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# Diversity of Odonata in Palakkal Kole wetland, Thrissur, Kerala before and after deluge

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## Abstract

A study was conducted to analyze the impact of the deluge on the Odonata diversity at Palakkal kole wetland, Thrissur, Kerala. The paper deals with the study of Odonata diversity of Palakkal Kole wetland, Thrissur before and after Kerala deluge, 2018. The comparison of Odonata diversity was made between 4 months (September to December) of 2017 and 2018. The diversity of Odonata of pre-deluge was 21 species and post-deluge was 22 species and the abundance were 1659 and 1042 respectively.

**Keywords:** Odonata, deluge, kole wetland, diversity

## Introduction

Insects are the most diverse group of animals on the planet, including more than a million described species and representing more than half of all known living organisms<sup>1</sup>. Order Odonata is a primitive group of carnivorous insects encompassing the dragonflies (Anisoptera) and the damselflies (Zygoptera) which have existed since the Triassic period. Odonates are the most dominant invertebrate predator in any ecosystem<sup>2</sup>. There are approximately 6000 species under 600 genera in 29 families described all over the world<sup>3</sup>. 474 species belonging to 142 genera in 18 families exist in India<sup>4</sup>. 193 species under 83 genera in 14 families are known from the Western Ghats<sup>5</sup>. Of this, 168 species are reported from Kerala<sup>6</sup>. This rich diversity is fast disappearing due to the destruction of their breeding and resting habitats.<sup>7</sup>

Dragonflies are considered as bio-indicators. Some species are habitat-specific and so can be used for mapping of the habitats which they represent<sup>7</sup>. Economically they are of great importance in destroying noxious flies and mosquitoes, as well as the smaller moths which are regarded as pests<sup>8</sup>. Dragonflies, therefore, have potential health and economic value, which is not yet fully exploited<sup>7</sup>. Palakkal kole wetland of Thrissur, our study area

was completely flooded during devastating deluge of August 2018. We tried to analyze if there is any effect of the deluge on the diversity of Odonata, by comparing post deluge diversity data (2018) with diversity data of the year previous to deluge (2017), which was already taken.

## Materials and Methods

Study area (Fig. 1)

Palakkal kole wetland was monitored for Odonata diversity. Palakkal is situated at a distance of 6 km from Thrissur, at geographical coordinates of 10°28' 15"N and 76°12' 40"E. The study site (Fig. 2) includes deep and shallow waters, open mudflats, grassland and paddy fields. It also includes



Fig. 1. Study area with Odonata transect: Palakkal Kole wetlands, Thrissur

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bunds, dykes and trees which provide different types of microhabitat for the odonates.



Fig. 2. Study site

### Data collection and analysis

The fieldwork was done for four months from September to December in 2017 and September to December in 2018 which include pre-deluge data and post-deluge data respectively. Odonata specimens were sampled twice in a month. The observation started at 9.30 am and it was continued upto 12.00 pm. The area under study was surveyed using the line-transect method (Fig. 1). Specimens were photographed using Nikon B700.



Fig. 3. *Acisoma panorpoides*  
Rambur



Fig. 5. *Pantala flavescens* Fabricius



Fig. 4. *Brachydiplax chalybea*  
Brauer



Fig. 6. *Rhyothemis variegata* Linnaeus

If found necessary, sweeping was carried out using an insect net to collect odonates. The day to day observations was noted in the field book and a data-sheet is prepared in Microsoft excel. The field photographs were used for identification of species with the help of the photographic field guide of dragonflies and damselflies of Kerala<sup>9</sup>.

Diversity and dominance were estimated using statistical indices such as Dominance Index and Shannon-Wiener Index.

$$\text{Dominance index} = 1 - \left( \frac{\sum_{i=1}^N n_i(n_i - 1)}{N(N - 1)} \right)$$

$$\text{Shannon index} = - \sum_{i=1}^N \left( \frac{n_i}{N} \log_2 \left( \frac{n_i}{N} \right) \right)$$

$n_i$  = the total number of individuals of each species

$N$  = the total number of organisms of all species

### Results

A total of 24 species of odonates under 19 genera belonging to 4 families namely, Libellulidae, Coenagrionidae, Gomphidae and Platycnemididae are recorded during the study period in two consecutive years. Dragonflies dominate with 17 species, 16 of which belong to family Libellulidae. The second dominant family was Coenagrionidae which belongs to damselflies with 6 species.

**Pre-deluge period (September to December 2017):** 21 species under 18 genera belonging to 4 families were recorded from the study area. Out of 21 species, dragonflies dominate with 15 species. Damselflies like *Copera marginipes* and *Ceragrion olivaceum* were recorded only in this period. *Rhyothemis variegata* (342) (Fig. 6) and *Acisoma panorpoides* (293) (Fig. 3) were the most abundant species recorded during this period. In pre-deluge, dominance index was 0.8785 and Shannon index was 2.347.

**Post-deluge period (September to December 2018):** 22 species under 19 genera belonging to 3 families were

recorded from the study area. Out of 22 species, dragonflies dominate with 17 species. Two dragonfly species; *Diplacodes trivialis*, *Tetrathemis platyptera* and a damselfly species, *Agriocnemis keralensis* were additionally recorded (endemic to Western Ghats)<sup>10</sup>. *Brachydiplax chalybea* (113) (Fig. 4) and *Brachythemis contaminata* (112) were the most abundant species of this period.

Odonata was observed in pre-deluge data (1659) compared to that of post-deluge data (1042).

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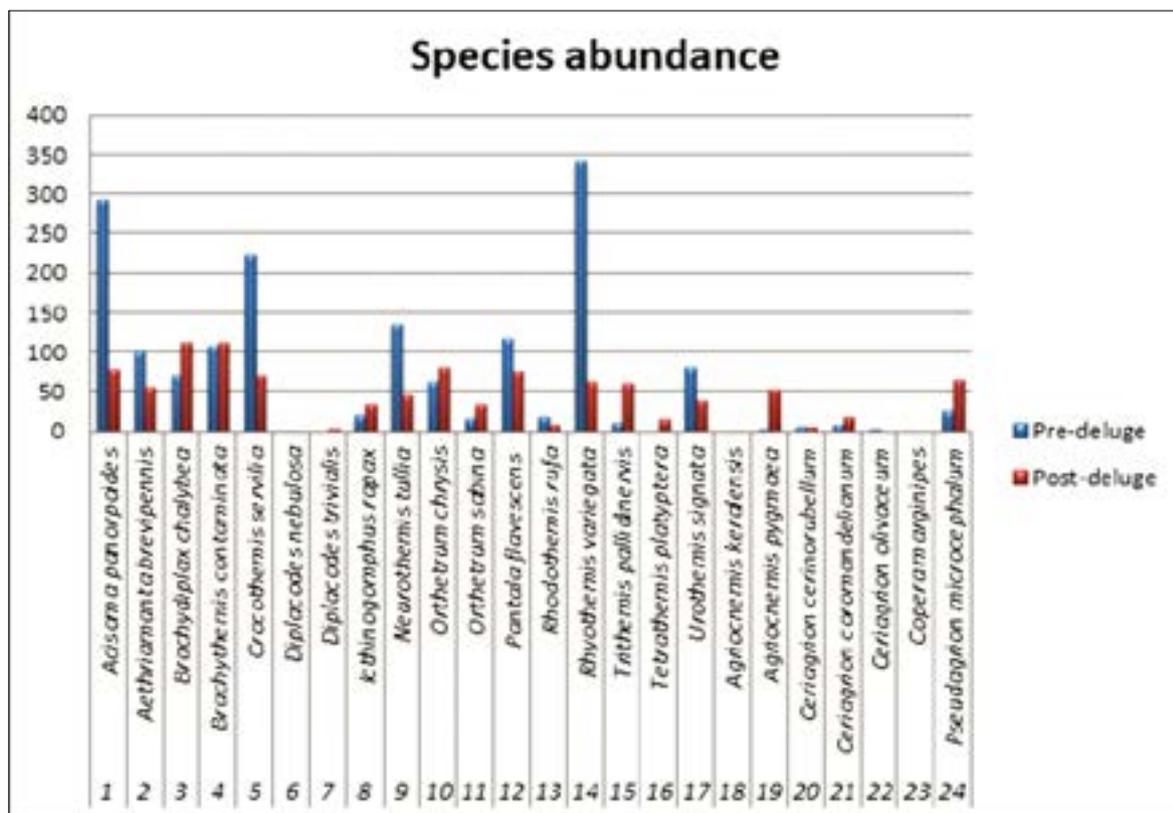


Fig .7. Diversity and abundance of odonata species recorded from study area

In Post-deluge, dominance index was 0.9287 and Shannon index was 2.735.

### Discussion and conclusion

A study conducted by Gigi *et al.*<sup>11</sup> at Muriyad kole wetlands of Irinjalakuda in 2016 recorded 12 species of dragonflies whereas in this study, 17 species of dragonflies were recorded. Even though a significant difference cannot observe on the Odonata diversity from the data collected in two different years at Palakkal kole wetland, more abundance of

the identification of Odonates. We are thankful to Vivek Chandran, Research scholar, Christ college, Irinjalakuda for helping us to prepare study area map. Our special gratitude also goes to Arun George, Karthika Sadhananthan, Bimal Das and Cicy Ann for their valuable support in the time of collection and in all phases of this work. We also express our sincere gratitude to the principal, Christ College Irinjalakuda for providing the facilities for work.

Table 1. Diversity and abundance of odonata species recorded from study area

Sl. No	Species	Family	Pre-deluge	Post-deluge	Total
1	<i>Acisoma panorpoides</i> Rambur, 1842	Libellulidae	293	78	371
2	<i>Aethriamanta brevipennis</i> (Rambur, 1842)	Libellulidae	101	57	158
3	<i>Brachydiplax chalybea</i> Brauer, 1868	Libellulidae	71	113	184
4	<i>Brachythemis contaminata</i> (Fabricius, 1793)	Libellulidae	108	112	220
5	<i>Crocothemis servilia</i> (Drury, 1770)	Libellulidae	225	71	296
6	<i>Diplacodes nebulosa</i> (Fabricius, 1793)	Libellulidae	1	2	3
7	<i>Diplacodes trivialis</i> (Rambur, 1842)	Libellulidae	0	5	5
8	<i>Ictinogomphus rapax</i> (Rambur, 1842)	Gomphidae	21	35	56
9	<i>Neurothemis tullia</i> (Drury, 1773)	Libellulidae	134	45	179
10	<i>Orthetrum chrysis</i> (Selys, 1891)	Libellulidae	63	80	143
11	<i>Orthetrum sabina</i> (Drury, 1770)	Libellulidae	17	35	52
12	<i>Pantala flavescens</i> (Fabricius, 1798)	Libellulidae	118	75	193
13	<i>Rhodothemis rufa</i> (Rambur, 1842)	Libellulidae	20	10	30
14	<i>Rhyothemis variegata</i> (Linnaeus, 1763)	Libellulidae	342	64	406
15	<i>Trithemis pallidinervis</i> (Kirby, 1889)	Libellulidae	12	61	73
16	<i>Tetrathemis platyptera</i> Selys, 1878	Libellulidae	0	16	16
17	<i>Urothemis signata</i> (Rambur, 1842)	Libellulidae	81	39	120
18	<i>Agriocnemis keralensis</i> Peters, 1981	Coenagrionidae	0	2	2
19	<i>Agriocnemis pygmaea</i> (Rambur, 1842)	Coenagrionidae	4	53	57
20	<i>Ceriagrion cerinorubellum</i> (Brauer, 1865)	Coenagrionidae	7	6	13
21	<i>Ceriagrion coromandelianum</i> (Fabricius, 1798)	Coenagrionidae	9	18	27
22	<i>Ceriagrion olivaceum</i> Laidlaw, 1914	Coenagrionidae	4	0	4
23	<i>Copera marginipes</i> (Rambur, 1842)	Platycnemididae	2	0	2
24	<i>Pseudagrion microcephalum</i> (Rambur, 1842)	Coenagrionidae	26	65	91

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