Entomology

A preliminary checklist on odonates in and around Lingambudhi lake, Mysuru, Karnataka

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Abstract

Odonates are amphibiotic, well-known dominant groups of freshwater and terrestrial insects. A field study was conducted to find out to prepare a checklist of odonates in and around Lingambudhi lake, Mysuru, Karnataka during June to August, 2023. Sampling was done by Direct Encounter Method and Identification of Odonates as per the Standard field guides. Biodiversity indices values were formulated for the observed data. A total 18 Odonate species has been identified, belonging to Anisoptera (12 species) and Zygoptera (06 species) suborders having 7 families. Family Libellulidae contributes highest number of Odonate species. It was observed that more anthropogenic activities lead to disturbance of odonates in study area. The study highlights the importance of odonates and provides data which would be useful in future biodiversity conservation.

Keywords: odonates, anisoptera, libellulidae, lingambudhi lake, mysuru

Introduction

Damselflies (Zygoptera) and Dragonflies (Anisoptera) are amphibiotic insects, which belong to order Odonate and constitute a small, well-known order of insects that are widely distributed all over the world [1]. They are considered to be the most diversified creatures on the earth [2] which are flying over Forest, Fields, Meadows, Ponds and rivers. Their occurrence is close to different fresh water habitat *viz.*, river, stream, lakes, pools and rice fields [3]. Dragonflies are excellent model organisms and flagship species in freshwater conservation. Generally, they are known as "guardians of the watershed" [4] and rich diversity and habitat specificity make them ideal tools for assessing freshwater ecosystem health. Odonates survive in a wide range of aquatic habitats *i.e.*, from lotic and lentic water bodies and some have been adapted to urban areas and exploit man-made water bodies [5]. Though most of the Odonates species are highly specific to a habitat, they are more susceptible to habitat alterations induced by human activities [6].

Globally around 5,740 species of Odonates are distributed all over world, in which India is highly diverse with 474 species with 142 genera and 18 families [7]. Around 174 species of Odonates have been reported from Western Ghats, Including 56 species endemic to the region [8]. While 154 species of Odonates were reported from Kerala [9]. They are group of insects, evolved during the Carboniferous era (Permian period) about 250 million years ago [10].

The Odonates have become most effective insect group in view to the ecological quality assessment [11]. Anecdotal observations suggest that some Odonates are habitat specific that they might disappear at minor changes [12]. Odonates are the valuable insects which help adopting decision regarding environment and crop management [13]. Both larvae adults of Odonata are regarded as important predators of rice fields [14]. The greatest numbers of species are found at places that provide a wide variety of micro-habitats, though dragonflies tend to be much more sensitive to pollution than damselflies [15]. They act as one of the most important invertebrate predators of an ecosystem [16]. Shade and aquatic vegetation could favour Zygoptera more than anisoptera. The availability of food source and the presence of suitable habitat for dragonflies is reflection of stable ecosystem in selected area [17]. Odontologists and many biologists appreciate their striking colors and equilibristic flight [18]. With this background and understanding the available scientific literature on Odonate diversity from the study area are replete, the present investigation was carried out.

Materials and methods

Source: *Google earth*

Fig 1: Map showing the study area

The present study was conducted in and around Lingambudhi Lake, (Wetland area) (12^0 16' 5.84" N and 76^0 36' 25.86" E with an altitude of 730 Msl.) Mysuru, Karnataka from June to August, 2023 to assess the diversity of Odonates. The lake was built by Maharaja Krishnaraja Wodeyar III, 1828 in memory of his fourth consort Maharani Lingaja Devi (Lingajaamaba Ammanni Devi) and the study area covers approximately 260 acres plot area. Observations were carried out between 8 to 10AM and 4 to 6PM on weekly basis, as Odonates are mostly active during these hours due to their dependence on sunlight directly to regulate their body temperature [19]**.** Odonates were recorded by Direct Encounter Method (DCM) and individuals were noted in the field with the help of field notes. The odonate species identification were done with the help of standard field guides, scientific literatures and taxonomic identification keys as per the standard methods [7, 20, 21, 22] and photographed using digital camera (CANON t3i rebel; 600D) for further analysis. The relative density is calculated by using the formula; D= Number of individuals / Total number of individual species x 100. Further, biodiversity indices were calculated using PAST software (*Ver. 2.01*) and presented results using MS office programme.

Results and discussion

Results revealed a total of 18 species of odonates were identified in study area during the period June to August, 2023 (Table 1 and Plate 1). Among them 12 species of Suborder Anisoptera and 06 species from Suborder Zygoptera belonging to 06 different families were recorded at the study area. In Anisoptera, *Brachythemia contaminata* and under Zygoptera *Ceriagrion caromandelianum* was highest in number compared to other Odonate species respectievely. This may be due to an ecological disturbance caused to the species present at the study area. Literature shows that, for tropical ecosystems higher number of libellulidae and coenagrionidae can be attributed to a higher amount of anthropogenic ecosystem distrubances. Hence agree with the previous study [21].

Among 18 species of Odonates 6 families has been observed they are; Libellulidae (10 Species *viz., Brachythemia contaminata, Acisoma panorpoides, Orthetrum pruinosum, Crocothemis servilia, Rhyothemis variegata, Diplacodes trivialis, Orthetrum sabina, Pantala flavescens, Tholymis tillarga, Trithemis aurora)* contributes 56%, followed by Coenagrionidae (04 species - *Ceriagrion caromandelianum, Ischnura senegalensis, Telebasis byersi Ischnura aurora*.) which constitutes around 22%. Whereas, Gomphidae includes 01 speices *Ictinogomphus rapax contributes* 6% in distribution and Aeshnidae (01 Species - *Anax indicus*), Calopterygidae (01 species - *Vestalis submontana)* and Lestidae (01 speices - *Lestes elatus)* contributes 5% each respectievely. *However, Family* Lebelluliade is most abundant compare to other Families Coenagrionidae, Gomphidae, Aeshnidae, Calopterygidae, Lestidae (Table 1 and Fig. 2). The Relative density and Occurrence of odonates during three different months were recorded as depicted in Table 2. Accordingly, in June only 4 species were recorded, followed by in July 11

species and August shows 16 species of Odonates. Interestingly, Ditch jewel (relative density value = 28.13) and Asian pintail (relative density value = 16.84) were recorded during all the three months and highest number of Odonate species are abundant in the month of August. As studies suggest that, this may be due to the prevailed climatic factors like temperature and humidity at the study area, which are the essential key factors for the odonates occurrence and are mainly dependent, also are most likely to be present in humid, warm and calm environments. The present study agrees with the previous study and similar variations was also observed in earlier studies [23] [24] [25] & [26]. Hence, agrees with the previous findings. The Shannon weaver diversity index, Simpson diversity index, Species richness index and Species evenness index values 2.247, 0.854, 3.050 and 1.789 (Figure 3) respectively suggest that the species of Odonates are moderately and evenly distributed at the study area during June to August, 2023. Thus, these values are keen to understand for long period assessment on odonate distribution and diversity. Further, it may also help to analyze their community structure, behaviour and impact of urbanization, habitat modifications at the study area.

Table 1: Preliminary Checklist of Odonate species recorded in and around Lingambudhi lake, Mysuru, Karnataka

Suborder	Family	Sl. No.	Common name	Scientific name
Anisoptera	Libellulidae	1	Ditch jewel	*Brachythemia contaminata*
		2	Asian pintail	*Acisoma panorpoides*
		3	Crimson-Tailed Marsh Hawk	*Orthetrum pruinosum*
		4	Scarlet Skimmer	*Crocothemis servilia*
		5	Common Picture Wing	*Rhyothemis variegata*
		6	Chalky percher	*Diplacodes trivialis*
		7	Slender Skimmer	*Orthetrum sabina*
		8	Wandering glider	*Pantala flavescens*
		9	Coral -tailed cloudwing	*Tholymis tillarga*
		10	crimson marsh glider	*Trithemis aurora*
	Gomphidae	11	Indian common clubtail	*Ictinogomphus rapax*
	Aeshnidae	12	Lesser green emperor	*Anax indicus*
Zygoptera	Coenagrionidae	13	Coromandel Marsh	*Ceriagrion caromandelianum*
		14	Marsh bluetail	*Ischnura senegalensis*
		15	Duckweed firetail	Telebasis byersi
		16	Golden darlet	*Ischnura aurora*
	Calopterygidae	17	Vestalis submontana	*Vestalis submontana*
	Lestidae	18	Emerald spreadwing	*Lestes dryas*

Table 2: Relative density and Monthwise occurrence of Odonate species recorded in and around Lingambudhi lake, Mysuru, Karnataka

Sl. No.	Common name	Relative Density	Month wise occurrence		
			June	July	August
1	Ditch jewel	28.13	+	+	+
2	Asian pintail	16.84	+	+	+
3	Crimson-Tailed Marsh Hawk	12.54	-	+	+
4	Scarlet Skimmer	8.74	-	+	+
5	Common Picture Wing	7.22	-	+	+
6	Chalky percher	6.46	-	+	+
7	Slender Skimmer	4.94	-	+	+
8	Wandering glider	4.18	-	+	+
9	Indian common clubtail	3.42	-	-	+
10	Coral -tailed cloudwing	2.66	+	+	-
11	Crimson marsh glider	1.52	-	-	+
12	Lesser green emperor	0.77	+	-	+
13	Coromandel Marsh	0.74	-	-	+
14	Marsh bluetail	0.73	-	+	-
15	Golden darlet	0.38	-	-	+
16	Duckweed firetail	0.37	-	+	+
17	Vestalis submontana	0.39	-	-	+
18	Emerald spreadwing	0.36	-	-	+

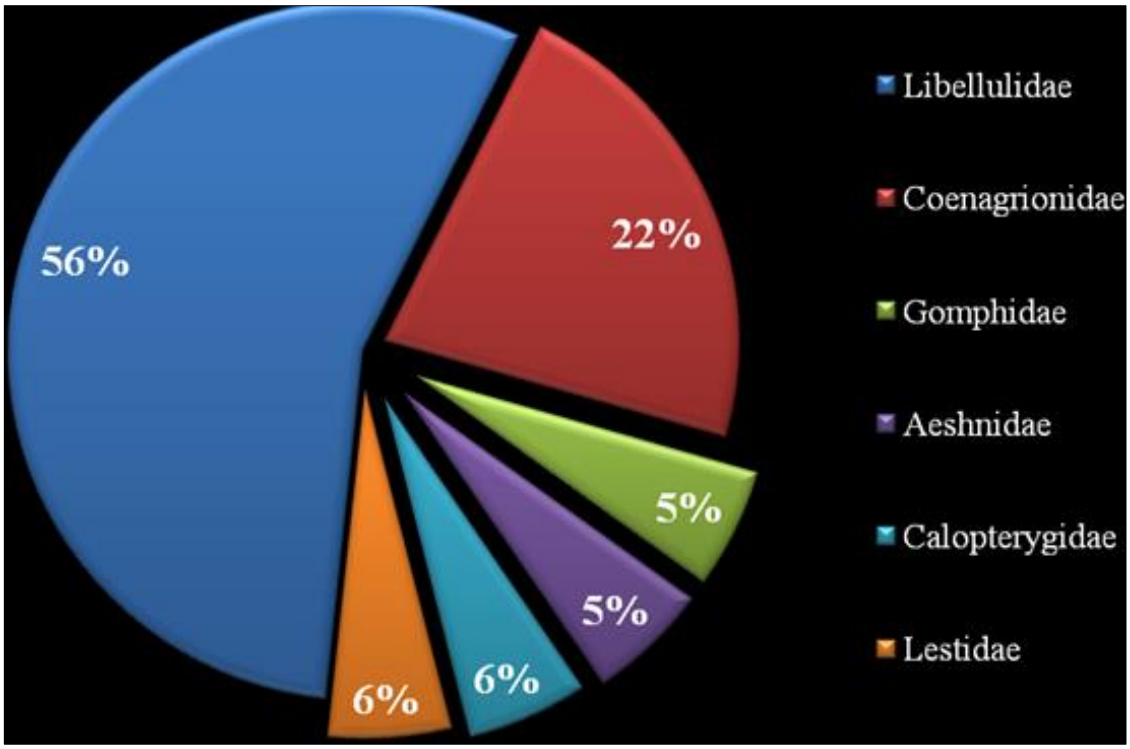


Fig 2: Odonate species in Percent Distribution among their families recorded in and around Lingambudhi lake, Mysuru, Karnataka

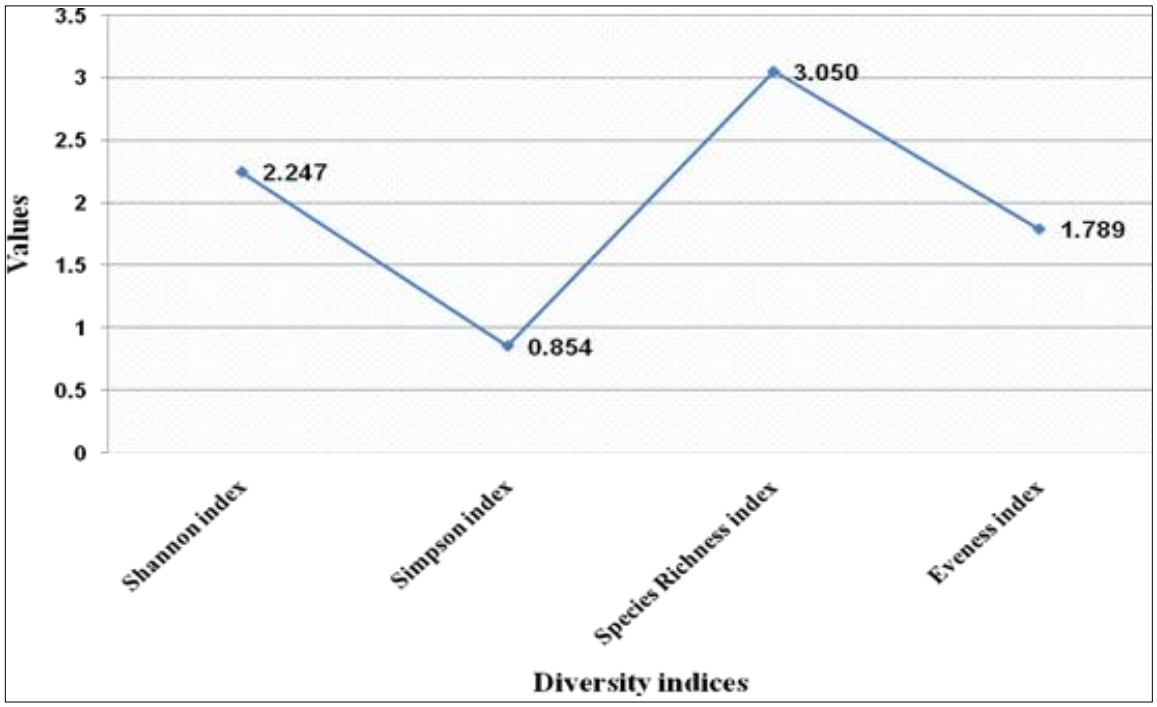
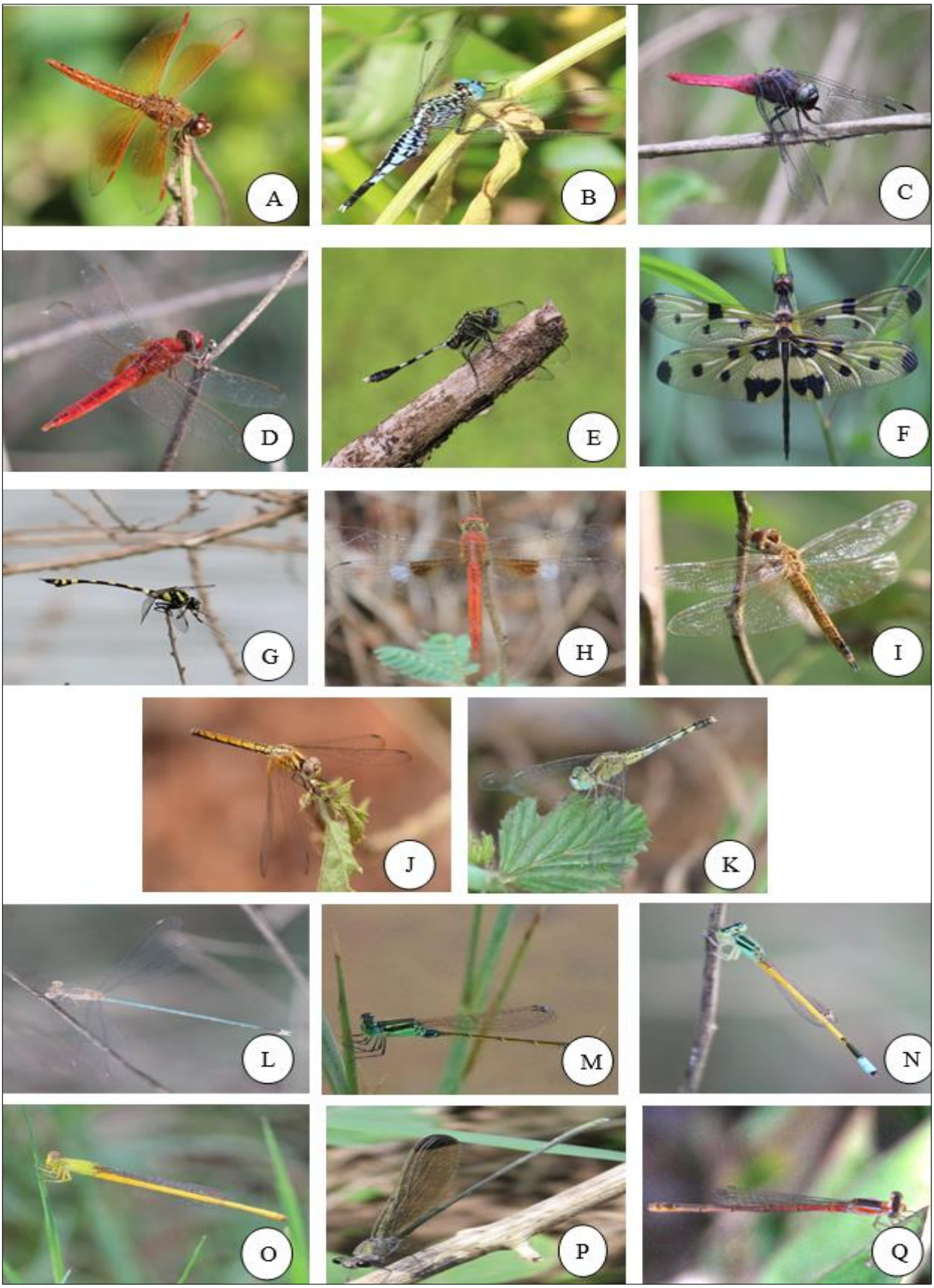


Fig 3: Diversity indicies values of recorded Odonates in and around Lingambudhi lake, Mysruru, Karnataka



(Anisoptera) A: Ditch jewel, B: Asian pintail, C: crimson tailed marsh hawk, D: Scarlet skimmer, E: Slender skimmer, F: Common picture wing, G: Indian common club tail, H: Coral-tailed cloudwing, I: Wandering glider, J: Crimson marsh glider, K: Chalky percher. (Zygoptera), L: Emerald spreadwing, M: Marsh blue tail, N: Golden darlet, O: Coromandel marsh, P: Vestalis submontana, Q: Duckweed firetail.

Plate 1: Odonate (Dragonflies and Damselflies) species recorded in and around Linambudhi Lake, Mysuru, Karnataka (2023)

Conclusion

Odonates acts as flagship insect communities and play an important role as perfect bio indicators of aquatic ecosystems. Understanding their association with the habitat generates necessary information for characterizing the response of odonates to change in their habitat. We suggest that more maintenance and research need to be carried out in and around Lingambudhi Lake, Mysuru for conservation of Odonate

diversity particularly. Thus, this study explores the attention towards odonate group and highlights its importance, by providing fundamental data which may be useful in future biodiversity conservation.

Conflict of interest

The authors declare that they have no competing interests.

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