Life Science Informatics Publications
**Research Journal of Life Sciences, Bioinformatics,
Pharmaceutical and Chemical Sciences**

Journal Home page <http://www.rjlbpcs.com/>

Original Research Article

DOI: 10.26479/2019.0506.02

**FIRST EXPLORATION ON THE INSECT FAUNAL DIVERSITY OF
HALIDAY WILDLIFE SANCTUARY, INDIAN SUNDARBAN**

Bulganin Mitra^{1*}, Balaram Panja², Udipta Chakraborti³, Sankarsan Roy⁴, Olive Biswas⁵

1. Ramkrishna Mission Vivekananda Centenary College, Rahara, Kolkata.
2. ADFO, Department of Forest (Govt. of WB), East Midnapore, West Bengal.
3. Department of Zoology, Kalyani University, Nadia, West Bengal.
4. O/o CMOH, Zilla Swasthya Bhawan, Purulia, West Bengal.
5. O/o CMOH, Bangur Hospital, South 24 Parganas, West Bengal.

ABSTRACT: Present paper reports 19 species of insects from different orders like Diptera (6 species), Hymenoptera (5 species), Lepidoptera (3 species), Odonata (4 species) and Hemiptera (1 species) from a very small island namely Haliday island (Local name: Zinjira Dwip) of Sundarban Biosphere Reserve, India. **Keywords:** Insect Diversity, Haliday WLS, Indian Sundarban.

Article History: Received: March 23, 2019; Revised: September 20, 2019; Accepted: November 08, 2019.

Corresponding Author: Dr. Bulganin Mitra*

Emeritus Professor, Ramkrishna Mission Vivekananda Centenary College, Rahara, Kolkata.

E-mail Address: bulganinmitra@gmail.com

1. INTRODUCTION

Presently the world's largest intact halophytic mangrove forest is the Sundarban, a UNESCO World Heritage Site that lies in India and Bangladesh in the Ganga and Brahmaputra deltaic zone. After separation of Bengal, two-thirds of the Sundarban falls in Bangladesh, while the Indian Sundarban measures about 9,630 square kilometres area between 21°40'04"N and 22°09'21"N latitude, and 88°01'56"E and 89°06'01"E longitude. This unique habitat is harbored with about 90 species of mangrove plants from which 24 species are "True mangroves", 31 species are "Back mangroves" and 35 species are "Associated mangrove species".[1] This mangrove forest provide shelter to faunal wealth of over 2626 species, of which many belongs to endangered category internationally.[2] The Indian Sundarban, a conglomerate of 104 Islands has an exclusive 56 islands under dense forest

cover without any human habitation. At present, there are four wildlife sanctuaries in Indian Sundarban of which Haliday Island wildlife sanctuary is the smallest one (Table.1). The Haliday island is a transitional ecotone which supports an unique diversity of flora and fauna, located on the confluence of Matla and Bay of Bengal which covers an area of 5.95 sq km. Major contributions on insect faunal diversity were done by taxonomic experts of various insect groups.[3-32] Altogether, 753 species under 506 genera of 129 families belonging to 12 orders of insect are reported from Sundarban Biosphere Reserve.[32] Unfortunately, nothing has been known about the insect faunal diversity from this fragile wildlife sanctuary since its establishment in the year 1976. Present communication reports 19 species under 5 orders of insects for the first time from this small sanctuary of Indian Sundarban.

Table 1: Wildlife sanctuaries of Indian Sundarban

Sl.No	Name	Area (km ²)	Established on	District
1.	Haliday Island	5.95	1976	South 24-Paraganas
2.	Lothian Island	38	1976	South 24-Paraganas
3.	Sajnakhali	362.4	1976	South 24-Paraganas
4.	West Sundarban	556.45	2013	South 24-Paraganas

Source – ENVIS Centre on Wildlife & Protected Areas

Hosted by Wildlife Institute of India, Dehradun (Updated- July 5, 2017)

Sponsored by Ministry of Environment, Forests & Climate Change, Govt. of India

http://wiienviis.nic.in/Database/WestBengal_7842.aspx

2. MATERIALS AND METHODS

a. Study area

Haliday Island was declared as a wildlife sanctuary by the department of Forests, Government of West Bengal Notification No 5388 for dated 24th June 1976. The sanctuary is located in between the latitude 21° 0' - 21° 21' N and 88° 0' – 88° 58' E and bio geographic zone 8B.

b. Methodology

The study was conducted during 2015–2016 in course of insect faunal survey under the project 'Role of Insect Pollinators on the Conservation of major mangrove species in Sundarban Islands, West Bengal' funded by Ministry of Environment, Forest and Climate Change, Government of India. All the lepidopteran and odonates fauna were identified on the basis of field observation and photographic documentation. Other specimens were identified by the help of experts of Zoological Survey of India, Kolkata.

c. Physiography

The Haliday Island is within the group of Sundarban Islands and facing towards the sea and the landmass is formed due to deposition of silt brought down by rivers Ganga and Brahmaputra from Himalayas with their network of tributaries. The soil is alkaline due to presence of sodium chloride in excess and can be called sodium clay. Consequently the soil organisms which decompose the forest litter and increase the fertility of the soil are scanty, so, the litter takes a considerable time to decompose. Moreover, the soil does not get much litter as the fallen leaves and debris are washed away by daily floods. For these reasons, the soil is very poor being solely dependent on deposits of fresh silt. The altitude is approximately 4.5 meter above mean sea level, very gentle and mostly flat. It is evident that Haliday Island is the product of tidal estuary. The portion of island area is inundated for many days for the high tides and ebb tides, which occurs twice a day. Salinity of this region is highly variable due to seasonal and tidal changes in the mixing ratios of inflowing freshwater with the seawater.[33]

d. Vegetation

The natural vegetation is consisting of mainly Goran (*Ceriops spp.*), Genwa (*Excoecaria agallocha*), Baine (*Avicennia marina*, *A. alba*, *A. officinalis*), Tora (*Aegialitis rotundifolia*), Garjan (*Rhizophora spp.*), Khalsi (*Aegiceras corniculatum*), Hental (*Phoenix spp.*) and Keora (*Sonneratia spp.*). There is patch of Ooloo grass (*Imperata cylindrica*) in the Haliday Island. Hental is only found on the eastern part while in the peripheral region of the island harbors taller trees and having average height of 450 cm and the inner region of the island harbors dense forests of Tora plants with average height 125 cm.

Fig. 1: Map of the Study location: Haliday island

Fig. 2: Haliday island, Indian Sundarban.

3. RESULTS AND DISCUSSION

Present communication reports 19 species belonging to 18 genera under 10 families of 5 orders of insects from this wildlife sanctuary for the first time. Of them, order Diptera shares maximum number of species (6), followed by Hymenoptera (5), Odonata (4), Lepidoptera (3) and Hemiptera (1) (Table.2). Diversity of insects does not mean the only number of species found from that particular ecosystem, moreover it focuses the surrounding environment that supports the particular species to inhabit there and to complete their life-cycle within it. Therefore, it is mandatory to give attention not only on the species diversity but also on the functional roles of these tiny insects in that particular ecosystem. Member of dipteran families like Syrphidae, Calliphoridae, Muscidae were frequent in flowers and one can easily observe these members to pollinate different flowers. [34] Sometimes the male mosquitoes (Culicidae) have also been observed as nectar feeder as they need energy for reproduction. Although mutualistic relations between ants and flowering plants is wide spread. Generally, ants are considered as nectar robbers, but they play major role in protecting plants from the herbivorous insects. Presence of formicids thus may control the phytophagous insects of this island. The other hymenopteran insects, *Apis (Megapis) dorsata* is a major pollinator of some mangrove plants in Indian part of Sundarban.[35] Besides this, butterflies are also help in pollination. Mani and Saravanan stated that butterflies are important pollinators of Asteraceae and represent nearly 75% of all visitors.[36] Only one species of family Lygaeidae of the order Hemiptera is found from this island. Majer et al. stated that the herbivorous order Hemiptera is potentially an important indicator group due to their role in nutrient cycling.[37] Odonates are considered as beneficial insects because their larvae (aquatic) and adults (terrestrial) are predators. Thus, assist in control of insect pest populations.[38]

Table 2: List of the insect fauna found in Haliday Island Wildlife Sanctuary

Sl. No.	Name of the Species	Family	Order
1	<i>Tabanus (Tabanus) striatus</i> Fabricius, 1787	Tabanidae	Diptera
2	<i>Chrysomya megacephala</i> (Fabricius, 1794)	Calliphoridae	Diptera
3	<i>Chrysomya rufifacies</i> (Macquart, 1843)	Calliphoridae	Diptera
4	<i>Stomorhina discolor</i> (Fabricius, 1794)	Rhiniidae	Diptera
5	<i>Anopheles (Cellia) annularis</i> Van der Wulp, 1884	Culicidae	Diptera
6	<i>Episyrphus (Episyrphus) balteatus</i> (De Geer, 1776)	Syrphidae	Diptera
7	<i>Camponotus compressus</i> (Fabricius, 1787)	Formicidae	Hymenoptera
8	<i>Oecophylla smaragdina</i> Fabricius, 1775	Formicidae	Hymenoptera
9	<i>Tetraponera rufonigra</i> (Jerdon, 1851)	Formicidae	Hymenoptera
10	<i>Paratrechina longicornis</i> (Latreille, 1802)	Formicidae	Hymenoptera
11	<i>Apis (Megapis) dorsata</i> Fabricius, 1787	Apidae	Hymenoptera
12	<i>Spilostethus hospes</i> (Fabricius, 1794)	Lygaeidae	Hemiptera
13	<i>Melanitis leda</i> Linnaeus, 1758	Nymphalidae	Lepidoptera
14	<i>Euploea core</i> (Cramer, 1780)	Nymphalidae	Lepidoptera
15	<i>Mycalesis perseus</i> Fabricius, 1775	Nymphalidae	Lepidoptera
16	<i>Orthetrum sabina sabina</i> (Drury, 1770)	Libellulidae	Odonata
17	<i>Crocothemis servilia servilia</i> (Drury, 1770)	Libellulidae	Odonata
18	<i>Rhyothemis variegata variegata</i> (Linnaeus, 1763)	Libellulidae	Odonata
19	<i>Brachythemis contaminata</i> (Fabricius, 1798)	Libellulidae	Odonata

4. CONCLUSION

Being the biological diversity is an important prerequisite for humans to exist on earth, it provides valuable ecosystem services. Though there are various threats to biodiversity, including habitat loss, overexploitation, pollution, alien species and climate change, so it is always essential to document the biodiversity of any ecosystem or protected areas for planning of better management and conservation. With only 0.06% of the land area, this small fragile Island accounts for 2.5 % of the recorded species of the Indian Sundarban. It is also interesting to note that, Haliday island itself holds 42% of the orders reported from Indian Sundarban. Therefore, this present communication will definitely serve as baseline data of the insect faunal diversity and their functional role in Haliday Island wildlife sanctuary of Indian Sundarban for further research works.

© 2019 Life Science Informatics Publication All rights reserved

Peer review under responsibility of Life Science Informatics Publications

2019 Nov – Dec RJLBPCS 5(6) Page No.15

ETHICS APPROVAL AND CONSENT TO PARTICIPATE

Not applicable.

HUMAN AND ANIMAL RIGHTS

No Animals/Humans were used for studies that are base of this research.

CONSENT FOR PUBLICATION

Not applicable.

AVAILABILITY OF DATA AND MATERIALS

The authors confirm that the data supporting the findings of this research are available within the article.

FUNDING

Ministry of Environment, Forest and Climate Change, Govt. of India

ACKNOWLEDGEMENT

Authors are grateful to Director, Zoological Survey of India for giving necessary permissions for the survey and constant support. Special thanks are also due to Ministry of Environment, Forest and Climate Change, Govt. of India for financial support. Authors are also thankful to the Forest Department, Govt. of West Bengal for necessary permission to conduct the surveys in Indian part of Sundarban.

CONFLICT OF INTEREST

There is no conflict of interest.

REFERENCES

1. Sinha R, Mitra B. Bengalian Rainforest to Sundarban Biosphere Reserve. In: eds. Chandra, Alfred, Mitra and Roy Chowdhury, Fauna of Sundarban Biosphere Reserve. Zoological Survey of India, Kolkata, 2017, pp. 6-16.
2. Chandra K, Alfred JRB, Mitra B, Roy Chowdhury B. Fauna of Sundarban Biosphere Reserve- An Introduction. In: eds. Chandra, Alfred, Mitra and Roy Chowdhury, Fauna of Sundarban Biosphere Reserve. Zoological Survey of India, Kolkata, 2017, 1-5.
3. Chatterjee GC. Mosquitoes of the genus *Anopheles* from Port Canning, Lower Bengal. Rec. Indian Mus., 1907, 1: 81-82.
4. Ray, S, Choudhury, A. Ecology of tabanid larvae and pupae (Diptera: Tabanidae) in Sunderbans Mangrove Ecosystem, Sagar Island. The Mangroves: Proc. Nat. Symp. Biol. Util. Cons. Mangroves, 1986, 516-521.
5. Choudhury A. Vertical distribution of immature *Culicoides oxystoma* Kieft. (Diptera: Ceratopogonidae) in intertidal mud and sand Oats of Sundarbans Sagar Island. The Mangroves: Proc. Nat Symp. Biol Util Cons. Mangroves, 1986, 522-526.
6. Mandal AK, Nandi NC. In: Zoological Survey of India. Fauna of Sundarban Mangrove Ecosystem, West Bengal, India. Fauna of Conservation Areas, 1989, 3: 116.

7. Agarwal VC, Ghose RK. Fauna of Sunderban tiger reserve. Fauna of Tiger Reserve (Sunderbans, Palamau, Simlipal and Manas). Fauna of Conservation Areas, 1995, 8: 1-46.
8. Majumder SC, Parui P. Diptera (Insecta) from Sundarban, West Bengal, Rec. Zool. Surv. India, 2001, 99(1-4): 171-199.
9. Bhattacharyya A, Datta B, Chowdhury A. Homopteran rice pests in Sunderbans biosphere reserve. Insect Environ., 2002, 8 (4): 191-192.
10. Sinha SK, Nandi BC. *Parasarcophaga (Liosarcophaga) choudhuryi* Sinha and Nandi (Diptera: Sarcophagidae) from Sagar Island, Sunderbans Biosphere reserve, India. Rec. zool. Surv. India, 2002a, 100(3-4): 117-121.
11. Sinha SK, Nandi BC. A new species of *Liproctia* Enderlein (Diptera: Sarcophagidae) from Sunderban Biosphere Reserve, India. Proc. zool. Soc. Calcutta, 2002b, 55(2): 39-41.
12. Mitra B, Mirdha R, Parui P. Diptera from Sagar Island, South 24 Parganas, West Bengal. Bionotes, 2003, 5(3): 69.
13. Sinha SK, Nandi BC. Studies on life history on dung-breeding muscid fly *Neomyia indica* (R-D) (Diptera:Muscidae) from Sunderbans Biosphere Reserve, West Bengal, India. Journ. Nat. Hist., 2005, 1(2):44-49.
14. Sinha SK, Nandi BC. Studies on life history of *Hemipyrellia ligurriens*(Wiedemann) (Diptera: Callipioridae) in Sunderbans Biosphere reserve, West Bengal, India, Rec. zool. Surv. India, 2007, 107(1):63-70.
15. Rajavel AR, Natarajan R, Vaidyanathan K. Mosquitoes of the mangrove forests of India: Part- 2 Sunderbans, West Bengal J. Am. Mosq. Control Assoc., 2005, 21(2): 136-138.
16. Mitra A, Mitra B. Pictorial handbook on Common Dragon and Damselflies (Odonata: Insecta) of mangroves of Sunderbans, India. Zool. Survey of India, 2009, 1-56.
17. Narendran TC, Girish Kumar P. Taxonomic studies on a collection of Chalcidoid wasps (Hymenoptera: Chalcidoidea) from Sunderbans, West Bengal India. Rec. Zool. Surv. India, 2009a, 109(1): 89-96.
18. Narendran TC, Girish Kumar P. Three new species of Pteromalidae (Hymenoptera: Chalcidoidea) from Sunderbans, West Bengal, India. J. Environ. Sociobiol., 2009b, 6(2): 123-130.
19. Sharma N. Population fluctuation of Grasshopper fauna in a field near Kakdwip, Sunderbans, West Bengal. Rec. Zool. Surv. India, 2012, 111(3): 27-30.
20. Mitra B. A Synoptic Retrospect on the Diptera fauna of Sunderban Biosphere Reserve, India. Prommalia, 2013, 1: 56-64.
21. Hassan ME, Biswas B. Record of some Hemipteran fauna from the Sunderban Biosphere Reserve, West Bengal. Bionotes, 2014, 16(1): 29.

22. Ghosh SK, Mitra B. Further records of aquatic beetles from Sunderban Biosphere Reserve, West Bengal. *Bionotes*, 2014, 16(2): 67-68.
23. Kumar J, Basu Roy A, Mitra B. Butterflies and Moths of Sunderban, West Bengal, India. *ZSI ENVIS Newsletter*, 2014, 20(1&2): 11.
24. Mitra B, Shah SK, Chakraborti U, Roy S, Biswas O, Biswas B, Das SK, Kumar P Girish. Additional Records of Entomofauna from Sunderban Islands, West Bengal. *Bionotes*, 2014, 16(4): 134-135.
25. Mitra B, Biswas O, Roy S and Chakraborti U. Pollinators of Mangroves in the perspective of Indian Sunderbans. *ZSI Envis Newslett.*, 2015a, 21: 6-11.
26. Mitra B, Parui P, Roy S, Biswas O, Chakraborti U. A note on Stilt-legged Flies (Diptera: Micropezidae) with the First Record of *Mimegralla albimana* (Doleschall, 1856) from Sunderban Biosphere Reserve, India. *Entomol. Appl. Sci. Lett.*, 2015b, 2(2): 16-19.
27. Mitra B, Chakraborti U, Das P, Majumder A. Longhorn beetle (Cerambycidae: Coleoptera) of Sunderban, West Bengal, India. *Entomol. Appl. Sci. Lett.*, 2015c, 2(2): 26-31.
28. Roy S, Chakraborty SK, Parui P, Chakraborti U, Biswas O, Mitra B. Re-description of *Cadrema pallida* var. *bilineata* (de Meijere, 1904) (Diptera: Chloropidae) and its role as pollinator and carrion feeder from Indian Sunderbans. *Ambient Science*, 2016, 3(2): 93-94.
29. Roy S, Parui P and Mitra B. *Plagiostenopterina sagarensis* sp. nov. (Diptera: Platystomatidae: Platystomatinae) from Sunderban Biosphere Reserve, India with a key to Indian species. *Zootaxa*, 2017, 4294 (4): 487–493.
30. Biswas O, Shah SK, Modak BK and Mitra B. Description of one new species of genus *Ramila* Moore, 1867 (Lepidoptera, Crambidae, Schoenobiinae) from Indian Sunderbans with a revised key to the Indian species. *Oriental Insects*, 2017.
31. Roy S, Chakraborty SK, Parui P and Mitra B. Taxonomy of Soldier Flies (Diptera: Stratiomyidae) of Sunderban Biosphere Reserve, India. *Proceedings of Zoological Society, Calcutta*, 2018, 71(2): 121-126.
32. Mitra B. Insect faunal diversity and their ecosystem services in Sundarban Biosphere Reserve. In: eds. Chandra, Alfred, Mitra and Roy Chowdhury, *Fauna of Sundarban Biosphere Reserve*. Zoological Survey of India, Kolkata, 2017, pp. 137-173.
33. Forest Department, Government of West Bengal “Management Plan of Haliday Island.
34. Woodcock TS, Larson BMH, Kevan PG and Inoue DW. Flies and Flowers II: Floral Attractants and Rewards. *Journal of Pollination Ecology*, 2014, 12(8): 63-94.
35. Chakraborti U, Mitra B, Bhadra K. Foraging Behaviour of *Apis (Megapis) dorsata* on two Mangrove Plant Species. *Ambient Science*, 2019, 6(2), Online.

36. Mani MS and Saravanan JM. Pollination ecology and evolution in Compositae (Asteraceae). Science Publishers, New Hampshire, 1999, pp. 166.
37. Majer JD, Brennan KEC and Bisevac L. Terrestrial invertebrates. In: eds. Perrow MR and Davy AJ, Handbook of Ecological Restoration. Cambridge, Cambridge University Press, 2002, pp. 279-299.
38. Shah SK, Mishra P, Mondal P, Dasgupta S and Mitra B. Odonata associated with the Tea plantations in North Bengal. Bionotes, 2015, 17(2): 50.