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Checklist of Odonata species as indicators of riparian ecosystem of a tropical river, the southern Western Ghats, Kerala, S. India

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Abstract

A total of 36 species of odonates, including 24 species of dragonflies (Suborder Anisoptera) belonging to 3 families and 12 species of damselflies (Suborder Zygoptera) belonging to five families were recorded from the riparian zones of Meenachil River Basin, Kottayam District. The study was carried for a period of six years from 2009-2015. The highest diversity of odonates was that of family Libellulidae (61.11%), followed by Coenagrionidae (13.89%), Calopterygidae (10.71%), Gomphidae (8.33%) and Platycnemididae (5.56%). Six species were reported for the first time. Our data revealed odonate assemblages specific to the studied habitats such as marshlands, flowing water bodies, stagnant water bodies and vegetation type (wet zone and dry zone). These data will be useful in future studies and conservation of biodiversity in the studied habitats.

Keywords: Odonata, Meenachil River Basin, Kottayam District, biodiversity conservation

1. Introduction

The damselflies (Zygoptera) and dragonflies (Anisoptera) are amphibiotic insects, which belong to the order Odonata, constitute a small, well known order of insects that are widely distributed all over the world [1]. Approximately 6,000 species and subspecies belonging to 630 genera in 28 families are known from all over the world [2], out of which 499 species and subspecies of Odonata under 139 genera in 17 families, are represented in India [3, 4]. They spend a major part of their life cycle in the fresh water ecosystem. The adults are generally predacious insects, while the larvae are carnivorous and voracious. Even though the species are usually highly specific to a habitat, some have adapted to urbanization and use man-made water bodies. Being primarily aquatic, their life history is closely linked to specific aquatic habitats [5]. In addition, their value as indicators of quality of the biotope is being increasingly recognized. They are denizens of many aquatic ecosystems and their distribution covers a great deal of continuum from temporary to permanent water bodies [6, 7]. Earlier 54 species of Odonata: Anisoptera (33) and Zygoptera (21) inhabiting temporary water bodies were recorded from different parts of India [8-17].

Dragonflies mostly occur in the vicinity of different freshwater habitats like rivers, streams, marshes, lakes and even small pools and rice fields. Odonates are good indicators of environmental changes as they are sensitive to changes in the habitats, atmospheric temperature and the weather conditions. They are biocontrol agents; many species of odonates inhabiting agro-ecosystems play a crucial role controlling pest populations [18].

Fraser published three volumes on Odonata in the 'Fauna of British India' including 536 species and sub species of Odonata from India with many species from Madhya Pradesh (MP) and from Bangladesh, Bhutan, Myanmar, Nepal, Pakistan and Sri Lanka [8-10]. After Fraser's work, some additions were made from Madhya Pradesh, India by Bhasin [19]. Madhya Pradesh and Chhattisgarh states present 70 species of the entire Odonata diversity of India, which has now increased from 70-76 species. Kumar and Prasad [20] and Mitra [21] reported 39 species of Odonata from central India. Mitra [22] while working on Odonata of Indravati Tiger Reserve added nine more species bringing the number of species to 48. Prasad and Varshney published a checklist of the Indian odonates, including updated data on larval studies of all the known species [3]. Srivastava and Babu studied the damselflies of Sagar [23]. Mishra studied the Odonata of Madhya Pradesh and described a total of 70 species belonging to 40 genera and nine families distributed in different localities [24].

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Earlier surveys showed that no study has been carried out so far from this region of Kottayam district; hence an attempt was made to study the odonata fauna of Meenachil River Basin as a whole.

2. Materials and Methods

The odonates in this study were collected from the Meenachil River from temporarily or permanently flowing or still water bodies. A biweekly survey was undertaken from 2009–2015 during the monsoon and post monsoon periods. The adult specimens were identified with the help of identification keys provided by several authors [4-5, 8-10, 25-26]. The odonates were categorized on the basis of their abundance as VC - very common (>100 sightings), C - common (50–100 sightings), R - rare (2–15 sightings), VR - very rare (<2 sightings) [18].

3. Results and Discussion

A total of 36 species of odonates belonging to 26 genera of two suborders and eight families viz., Aeshnidae, Calopterygidae, Chlorocyphidae, Coenagrionidae, Gomphidae, Libellulidae, Platynemididae and Protoneuridae were recorded. Among them, nine previously unrecorded species were included in the check list of Kottayam district. The total of 36 species, 14 were very common, 14 were common and 8 rare in occurrence.

Most odonates recorded belong to the Libellulidae (22 species) with six new records (i.e., *Aethriamanta brevipennis*, *Brachydiplax sobrina*, *Bradinopyga geminata*, *Crocothemis servilia*, *Lathrecista asiatica* and *Orthetrum glaucaum*). Coenagrionidae (five species) were recorded with two new records (*Pseudagrion microcephalum* and *Pseudagrion rubriceps*). A new record from Aeshnidae was recorded (*Gynacantha dravida*). Only one species was recorded from the Protoneuridae and Gomphidae. Family Platynemididae was represented by two species, while Chlorocyphidae with one species. The list of odonates along with their scientific names and their status is provided in Table 1.

Table 1: List of Odonata of Meenachil River Basin

Anisoptera (Dragonflies)		Status
Aeshnidae		
1	<i>Gynacantha dravida</i> Lieftinck	R
Gomphidae		
2	<i>Ictinogomphus rapax</i> (Rambur)	VC
Libellulidae		
3	<i>Acisoma panorpoides</i> (Rambur)	C
4	<i>Aethriamanta brevipennis</i> (Rambur)	R
5	<i>Brachydiplax chalybea</i> Brauer	R
6	<i>Brachydiplax sobrina</i> (Rambur)	C
7	<i>Brachythemis contaminata</i> (Fabricius)	VC
8	<i>Bradinopyga geminata</i> (Rambur)	VC
9	<i>Crocothemis servilia</i> (Drury)	VC
10	<i>Diplacodes trivialis</i> (Rambur)	VC
11	<i>Lathrecista asiatica</i> (Fabricius)	R
12	<i>Neurothemis tullia</i> (Drury)	VC
13	<i>Orthetrum chrysis</i> (Selys)	C
14	<i>Orthetrum glaucaum</i> (Brauer)	C
15	<i>Orthetrum luzonicum</i> (Brauer)	R
16	<i>Orthetrum sabina</i> (Dury)	VC
17	<i>Pantala flavescens</i> (Fabricius)	VC
18	<i>Potamarcha congener</i> (Rambur)	C
19	<i>Rhodothemis rufa</i> (Rambur)	R
20	<i>Rhyothemis variegata</i> (Linnaeus)	VC
21	<i>Tholymis tillarga</i> (Fabricius)	R
22	<i>Trithemis aurora</i> (Burmeister)	VC
23	<i>Trithemis festiva</i> (Rambur)	VC
24	<i>Urothemis signata</i> (Rambur)	VC

Zygoptera (Damselflies)		
Calopterygidae		
25	<i>Vestalis apicalis</i> Selys	C
26	<i>Vestalis gracilis gracilis</i> (Rambur)	C
27	<i>Vestalis gracilis montana</i> Fraser	C
Chlorocyphidae		
28	<i>Rhincocypha bisignata</i> (Selys)	C
Coenagrionidae		
29	<i>Agriocnemis pygmaea</i> (Rambur)	VC
30	<i>Ceriagrion cerinorubellum</i> (Brauer)	C
31	<i>Ceriagrion coromandelianum</i> (Fabricius)	C
32	<i>Pseudagrion microcephalum</i> (Rambur)	C
33	<i>Pseudagrion rubriceps</i> (Selys)	VC
Platynemididae		
34	<i>Copera marginipes</i> (Rambur)	C
35	<i>Copera vittata</i> (Selys)	C
Protoneuridae		
36	<i>Caconeura risi</i> (Fraser)	R

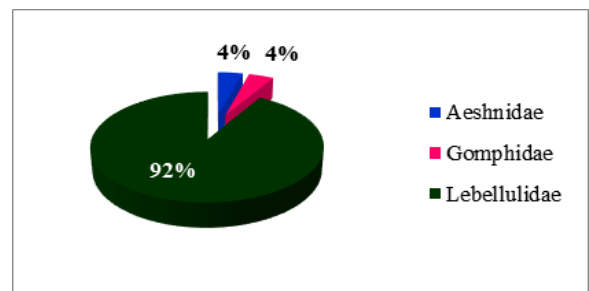


Fig 1: Percentage of dragonfly species from each family

So far, the occurrences of 31 species of odonates were reported under 22 genera and seven families from Kottayam district [27]. The present observations indicate good diversity of Odonata in the riparian zone of Meenachil River Basin. They amount for about 22% of the reported species from Kerala.

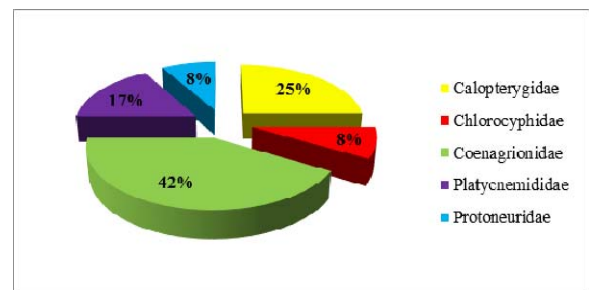


Fig 2: Percentage of damselfly species from each family

Temporary water bodies are found throughout the world particularly in tropical countries [28]. Anisoptera was abundant in most of the water bodies sampled. This might be due to their high dispersal ability [29-31] and their adaptability to wide range of habitats [32-34]. Less abundance of damselflies was probably due to their limited dispersal ability [35], undulating environment afforded by the temporary water bodies [28, 31] and partial or absence of shade cover [36].

The size of the temporary water bodies determines the species richness and diversity of Odonata [37-41]. Factors affecting Odonata species assemblage in temporary water bodies are human disturbances (modification of habitat structure) [42-48], contamination of water bodies [49] and the presence of predators [50-51]. Minimum diversity in Ukkadam tank could be due to the discharge of sewage water into the tank and presence of insectivorous fish. The abundance of Libellulidae (Anisoptera) and Coenagrionidae (Zygoptera) in the present study might be due to their shorter life cycle and widespread distribution [44] and tolerant to wide range of habitats [52-53].



4. Conclusion

The Meenachil River Basin seems to have a rich Odonata diversity of 36 species on the river bank probably due to its establishment in the dense shrub and tree vegetation. The observations recorded in the present study may prove valuable as a reference for assessing the changes due to the environmental conditions in the locality, in future. Continuous exploration in Meenachil River Basin region could add many more new species from the region.

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