rusty marsh dart	*C. olivaceum*	+	+ +
	Azure dartlet	*Enallagma parvum*	+	+ + +
	Golden dartlet	*Ischnura aurora*	+ +	+
	Senegal golden dartlet	*I. senegalensis*	+	+ +
	Black marsh dart	*Onychargia atrocyana*	+ + + +	+ + +
	Three lined dart	*Pseudagrion decorum*	+ +	NR
	Blue dart	*P. microcephalum*	+ + +	NR
	Saffron-faced blue dart	*P. rubriceps*	NR	+
Platycnemididae	Pied bush dart	*Copera ciliata*	+	NR
	Yellow bush dart	*C. marginipes*	+	++
	Blue bush dart	*C. vittata*	+	+
Protoneuridae	Coorgbambootail	*Caconeurar amburi*	+	NR
	Black-winged Bambootail	*Disparoneura quadrimaculata*	++	NR
Calopterygidae	Stream glory	*Neurobasis chinensis*	+	NR

Images 1 – 12: Selected dragonfly (Anisoptera) species as recorded during the present study

1.Giant green clubtail (*Megalogomphus* sp)

2. Common hooktail (*Paragomphus lineatus*)

3. Blue-tailed green darner (*Anax guttatus*)



4. Trumpet tail (*Acisoma panorpoides*)

5. Fulvous forest skimmer (*Neurothemis fulvia*)

6. Black-tipped ground skimmer (*Diplacodes nebulosa*)

7. Crimson marsh glider (*Trithemis aurora*)

8. Black stream glider (*Trithemis festiva*)

9. Common torrent hawk (*Epophthalmia vittata*)

10. Common picture wing (*Rhyothemis variegate*)

11. Tricoloured marsh hawk (*Orthetrum luzonicum*)

12. Scarlet marsh hawk (*Aethriamanta brevipennis*)

Images 13 – 18: Selected damselfly (Zygoptera) species as recorded during the present study

13. Black-winged bamboo-tail (*Disparoneura quadrimaculata*)

14. Coorgbambootail (*Caconeura ramburi*)

15. Pied bush dart (*Copera ciliate*)

16. Saffron–faced blue dart (*Pseudagrion rubriceps*)

17. Senegal golden dartlet (*Ischnura senegalensis*)

18. Black marsh dart (*Onychargia atrocyana*)

CONCLUSION

The present study was the first attempt to make a checklist of Odonates and look for their abundance pattern from Gandheswari River bank and adjoining region from Bankura and further investigations are needed to portray a comprehensive picture of Odonates diversity from this region. Findings made during the present study indicated that Odonate diversity of this region constitutes a valuable natural resource in ecological, aesthetic, scientific and educational terms and its conservation and management are critical to the interests of humankind itself. However, this region might witness a rapid decrease in Odonata diversity in coming years due to the deteriorating habitat conditions and immense anthropogenic pressure. Increasing pollution in waterbodies, conversion of land use pattern along with increasing urbanization is causing fragmentation, degradation and loss of habitat types, affecting biodiversity and needs serious attention from the concerned authorities most urgently. To this, all concerned, conservationists, government and nongovernmental agencies have a major role to play in creating public awareness

and support to protect and conserve the Odonata populations from Gandheswari River bank, adjoining areas and beyond.

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