ODONATA FAUNA IN ADJOINING COASTAL AREAS OF PURBA MEDINIPUR DISTRICT, WEST BENGAL, INDIA

Arajush Payra* and Ashish D. Tiple**

* Department of Wildlife and Biodiversity Conservation, North Orissa University, Takatpur, Baripada-757003, Odisha, INDIA. E-mail: arajushpayra@gmail.com
** Department of Zoology, Vidyabharti College, Seloo, Wardha, Maharashtra 442104, INDIA.

[Payra, A. & Tiple, A. D. 2019. Odonata fauna in adjoining coastal areas of Purba Medinipur District, West Bengal, India. Munis Entomology & Zoology, 14 (2): 358-367**]**

ABSTRACT: The Present study was carried out to reveal the odonate diversity in adjoining coastal areas of Purba Medinipur District, West Bengal, India. Study was carried out from January 2014 to January 2018. During the study period a total of 49 species belonging to 35 genera and 7 families were recorded, including addition of 24 species representing 20 genera and 6 families for the district. The maximum number of odonates were found in Libellulidae (n=27), followed by Coenagrionidae (n=12 species), Aeshnidae (n=4 species), Lestidae (n=2 species), Platycnemididae (n=2 species), Gomphidae (n=1 species) and Macromiidae (n=1 species). Among the 4 selected study sites, the highest number of odonate species was observed in S3 (n= 39) and lowest in S1 (n= 21). Out of the 49 Odonates recorded from the district, 48 species come under the IUCN Red List of Threatened Category. Among them 45 species come under Least Concern (LC) Category, three species under Data Deficient (DD) and One species Not evaluated.

KEY WORDS: Dragonfly, Damselfly, Diversity, Coastal area, Purba Medinipur

In biological studies insects occupy a vital position due to their rich diversity and significant role in ecological courses (Hölldobler & Wilson, 1990; Groom-bridge, 1992). Among the insect's, order Odonata (dragonflies and damselflies) regarded as ideal taxonomic group for the investigation of the environmental health and climate change (Subramanian et al., 2008; Hassall & Thomoson, 2008). Odonates can be found in almost all kinds of freshwater habitats, from permanent running waters, lakes to small temporary rain pools. Their amphibious nature makes them well studied group of insects for assessing environmental changes in both the long term and short-term monitoring (Corbet, 1999). Odonata larvae reside in aquatic habitats, require very specific environmental condition to survive as they have a narrow range for temperature, oxygen levels, vegetation cover, microhabitats and water quality (Clausnitzer et al., 2009). While adult odonates shows high sensitivity with respects to the structure of their terrestrial habitats (Sheldon & Walker, 1998; Orr, 2006). As a consequence, odonates play vital role to bridge multiple trophic levels and act as a major linkage between freshwater and terrestrial food webs (Burkle et al., 2012; Hall et al., 2014).

Globally 6256 species in 686 genera of odonates have been reported, of which India known to represent 487 species, 27 Subspecies in 152 genera under 18 families. (Subramanian & Babu, 2017). Studies on the Odonata fauna of Southern parts of West Bengal were mainly carried out by Selys (1891); Laidlaw (1914); Fraser (1933, 1934, 1936); Ram et al. (1982); Srivastava & Das (1987); Prasad & Ghosh (1988); Mitra (1983, 2002); Srivastava & Sinha (1993); Gupta et al. (1995); Dawn (2014); Jana et al. (2014); Payra & Tiple (2016); Payra et al. (2017); Dwari et al. (2017). However, knowledge on the Odonata fauna of Purba Medinipur District is very fewer. Henceforth, to provide baseline data and to upgrade the

known Odonata fauna, present study was carried out in adjoining coastal areas of Purba Medinipur district.

STUDY AREA

Purba Medinipur is the Southernmost district of West Bengal, is part of the Lower Gangetic Plain and Eastern Coastal Plains.With an area of about 4151.64 km², the district is surrounded by Bay of Bengal in the south and the state Odisha is at the Southwest border. Hooghly River and South 24 Parganas to the East and Howrah to the North-East, and at its Northwest border placed Paschim Medinipur. Except the Coastal Plains of the Southern part of the district, rest of the area almost entirely flat plains. The elevation of the district lies within 10 m a.s.l.

The climate of this area is tropical. During summer days (March-June) temperature of this region ranges from 30⁰-38⁰ C and in winter (November-February) temperature ranges from 15⁰-25⁰ C. Average annual rainfall is about 1700 mm. The coastal tract of Purba Medinipur is about 60 km in length, representing 27% coastal environment of West Bengal (Chakraborty, 2010).

MATERIALS AND METHODS

Opportunistic sampling and photo documentation were conducted in selected areas of Purba Medinipur district. Four adjacent coastal areas were sampled, viz., Digha- Site 1, Shankarpur- Site 2, Ramnagar- Site 3 and Junput- Site 4 (Details concerning all the selected four sites were presented in Table 1). Samplings were carried out from January 2014 to January 2017. Most of the sampling were done between 10 am to 2 pm, when odonates activities found in top most to control their body temperature in sunlight (Subramanian, 2009; Koli et al., 2014). Identification of the Odonates was primarily made directly in the field. In critical condition specimens were collected only with handheld aerial sweep nets and subsequently released without harm. Photographs of the specimens were taken in the field from various angles and identified with the help of field identification guide (Andrew et al., 2008; Nair, 2011; Subramanian, 2009). Those specimens are difficult to identify in the field, were collected and preserved in 70% alcohol or Acetone and carried them to the laboratory for further identification with the help of taxonomic keys (Fraser 1933, 1934, 1936; Mitra 2002). Systematic arrangement and Scientific name of the species follows Subramanian & Babu (2017).

RESULTS

A total of 49 species belonging to 35 genera and 7 families viz. Lestidae, Platycnemididae, Coenagrionidae (under suborder Zygoptera) and Aeshnidae, Gomphidae, Macromiidae, Libellulidae (under suborder Anisozygoptera) were recorded (Table 2). The maximum number of odonates were found in Libellulidae (n=27), followed by Coenagrionidae (n=12 species), Aeshnidae (n=4 species), Lestidae (n=2 species), Platycnemididae (n=2 species), Gomphidae (n=1 species) and Macromiidae (n=1 species).

Among which 24 species viz. *Lestes umbrinus* Selys,1891; *Copera marginipes* (Rambur, 1842); *Agriocnemis kalinga* Nair & Subramanian, 2015; *Onychargia atrocyana* (Selys, 1865); *Paracercion malayanum* (Selys, 1876); *Pseudagrion microcephalum* (Rambur, 1842); *Pseudagrion rubriceps* Selys, 1876; *Anaciaeschna jaspidea* (Burmeister, 1839); *Anax guttatus* (Burmeister, 1839);

Gynacantha dravida Lieftinck,1960; *Epophthalmia vittata* Burmeister,1839; *Brachydiplax chalybea* Brauer, 1868; *Brachydiplax farinosa* Krüger, 1902; *Bradinopyga geminata* (Rambur, 1842); *Lathrecista asiatica* (Fabricius, 1798); *Macrodiplax cora* (Brauer,1867); *Neurothemis fulvia* (Drury, 1773); *Neurothemis intermedia* (Rambur, 1842); *Orthetrum pruinosum* (Burmeister,1839); *Rhodothemis rufa* (Rambur,1842); *Tramea basilaris* (Palisot de Beauvois, 1805); *Tramea limbata* (Desjardins,1832) and *Zyxomma petiolatum* Rambur, 1842 representing 20 genera were newly reported for the district.

Out of the 4 selected study sites, the highest number of Odonate species (39) was recorded in S3. S2 ranked second with 34 species. Species richness was comparatively low in the remaining Study sites: S4 with 26 species and S1 with 22 species. (Table 3). The result of high species richness in the particular study sites (S3 and S2) may be due to the intensity and duration of longer surveys, rather than true ecological species richness. During the study period we also found, some of the species were mainly restricted to particular sites, species like, *Mortonagrion aborense* (Laidlaw, 1914); *Anaciaeschna jaspidea* (Burmeister, 1839); *Gynacantha khasiaca* MacLachlan,1896 were only recorded in S3. *Lestes umbrinus* Selys, 1891 and *Lestes viridulus* Rambur, 1842 only found in S4, *Onychargia atrocyana* (Selys, 1865), *Paracercion calamorum* (Ris,1916) were only found in S2.

Amid the 49 odonates, recorded from Purba Medinipur district 48 species comes under the IUCN Red List of Threatened Category. Among them 45 species come under Least Concern (LC) Category, three species under Data Deficient (DD) and One species is Not evaluated.

DISCUSSION

In Purba Medinipur district first faunistic study on odonates was carried out by Prasad & Ghosh (1988) while conducting the survey of the Estuarine Odonata of East India and recorded 22 species of odonates belonging to 19 genera and 6 families. Later Jana et al. (2014), reported 13 species of Odonates belonging to 12 genera 3 families from eight contrasting coastal areas of the District. Respectively Payra & Tiple (2016) and Payra et al. (2017) reported *Mortonagrion aborense* Laidlaw, 1914 and *Gynacantha khasiaca* Maclachlan, 1896 for the first time from district as well as from southern parts of West Bengal. As a result, during the present study 49 species were recorded and with the addition of 24 species the number of known odonates from the Purba Medinipur is increased to a total of 50 species (33 in the suborder Anisoptera and 17 in the suborder Zygoptera). Only *Agriocnemis lacteola* Selys, 1877 has not been recorded in the present study from our respective study area. This species previously been reported by Prasad & Ghosh (1988) from Nandakumar.

Expansion of urbanization in such adjacent coastal areas is a matter of concern. As expansion of urbanization causing loss of natural and semi natural habitats of Odonates, as well as the residual habitat quality may have adversely affected by various forms of pollutants (Tiple et al., 2013; Tiple & Koparde, 2015). Consequently, the necessity of increase the number of surveys from this area of West Bengal, should be emphasized, considering that coastal habitats are in the state of fragmentation and degradation. Result of the present study shows, adjoining coastal areas seems to have rich odonate diversity (49 species) and highlight the significance of the adjoining Coastal areas for Odonates conservation in southern parts of West Bengal, India. The study also provides

baseline information for future quantitative work on the diversity of odonates in this particular study area.

ACKNOWLEDGEMENTS

First author is very much thankful to his family and friends, for their continuous support.

LITERATURE CITED

Burkle, L. A., Mihaljevic, J. R. & Smith, K. G. 2012. Effects of an invasive plant transcend ecosystem boundaries through a dragonfly-mediated trophic pathway. Oecologia, 170 (4): 1045-1052.
Chakraborty, S. 2010. Coastal environment of Midnapore, West Bengal: Potential threats and Management. Journal of Coastal Environment, 1 (1): 27-40.
Clausnitzer, V., Kalkman, V. J., Ram, M., Collen, B., Baillie, J. E., Bedjanič, M., ... & Karube, H. 2009. Odonata enter the biodiversity crisis debate: the first global assessment of an insect group. Biological Conservation, 142 (8): 1864-1869.
Corbet, P. S. 1999. Dragonflies: Behaviour and Ecology of Odonata. Harley, Colchester, 829 pp.
Dawn, P. 2014. Taxonomic study of Odonata [Insecta] in Kolkata and surroundings, West Bengal, India. Journal of Entomology and Zoology Studies, 2 (3): 147-152.
Dwari, S., Chowdhury, S. & Mondal, A. K. 2017. First report of Lestes elatus (Hagen in Selys, 1862) from West Bengal, India. Journal on New Biological Reports, 6 (1): 47-51.
Fraser, F. C. 1933. Fauna of British India Odonata 1. Taylor and Francis Ltd. London, 423 pp.
Fraser, F. C. 1934. Fauna of British India Odonata 2. Taylor and Francis Ltd. London, 398 pp.
Fraser, F. C. 1936. Fauna of British India Odonata 3. Taylor and Francis Ltd. London, 461 pp.
Groombridge, B. (ed.) 1992. Global biodiversity. Status of the earth's living resources. Chapman & Hall, London.
Gupta, I. J., De, M. L. & Mitra, T. R. 1995. Conspectus of Odonata Fauna of Calcutta, India. Records of Zoological Survey of India, 95 (1-2): 107-121.
Hall, A. M., McCauley, S. J. & Fortin, M. J. 2015. Recreational boating, landscape configuration, and local habitat structure as drivers of odonate community composition in an island setting. Insect Conservation and Diversity, 8: 31-42.
Hassall, C. & Thompson, D. J. 2008. The effects of environmental warming on Odonata: a review. International Journal of Odonatology, 11 (2): 131-153.
Hölldobler, B., & Wilson, E. O. 2009. The superorganism: the beauty, elegance, and strangeness of insect societies. WW Norton & Company.
Jana, D., Tamili, K. D. & Chakroborty, S. K. 2014. Diversity of dragonflies (Insecta: Odonata) in contrasting coastal environment of Midnapore (East), West Bengal, India Journal of Radix International Educational and Research Consortium, 3 (4): 1-11.
Koli, V. K., Bhatnagar, C. & Shekhawat, D. S. 2014. Diversity and Species Composition of Odonates in Southern Rajasthan, India. Proceedings of the Zoological Society, 68: 202-211.
Mitra, T. R. 1983. A List of the Odonata of Calcutta. Entomologist's Monthly Magazine, 119: 29-31.
Mitra, T. R. 2002. Geographical distribution of Odonata (Insecta) of Eastern India. Memoirs of the Zoological Survey of India, 19 (1): 1-208.
Nair, M. V. 2011. Dragonflies & Damselflies of Orissa and Eastern India. Wildlife Organization, Forest & Environment Department, Government of Orissa, 252 pp.
Orr, A. G. 2006. Odonata in Bornean tropical rain forest formations: diversity, endemicity and implications for conservation management. Forest and Dragonflies. Pensoft Publishers, Sofia.
Payra, A. & Tiple, A. D. 2016. Notes on the occurrence of Mortonagrion aborense Laidlaw, 1914 (Odonata: Coenagrionidae) from lower West Bengal, India. Journal of Threatened Taxa, 8 (7): 9038-9041.
Payra, A., Das, G. N., Pal, A., Patra, D. & Tiple, A. D. 2017. New locality records of a rare Dragonfly Gynacantha khasiaca Maclachlan, 1896 (Odonata Aeshnidae) from India. Biodiversity Journal, 8 (1): 27-32.
Prasad, M. & Ghosh, S. K. 1988. A contribution on the Estuarine Odonata of East India. Records of Zoological Survey of India, 85: 197-216.
Ram, R., Srivastava, V. D. & Prasad, M. 1982. Odonata (Insecta) Fauna of Calcutta and surroundings. Records of Zoological Survey of India, 80: 169-196.
Selys, L. 1891. Odonates in 'Viaggio Di Leonardo Fea in Birmania e Regional Viccine. Annali del Museo civico di storianaturale Giacomo Doria, 2 (10): 433-518.
Sheldon, F. & Walker, K. F. 1998. Spatial distribution of littoral invertebrates in the lower Murray–Darling River system, Australia. Marine and Freshwater Research, 49 (2): 171-182.
Srivastava, V. K. & Das, S. 1987. Insecta: Odonata, fauna of Orissa. State Fauna Series, Zoological Survey of India, Kolkata, 1: 135-159.
Srivastava, V. K. & Sinha, C. 1993. Insecta: Odonata fauna of West Bengal, State Fauna Series. Zoological Survey of India, Kolkata, 4: 51-168.
Subramanian K. A., Ali, S. & Ramchandra, T. V. 2008. Odonata as indicators of riparian ecosystem health a case study from south western Karnataka, India. Fraseria (NS), 7: 83-95.
Subramanian, K. A. 2009. Dragonflies and Damselflies of Peninsular India - A Field Guide. Vigyan Prasar, Noida, India, 168 pp.
Subramanian, K. A. & Babu, R. 2017. Checklist of Odonata (Insecta) of India. Version 3.0. www.zsi.gov.in. 1-54 pp.
Tiple, A. D. & Koparde, P. 2015. Odonata of Maharashtra, India with notes on species distribution. Journal of Insect Science, 15: 1-10.
Tiple A. D., Andrew, R. J., Subramanian, K. A. & Talmale, S. S. 2013. Odonata of Vidarbha region, Maharashtra state, central India. Odonatologica, 42: 237–245.

Table 1. Selected study sites with habitat description.

Sl.No.	Name	Latitude	Longitude	Altitude	Habitat types
1.	Digha	21°37'33.54"N	87°30'28.21"E	7m	Coastal Forest, Permanent and temporary water bodies, Agriculture fields
2.	Shankarpur	21°38'24.43"N	87°34'43.35"E	10m	Coastal Forest, Permanent and temporary water bodies, Agriculture fields, Aquaculture lands, Mangroves
3.	Ramnagar	21°40'48.75"N	87°33'33.24"E	4m	Agriculture field, Permanent and temporary water bodies, Village woodlands
4.	Juneput	21°43'29.85"N	87°48'43.53"E	7m	Coastal Forest, Permanent and temporary water bodies, Agriculture fields, Aquaculture lands, Mangroves

Table 2. Checklist of Odonata fauna (Dragonflies and damselflies) in Purba Medinipur District.

Sl. No	**Scientific Name**	**Study Sites (Present study)**	**IUCN STATUS**	**Previous Studies in Purba Medinipur**
Suborder Zygoptera Selys, 1854				
Family: LestidaeCalvert, 1907				
1.	*Lestes umbrinus* Selys,1891	S4	DD	*
2.	*Lestes viridulus* Rambur, 1842	S4	LC	Prasad & Ghosh (1988)
Family: Platycnemididae Yakobson & Bainchi, 1905				
3.	*Pseudocopera ciliata* (Selys, 1863)	S2, S3	LC	Prasad & Ghosh (1988)
4.	*Copera marginipes* (Rambur, 1842)	S1, S2, S3, S4	LC	*
Family: Coenagrionidae Kirby, 1890				
5.	*Agriocnemis pygmaea* (Rambur, 1842)	S1, S2, S3, S4	LC	Prasad & Ghosh (1988)
6.	*Agriocnemis kalinga* Nair and Subramanian, 2015	S3, S4	NE	*
7.	*Agriocnemis lacteola* Selys, 1877			Prasad & Ghosh (1988)
8.	*Ceriagrion cerinorubellum*	S1, S2, S3,	LC	Prasad & Ghosh

	(Brauer, 1865)	S4		(1988), Jana et al. (2014)
9.	*Ceriagrion coromandelianum* (Fabricius, 1798)	S1, S2, S3, S4	LC	Prasad & Ghosh (1988), Jana et al. (2014)
10.	*Ischnura aurora* (Brauer, 1865)	S1, S2, S3, S4	LC	*
11.	*Ischnura senegalensis* (Rambur, 1842)	S1, S2, S3, S4	LC	Prasad & Ghosh (1988), Jana et al. (2014)
12.	*Mortonagrion aborense* (Laidlaw, 1914)	S3	LC	Payra & Tiple (2016)
13.	*Onychargia atrocyana* (Selys, 1865)	S2	LC	*
14.	*Paracercion malayanum* (Selys, 1876)	S2	LC	*
15.	*Pseudagrion decorum* (Rambur, 1842)	S1, S2, S3, S4	LC	Prasad & Ghosh (1988)
16.	*Pseudagrion microcephalum* (Rambur, 1842)	S1, S2, S3, S4	LC	*
17.	*Pseudagrion rubriceps* Selys, 1876	S1, S2, S3, S4	LC	*
Suborder Anisozygoptera Hanlirsch, 1906				
Family: Aeshnidae Leach, 1815				
18.	*Anaciaeschna jaspidea* (Burmeister, 1839)	S3	LC	*
19.	*Anax guttatus* (Burmeister, 1839)	S3, S4	LC	*
20.	*Gynacantha dravida* Lieftinck,1960	S2	DD	*
21.	*Gynacantha khasiaca* MacLachlan,1896	S3	DD	Payra et al. (2017)
Family: Gomphidae Rambur, 1842				
22.	*Ictinogomphus rapax* (Rambur, 1842)	S1, S2, S3, S4	LC	Jana et al. (2014)
Family: MacromiidaeNeedham, 1903				
23.	*Epophthalmia vittata* Burmeister,1839	S3	LC	*
Family: Libellulidae Leach, 1815				
24.	*Acisoma panorpoides* Rambur, 1842	S1, S2, S3, S4	LC	Prasad & Ghosh (1988)
25.	*Aethriamanta brevipennis* (Rambur, 1842)	S3	LC	Prasad & Ghosh (1988)
26.	*Brachydiplax chalybea* Brauer, 1868	S2, S3	LC	*
27.	*Brachydiplax farinosa* Krüger, 1902	S3	LC	*
28.	*Brachydiplax sobrina* (Rambur, 1842)	S2, S3, S4	LC	Prasad & Ghosh (1988), Jana et al. (2014)
29.	*Brachythemis contaminata* (Fabricius,1793)	S1, S2, S3, S4	LC	Prasad & Ghosh (1988), Jana et al. (2014)
30.	*Bradinopyga geminata* (Rambur, 1842)	S3	LC	*

31.	*Crocothemis servilia* (Drury, 1770)	S1, S2, S3, S4	LC	Prasad & Ghosh (1988), Jana et al. (2014)
32.	*Diplacodes nebulosa* (Fabricius, 1793)	S2, S3	LC	Prasad & Ghosh (1988)
33.	*Diplacode strivialis* (Rambur,1842)	S1, S2, S3, S4	LC	Prasad & Ghosh (1988), Jana et al. (2014)
34.	*Lathrecista asiatica* (Fabricius, 1798)	S2	LC	*
35.	*Macrodiplax cora* (Brauer,1867)	S1, S2	LC	*
36.	*Neurothemis fulvia* (Drury, 1773)	S1, S2, S3, S4	LC	*
37.	*Neurothemis intermedia* (Rambur, 1842)	S3, S4	LC	*
38.	*Neurothemis tullia* (Drury, 1773)	S3	LC	Prasad & Ghosh (1988)
39.	*Orthetrum sabina* (Drury, 1770)	S1, S2, S3, S4	LC	Prasad & Ghosh (1988), Jana et al. (2014)
40.	*Orthetrum pruinosum* (Burmeister,1839)	S4	LC	*
41.	*Pantala flavescens* (Fabricius, 1798)	S1, S2, S3, S4	LC	Prasad & Ghosh (1988), Jana et al. (2014)
42.	*Potamarcha congener* (Rambur, 1842)	S1, S2, S3, S4	LC	Prasad & Ghosh (1988)
43.	*Rhodothemis rufa* (Rambur,1842)	S2, S3	LC	*
44.	*Rhyothemis variegata* (Linnaeus, 1763)	S1, S2, S3, S4	LC	Prasad & Ghosh (1988), Jana et al. (2014)
45.	*Tholymis tillarga* (Fabricius, 1798)	S2, S3	LC	Jana et al. (2014)
46.	*Tramea basilaris* (Palisot de Beauvois, 1805)	S2	LC	*
47.	*Tramea limbata* (Desjardins,1832)	S2	LC	*
48.	*Trithemis pallidinervis* (Kirby, 1889)	S1, S2, S3, S4	LC	Prasad & Ghosh (1988)
49.	*Urothemis signata* (Rambur, 1842)	S2, S3	LC	Prasad & Ghosh (1988), Jana et al. (2014)
50.	*Zyxomma petiolatum* Rambur, 1842	S1, S2, S3	LC	*

*= first time reported from district

Fig. 1. *Lestes viridulus* Rambur

Fig. 2. *Lestes umbrinus* Selys

Fig. 3. *Copera marginipes* (Rambur)

Fig. 4. *Pseudagrion pruinosum* (Burmeister)

Fig. 5. *Agriocnemis kalinga* Nair & Subram.

Fig. 6. *Paracercion malayanum* (Selys)

Fig. 7. *Mortonagrion aborense* (Laidlaw)

Fig. 8. *Anax guttatus* (Burmeister)

Fig. 9. *Anaciaeschna jaspidea* (Burmeister)

Fig. 10. *Gynacantha dravida* Lieftinck

Fig. 11. *Gynacantha khasiaca* McLachlan

Fig 12. *Ictinogomphus rapax* (Rambur)

Fig. 13. *Trithemis pallidinervis* (Kirby)

Fig. 14. *Brachydiplax farinosa* Krüger

Fig. 15. *Diplacodes nebulosa* (Fabricius)

Fig. 16. *Lathrecista asiatica* (Fabricius)

Fig. 17. *Neurothemis fulvia* (Drury)

Fig. 18. *Macrodiplax cora* (Brauer)

Fig. 19. *Rhodothemis rufa* (Rambur)

Fig. 20.*Tramea basilaris (*Palisot de Beauvois)

Fig. 21. *Tramea limbata* (Desjardins)

Fig. 22. *Neurothemis intermedia* (Rambur)