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A Checklist of Odonata (Insecta) of Dibrugarh District of Assam, India

Sailendra Mohan Das, Tikendrajit Gogoi and Mridupaban Phukon

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Abstract

Dibrugarh district of Assam is situated to proximity to the junction of Eastern Himalayas and Indo-Burma Biodiversity Hotspots. Climatic conditions of the district support a very rich biodiversity, where Odonatdes (Dragonflies and Damselflies) are an important component. The present study was carried out in Dibrugarh district to document the status and distribution of odonates from April, 2019 to May, 2022. A total number of 81 species of odonates representing 54 genera and 11 families have been recorded in this study. Conservation status of the recorded species indicates that 69 species were under the category of Least Concern (LC), 7 species were Data Deficient (DD) and 1 species was Not Evaluated (NE). However, habitat destruction due to lack of awareness among the local people is the potential threat to the conservation of odonates in the district.

Keywords: Odonata, relative abundance, conservation status, Dibrugarh district.

1. Introduction

The order Odonata, which comprise of dragonflies and damselflies are one of the most magnificent group of insects next to butterfly. Odonates have been dominating the insect world nearly 250 million years equally on land and in water. They are playing a crucial ecological role both as predator and prey in the natural as well as man-made ecosystems (Corbet, 1993) ^[15]. They are also helping to control pest population and vector born diseases among the animals and human beings. The order Odonata is presently divided into two sub-orders, viz. 'Zygoptera' and 'Anisoptera' (Dumont *et al.*, 2010) ^[20]. Damselflies are placed under the sub-order Zygoptera; while, dragonflies are included under the sub-order Anisoptera. Globally, 6,372 species of odonates have been documented (Paulson *et al.*, 2022) ^[32]. With around 500 species India is holding about 7.8% odonate species of the world within its limit (Joshi *et al.* 2021) ^[24].

Odonatological study of North Eastern India dates back to pre- independence era (e.g. Laidlaw, 1914^[28]; Fraser, 1933, 1934, 1936, ^[21, 22, 23] etc.). In spite of that, odonates of Assam have remained poorly studied even after the independence. There are a few works available on odonates fauna of Assam (e.g. Asahina, 1984; Lahiri, 1987; Kalita, 2014; Kalita and Ray, 2015; Baruah *et al.*, 2016; Das, 2016 and 2017; Baruah, 2016; Kumar *et al.*, 2018; Bora, 2019; Thakuria, 2020; etc.) ^[11, 29, 25, 26, 16, 17, 15, 27, 12, 36], which are providing sporadic information regarding the present distribution of odonates in the state. Das & Gogoi (2018) ^[18] was compiled a checklist of Odonates of Assam on the basis of available published work where 98 species were documented. Very recently, Joshi *et al.*, (2021) ^[24] is trying to provide a compiled checklist of Odonata of Assam, where they are documenting 114 species. But, especially in Dibrugarh district very limited work has been done on odonates till date.

In 1911-12, during 'Abor Expedition' about 10 species of dragonflies and damselflies were recorded from Dibrugarh. Laidlaw (1914) ^[28] described *Argiocnemis aborensis* (synonym *Mortonagrion aborensis*) on the basis of a single male from Dibrugarh, North Eastern Assam, in his monograph on Indian Odonata. Jaganathan was compiled a checklist of about 40 dragonflies and damselflies species in Jeypore rain forest of Dibrugarh district (www.jeyporerainforest.com) ^[38]. Sourabh Biswas, Somen Sarkar and Vidya Venkatesh photo documented nine species of odonates from the Jeypore reserve forest (www.indianodonata.org) ^[39]. Das and Gogoi (2018-a) ^[19] reported 41 species of dragonflies and damselflies from Dibrugarh city and its vicinity.

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Payra *et al.* (2021) [33] reported *Indothemis carnatica* (Fabricius, 1798) for the first time from Assam based on photographic records, from the Jeypore Reserve Forest (presently Dihing-Patkai National Park) of Dibrugarh district. However, a systematic study of odonate fauna of the district is still awaited. Wherefore, the present study was carried out for partial fulfillment of this long anticipation.

2. Materials and Methods

2.1 Study area

Dibrugarh district is located near to the junction of Eastern Himalaya and Indo-Burma Biodiversity Hotspots. Its

geographical coordinates extends from 27°5'38" N to 27°42'30" N latitude and 94°33'46"E to 95°29'8"E longitude covering an area of 3,381 sq. km. in the eastern part of Assam, India. The river Brahmaputra flows throughout the North Western boundary of the district; while the South Eastern corner of the district is bordered by Patkai foot hills with lowland evergreen rainforest. The district has sub-tropical wet climate with average annual temperature 23.5°C and average annual rainfall 2819 mm; summers are much rainier than the winter. These climatic conditions make the district suitable to shelter a rich diversity of odonates.

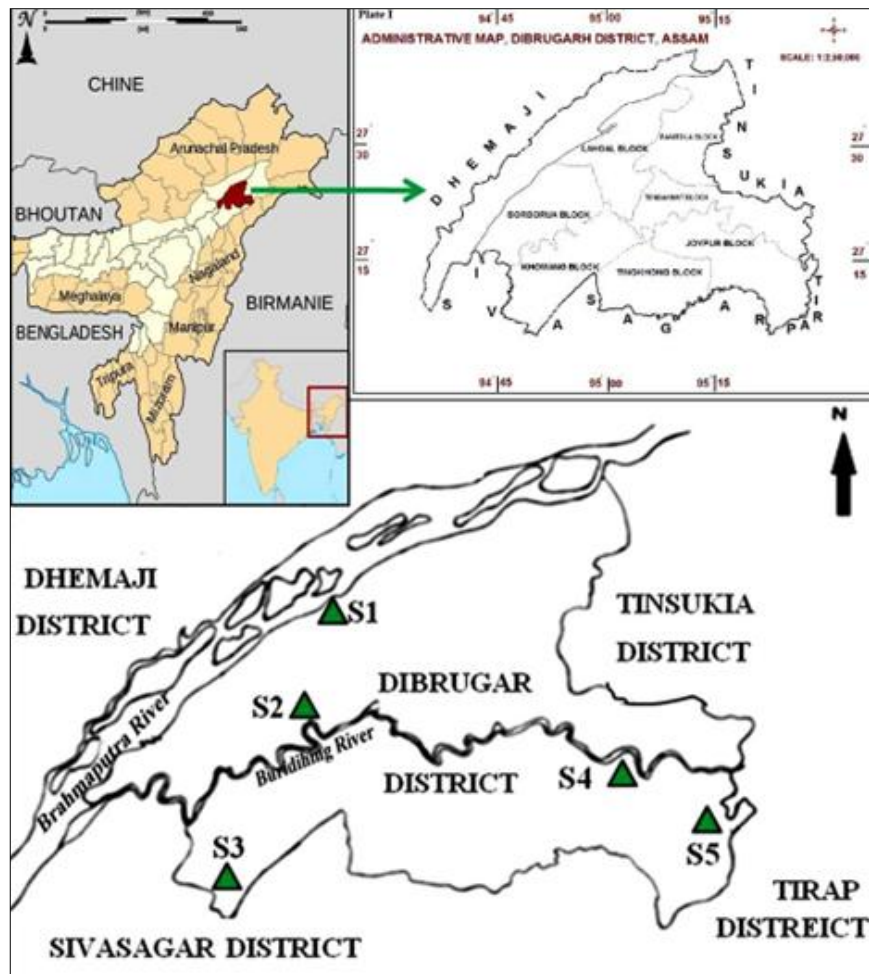


Fig 1: Map of the study area

2.2 Data collection

Field survey was carried out in five different locations of Dibrugarh district (Table-1) from April, 2019 to June, 2022. The survey was halt during Covid 19 lockdown period. Sampling of adult odonates was done randomly on days with fine weather conditions. Visual encounter survey (Rodriguez, 2007) [34] was used to determine odonate species and their abundance. Digital cameras were used to photo-document the encountered odonate species in the field. No specimen was killed or preserved during the study. The images were cross checked using standard literatures like Fraser (1933, 1934 & 1936) [21, 22, 23], Mitra (2006) [30], Subramanian (2009) [35] and Nair (2011) [31]. Information provided by previous workers on odonates of the district was also consulted as secondary data source for compilation of an updated checklist. Help of web forums such as Indian Biodiversity Portal, Odonata of India, etc. were also accessed whenever necessary. The abundance

of species was determined by number of individuals encountered during visual survey in the field. The odonate species were categorized into five relative abundance categories such as VC-very common (80 - 100% sightings during the field days), C-common (60-79% sighting), O-occasional (40 - 59% sighting), R-rare (20 - 39% sighting) and VR-very rare for those that was sighted only less than 19% of the field days (Adarsh *et al.*, 2014) [1]. Conservation status of different species was assigned using IUCN Red List Version 3.1 (www.iucnredlist.org) [40].

3. Result and Discussion

In the present study, a total number of 81 species of odonates representing 54 genera under 11 families were recorded from Dibrugarh district. Sub-order Zygoptera (Damselflies) consist of 33 species belonging to 20 genera and 7 families. Sub-order Anisoptera (Dragonflies) consist of 48 species

belonging to 34 genera and 4 families [Table-2(A) and 2(B)]. The relative abundance analysis shows that out of the total recorded species, 15 species were very common, 14 were common, 19 were occasional, 14 were rare and 3 were very rare (Fig-2). Among dragonflies *Acisoma panorpoides*, *Aethriamanta brevipennis*, *Brachydiplax chalybea*, *Brachythemis contaminata*, *Diplacodes trivialis*, *Neurothemis fulvia*, *Neurothemis intermedia*, *Orthetrum pruinusum*, *Orthetrum sabina*, *Pantala flavescens* and *Rhyothemis*

variegata of Libellulidae family were the most common species. Damselflies, such as *Agriocnemis lacteola*, *Ceriagrion cerenorubellum*, *Ceriagrion coromandelianum* and *Pseudagrion rubriceps* of Coenagrionidae family were most common in the district. So far the IUCN Red List is concerned, 69 species were under the category of Least Concern (LC), 7 species were Data Deficient (DD) and 1 species was Not Evaluated (NE).

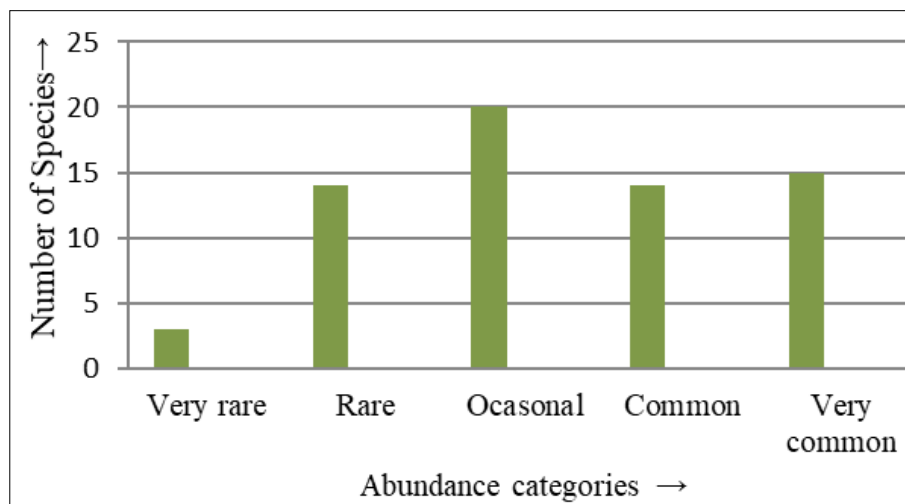


Fig 2: Relative Abundance of odonates in Dibrugarh district

Out of 11 families, Libellulidae was the dominant family with 40 species under 27 genera, accounting for 49.38% of total odonates species recorded in the district (Fig-3). The species composition in undisturbed habitat such as stream and river bank of forest edges and perennial wetlands (i.e. S2, S4 and S5) was more in comparison to those areas like paddy fields, ponds and seasonal wetlands with human influence (S1 and S3) (Table-1). An unidentified species of *Burmagomphus* genus was recorded from Mohanaghat area of Dibrugarh city during the study. A similar type of unidentified species belonging to *Burmagomphus* genus was also reported from Rani Reserve Forest of Assam (Thakuria and Kalita, 2021) [38]. Jaganathan was also mentioned an unidentified *Burmagomphus* member in his checklist 'Odonates of Jeypore'. He reported *Coeliccia chromothorax* (Selys, 1891), along with more four species viz. *Indolestes sp.*, *Megalestes sp.*, *Rhinocypha sp.*, and *Macromia sp.* in the checklist (www.jeyporerainforest.com). We did not come across these species during our study; however, we have included them in the present checklist. We recorded a rare dragonfly *Lyriothemis acigaster* (Selys, 1878) from Jeypore area. Previously this species was reported only from two places of Assam i.e. North Lakhimpur (Fraser,1936) [22] and Jorhat (Anonymous, 2022) [2]. We have included those odonate

species in the present checklist, which have photographic records from the Jeypore Reserve Forest (presently Dihing-Patkai National Park) of Dibrugarh district. Somen Sarkar reported seven species viz. *Aristocypha quadrimaculata* (Selys, 1853) (Anonyms, 2022a) [3], *Heliocypha perforata* (Percheron, 1835) (Anonyms, 2022b) [4], *Coeliccia schmidti* Asahina 1984 (Anonyms, 2022c) [5], *Dysphaea walli* Fraser,1927 (Anonyms, 2022d) [6], *Amphithemis vacillans* Selys, 1891 (Anonyms, 2022e) [7], *Onychothemis testaceae* Laidlaw,1902 (Anonyms, 2022f) [8], *Tetrathemis platyptera* Selys,1878 (Anonyms, 2022g) [9] from that area. Sourabh Biswas reported *Diplacodes lefebvreii* (Rambur, 1842) (Anonyms, 2022h) [10] and Vidya Venkatesh reported *Aristocypha hilaryae* (Fraser,1927) (Anonyms, 2022i) [11] from the same area. Laidlaw (1914) [29] already reported 10 species, viz. *Aciagrion pallidum*, *Argiocnemis aborensis* (synonyme *Mortonagrion aborensis*), *Agriocnemis incise* (synonyme *Agriocnemis femina*), *Agriocnemis lacteola*, *Ceriagrion coromandelianum*, *Ischnura rufostigma*, *Pseudagrion sp.*, *Diplacodites nebulosa*, *Neurothemis fulvia* and *Trithemis pallidinervis*, from Dibrugarh. A century ago of Laidaw's study, recording all ten species of odonates from Dibrugarh indicates the existence of satisfactory odonates fauna in the district.

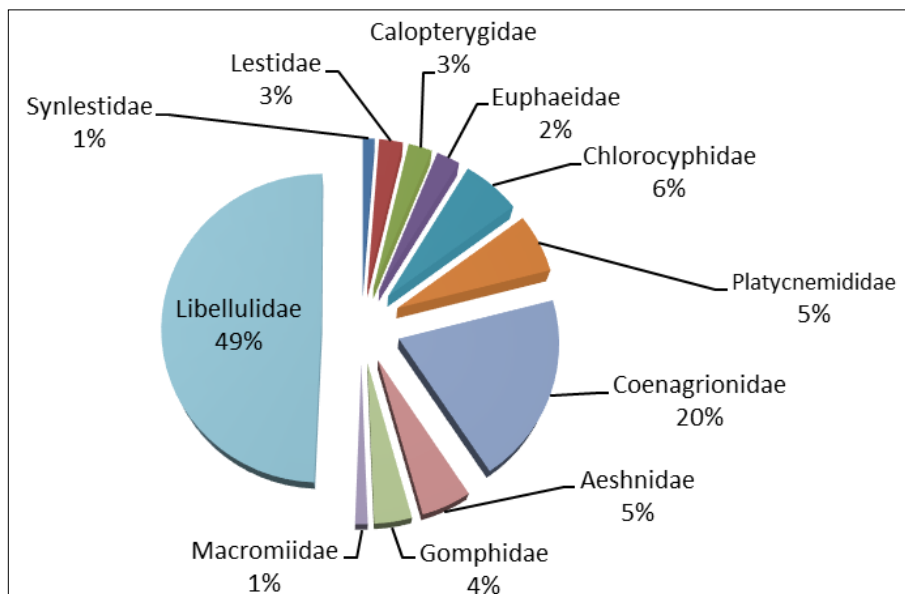


Fig 3: Family-wise record of odonate species in Dibrugarh district

Table 1: Habitat types and odonates diversity in Dibrugarh district.

Sl. S.N.	Places (As in map)	Geographical Locations		Elevation (in meter)	Types of Habitat	Recorded Species (In the field)
		Latitude	Longitude			
1	Dibrugarh S1	27°47' N	94°88' E	104	Seasonal wetlands and river bank near human habitat	42
2	Jokai S2	27°38' N	94°93' E	107	Seasonal and perennial wetlands of forest edge	46
3	Moran S3	27°19' N	94°91' E	97	Paddy fields & ponds with human interference	34
4	Merbeel S4	27°31' N	95°20' E	121	Perennial wetland with less human interference	53
5	Jeypore S5	27°25' N	95°41' E	123	River bank of forest edge	49

Table 2: [A] Checklist of Damselflies (sub-order: Zygoptera) recorded from Dibrugarh district, Assam, India. Species marked (*) are only based on literature.

Scientific Name with Family	English Names	IUCN Status	Relative Abundance
Family: Lestidae			
1.	<i>Indolestes sp.*</i>		
2.	<i>Lestes praemorsus</i> Hagen in Selys, 1862	Sapphire-eyed Spreadwing	LC R
Family: Synlestidae			
3.	<i>Megalestes sp.*</i>		
Family: Euphaeidae			
4.	<i>Dysphaea walli</i> Fraser, 1927*	Sapphire Torrent Dart	DD
5.	<i>Euphaea ochracea</i> Selys, 1859		LC O
Family: Calopterygidae			
6.	<i>Neurobasis chinensis</i> (Linnaeus, 1758)	Stream Glory	LC O
7.	<i>Vestalis gracilis</i> (Rambur, 1842)	Clear-wing Forest Glory	LC R
Family: Chlorocyphidae			
8.	<i>Aristocypha hilaryae</i> (Fraser, 1927) *		DD
9.	<i>Aristocypha quadrimaculata</i> (Selys, 1853) *		LC
10.	<i>Heliocypha perforata</i> (Percheron, 1835) *	Stream Sapphire	LC
11.	<i>Libellago lineata</i> (Burmeister, 1839)	River Heliodor	LC C
12.	<i>Rhinocypha sp.*</i>		
Family: Platycnemididae			
13.	<i>Coeliccia chromothorax</i> (Selys, 1891)*		LC
14.	<i>Coeliccia schmidtii</i> Asahina 1984*		DD
15.	<i>Copera marginipes</i> (Rambur, 1842)	Yellow Bush Dart	LC R
16.	<i>Copera vittata</i> (Selys, 1863)	Blue Bush Dart	LC R
17.	<i>Onychargia atrocyana</i> Selys, 1865	Black Marsh Dart	LC C
Family: Coenagrionidae			
18.	<i>Aciagrion occidentale</i> Laidlaw, 1919	Green-striped Slender Dartlet	LC O
19.	<i>Aciagrion pallidum</i> Selys, 1891	Pale Slender Dartlet	LC O
20.	<i>Agriocnemis femina</i> (Brauer, 1868)	Pruinosed Dartlet	LC O
21.	<i>Agriocnemis kalinga</i> Nair & Subramanian, 2014	Indian Hooded Dartlet	LC R
22.	<i>Agriocnemis lacteola</i> Selys, 1877	Milky Dartlet	LC VC

23.	<i>Agriocnemis pieris</i> Laidlaw,1919	White Dartlet	LC	O
24.	<i>Agriocnemis pygmaea</i> (Rambur, 1842)	Pigmy Dartlet	LC	C
25.	<i>Ceriagrion cerinorubellum</i> (Brauer, 1865)	Orange-tailed Marsh Dart	LC	VC
26.	<i>Ceriagrion coromandelianum</i> (Fabricius,1798)	Coromandel Marsh Dart	LC	VC
27.	<i>Ceriagrion olivaceum</i> Laidlaw,1914	Rusty Marsh Dart	LC	O
28.	<i>Ceriagrion rubiae</i> Laidlaw,1916	Orange Marsh Dart	LC	R
29.	<i>Ischnura rubilio</i> Selys,1876	Western Golden Dartlet	NE	O
30.	<i>Ischnura rufostigma</i> Selys,1876		LC	VR
31.	<i>Mortonagrion aborensis</i> (Laidlaw, 1914)		LC	R
32.	<i>Pseudagrion decorum</i> (Rambur, 1842)	Three-lined Dartlet	LC	O
33.	<i>Pseudagrion rubriceps</i> Selys,1876	Saffron-faced Blue Dart	LC	VC

Table 2 [B]: Checklist of Dragonflies (sub-order: Anisoptera) recorded from Dibrugarh district, Assam, India. Species marked (*) are only based on literature.

Scientific Name	English Names	IUCN Status	Relative Abundance
Family: Aeshnidae			
1.	<i>Anaciaeschna jaspidea</i> (Burmeister, 1839)	Rusty Darner	LC O
2.	<i>Anax guttatus</i> (Burmeister,1839)	Blue-tailed Green Darner	LC C
3.	<i>Gynacantha bainbriggei</i> Fraser,1922		DD R
4.	<i>Gynacantha dravida</i> Liefstinck,1960	Brown Darner	DD R
Family: Gomphidae			
5.	<i>Burmagomphus sp.</i>		VR
6.	<i>Ictinogomphus rapax</i> (Rambur, 1842)	Common Clubtail	LC O
7.	<i>Paragomphus lineatus</i> (Selys,1850)	Common Hooktail	LC R
Family: Macromiidae			
8.	<i>Macromia sp. *</i>		
Family: Libellulidae			
9.	<i>Acisoma panorpoides</i> Rambur, 1842	Trumpet Tail	LC VC
10.	<i>Aethriamanta brevipennis</i> (Rambur, 1842)	Scarlet Marsh Hawk	LC VC
11.	<i>Amphithemis vacillans</i> Selys, 1891 *		DD
12.	<i>Brachydiplax chalybea</i> Brauer, 1868	Rufous-backed Marsh Hawk	LC VC
13.	<i>Brachydiplax farinosa</i> Kruger,1902	Blue-tailed Dasher	LC C
14.	<i>Brachydiplax sobrina</i> (Rambur, 1842)	Little Blue Marsh Hawk	LC C
15.	<i>Brachythemis contaminata</i> (Fabricius,1793)	Ditch Jewel	LC VC
16.	<i>Bradinopyga geminata</i> (Rambur, 1842)	Granite Ghost	LC O
17.	<i>Cratilla lineate</i> (Brauer, 1878)	Emerald-banded skimmer	LC R
18.	<i>Crocothemis servilia</i> (Drury, 1773)	Ruddy Marsh Skimmer	LC C
19.	<i>Diplacodes lefebvrii</i> (Rambur, 1842)*	Black Ground Skimmer	LC
20.	<i>Diplacodes nebulosa</i> (Fabricius,1793)	Black-tipped Ground Skimmer	LC C
21.	<i>Diplacodes trivialis</i> (Rambur, 1842)	Ground Skimmer	LC VC
22.	<i>Hydrobasileus croceus</i> (Brauer, 1867)	Amber-winged Marsh Glider	LC R
23.	<i>Indothemis carnatica</i> (Fabricius,1798) *	Light-tipped Demon	LC
24.	<i>Lathrecista asiatica</i> (Fabricius,1798)	Asiatic Bloodtail	LC O
25.	<i>Lyrithemis acigastra</i> (Selys,1878)	Little Bloodtail	DD VR
26.	<i>Neurothemis fulvia</i> (Drury, 1773)	Fulvous Forest Skimmer	LC VC
27.	<i>Neurothemis intermedia</i> (Rambur, 1842)	Ruddy Meadow Skimmer	LC VC
28.	<i>Neurothemis tullia</i> (Drury, 1773)	Pied Paddy Skimmer	LC C
29.	<i>Onychothemis testacea</i> Laidlaw,1902*	Stellate River Hawk	LC
30.	<i>Orthetrum chrysis</i> (Selys,1891)	Brown-backed Red Marsh Hawk	LC O
31.	<i>Orthetrum glaucum</i> (Brauer, 1865)	Blue Marsh Hawk	LC O
32.	<i>Orthetrum luzonicum</i> (Brauer, 1868)	Tri-coloured Marsh Hawk	LC O
33.	<i>Orthetrum pruinosum</i> (Burmeister,1839)	Crimson-tailed Marsh Hawk	LC VC
34.	<i>Orthetrum sabina</i> (Drury, 1773)	Green Marsh Hawk	LC VC
35.	<i>Orthetrum triangulare</i> (Selys,1878)	Blue-tailed Forest Hawk	LC O
36.	<i>Palpopleura sexmaculata</i> (Fabricius,1787)	Blue-tailed Yellow Skimmer	LC C
37.	<i>Pantala flavescens</i> (Fabricius,1798)	Wandering Glider	LC VC
38.	<i>Potamarcha congener</i> (Rambur, 1842)	Yellow-tailed Ashy Skimmer	LC O
39.	<i>Rhodothemis rufa</i> (Rambur, 1842)	Rufous Marsh Glider	LC C
40.	<i>Rhyothemis plutonia</i> Selys,1883	Great Blue Wing	LC R
41.	<i>Rhyothemis variegata</i> (Linnaeus,1763)	Common Picture Wing	LC VC
42.	<i>Tetrathemis platyptera</i> Selys,1878*	Pigmy Skimmer	LC
43.	<i>Tholymis tillarga</i> (Fabricius,1798)	Coral-tailed Cloud Wing	LC C
44.	<i>Tramea basilaris</i> (Palisot de Beauvois,1817)	Red Marsh Trotter	LC O
45.	<i>Trithemis aurora</i> (Burmeister,1839)	Crimson Marsh Glider	LC C
46.	<i>Trithemis pallidinervis</i> (Kirby, 1889)	Long-legged Marsh Glider	LC C
47.	<i>Urothemis signata</i> (Rambur, 1842)	Great Crimson Glider	LC O
48.	<i>Zyxomma petiolatum</i> Rambur, 1842	Brown Dusk Hawk	LC R

N.B.: Systematic arrangement and the taxonomy followed in the checklist is based on World List of Odonata (Paulson *et al.* 2022) [32].

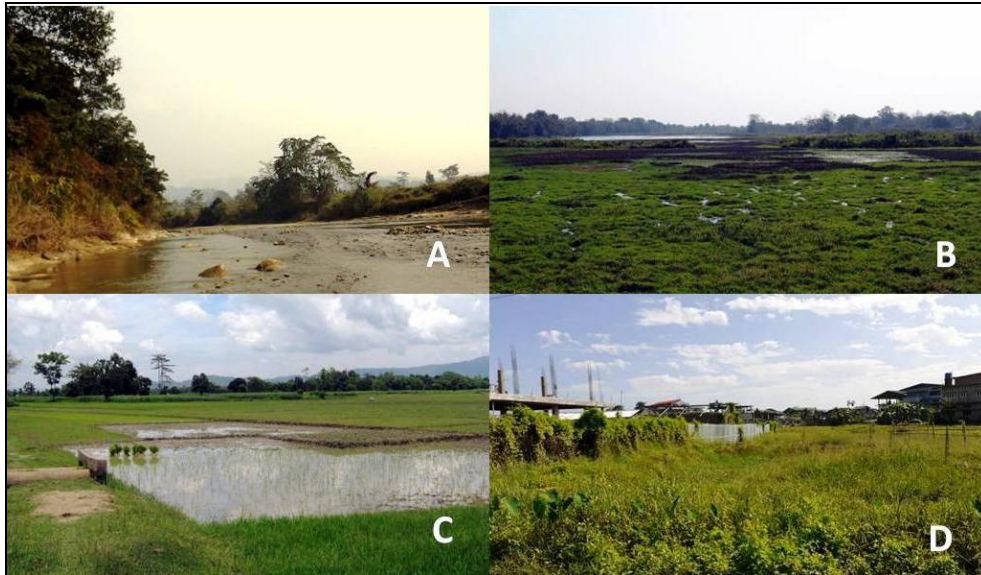


Fig 4: Odonates habitat in Dibrugarh district of Assam A- River at the forest edge, B- Perennial Wetland, C-Paddy field, D - Seasonal wetland in human habitat



Fig 5: A- *Anaciaeschna jaspidea* , B- *Anax guttatus* , C-*Gynacantha bainbriggei* , D- *Gynacantha dravida*, E-*Burmagomphus* sp. F-*ktinogomphus rapax* , G- *Paragomphus lineatus*, H- *Acisornia panorpoides*, I- *Aethriamanta brevipennis*, J- *Brachydiplax chalybea*, K- *Brachydiplax farinosa*, L- *Brachydiplax sobrina*

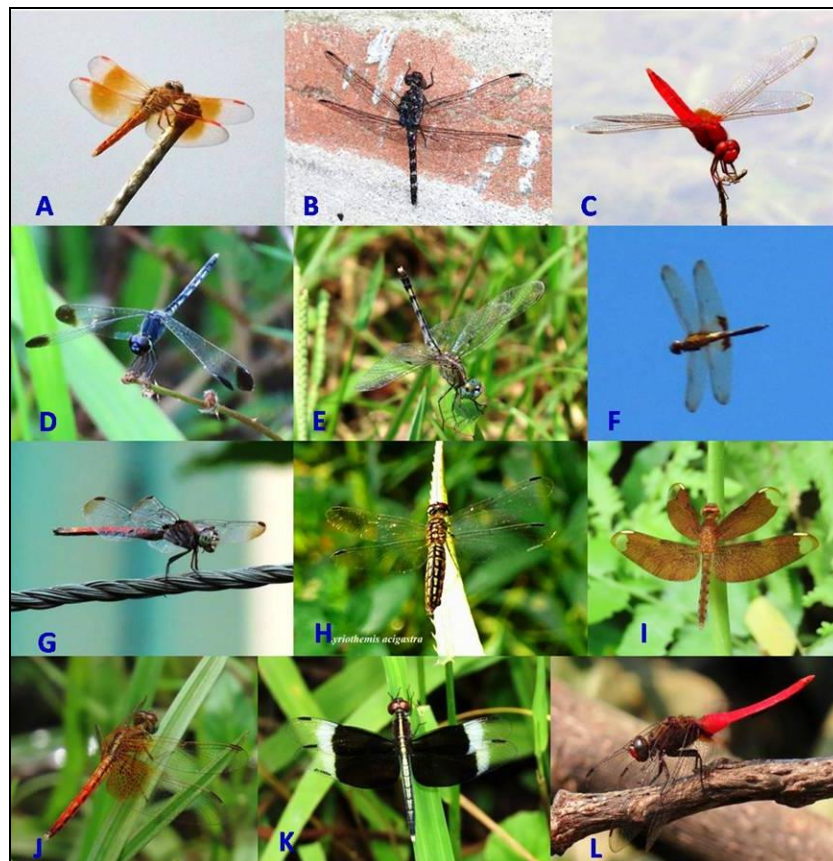


Fig 6: A- *Brachythemis contaminata*, B- *Bradinopyga geminata*, C- *Crocothemis servilia*, D- *Diplacodes nebulosa*, E- *Diplacodes trivialis*, F- *Hydrobasileus croceus*, G- *Lathrecista asiatica*, H- *Lyriothemis acigastri* I- *Neurothemis fulvia*, J- *Neurothemis intermedia* K- *Neurothemis tullia*, L- *Orthetrum chrysis*



Fig 7: A- *Orthetrum luzonicum*, B- *Orthetrum pruinosum*, C- *Orthetrum sabina*, D- *Palpopleura sexmaculata*, E- *Pantala flavescens*, F- *Potamarcha congener*, G- *Rhodothemis rufa*, H- *Rhyothemis plutonia*, I- *Rhyothemis variegata*, J- *Tholymis tillarga*, K- *Tramea basilaris*, L- *Trithemis aurora*

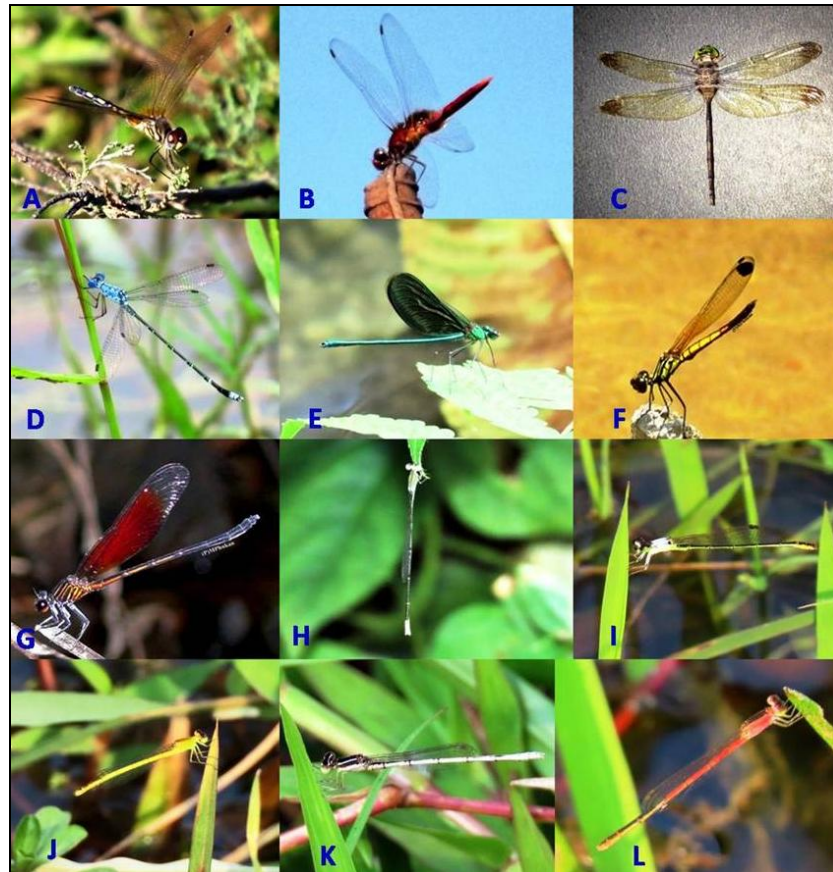


Fig 8: A- *Trithemis pallidinervis*, B- *Utothemis signata*, C- *Zyxomma petiolatum*, D- *Lestes praemorsus*, E- *Neurobasis chinensis*, F- *Libellago lineata*, G- *Euphaea ochracea*, H- *Aciagrion pallidum*, I- *Agriocnemis femina*, J- *Agriocnemis kalinga*, K- *Agriocnemis pieris*, L- *Agriocnemis pigmaea*

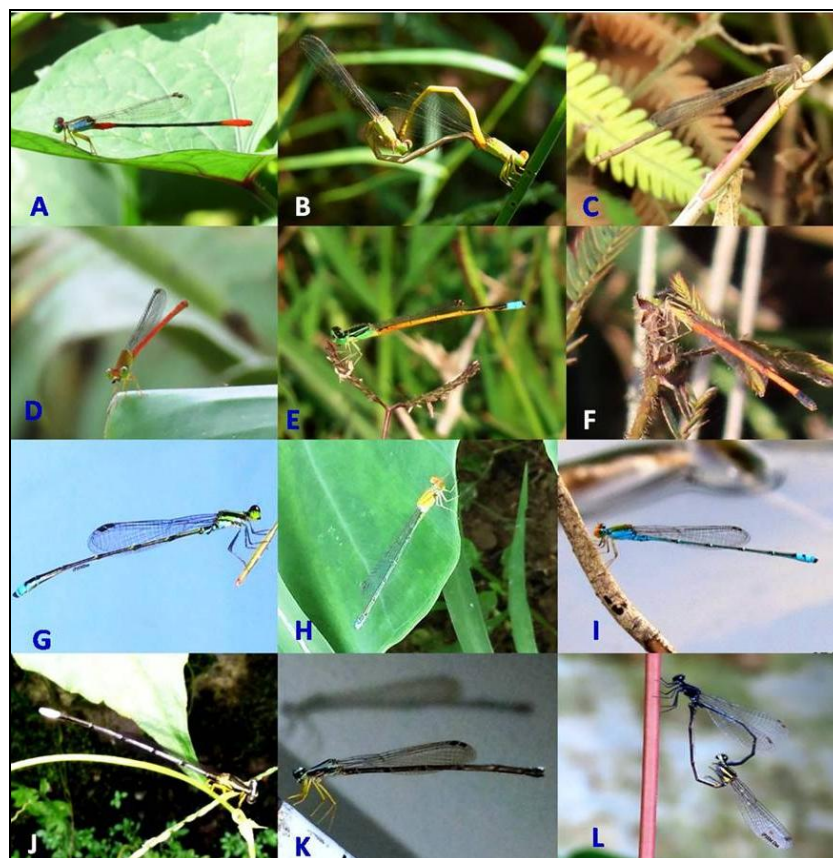


Fig 9: A- *Ceriagrion cerinorubellum*, B- *Ceriagrion commandelianum*, C- *Ceriagrion olivacem*, D- *Ceriagrion rubiae*, E- *Ischnura rubilio*, F- *Ischnura rufostigma*, G- *Mortonagrion aborense*, H- *Pseudagrion decorum*, I- *Pseudagrion rubriceps*, J- *Copera marginzpes*, K- *Copera vittata*, L- *Onychargia atrocyana*

4. Conclusion

The present study on odonates of Dibrugarh district revealed the presence of 79 species which accounts 15.8% of total odonates found in India. But the misery is that people of the study area were least concerned about the importance of this group of insect to mankind. There is no doubt that further intensive study will surely provide more valuable information about odonates diversity of the district. However, habitat destruction due to developmental works in natural wetlands and indiscriminate use of pesticides in crop fields are the two major present threats to the existence of odonates of the region. Hence, mass awareness among the local people about ecological importance of odonates, is an urgent need for conserve this charismatic group of insect in the district.

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