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Distribution of dragonflies and damselflies from Pulicat lagoon, Tamilnadu

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Abstract
The colourful damselflies and dragonflies of the order Odonata mostly seen together during monsoon season. Over all 18 odonates were recorded, represented by 16 genera and 3 families. We observed their presence during the onset of Northeast monsoon (late Sep 2014) and decline in their population during the onset of winter season (Dec 2014). From the month of september to december we encountered the maximum number of Odonates from the Pulicat lagoon.
Orthetrum Sabina a migratory odonate species was the most dominant one contributed 19.6% followed by *Brachthemis contaminate* 11.3%, *Ceriagrion coromandelianum* 10.6%, *Micrathyria tibialis* 8.1% and least dominant species were *Copera marginipes* contributed only 0.38%. The presence of odonates is a mark of proof to conclude that the lagoon is still productive.

Keywords: Damselflies and dragonflies, Pulicat lagoon.

1. Introduction
Dragonflies and damselflies are the most prominent representatives of the order Odonata contribute a large proportion of total invertebrate biomass and species richness [1-3].They are sensitive, react immediate to any sudden changes occur in the habitat [4].
Odonates spread all over the world but their centre of species richness reported from tropical countries. Odonates are easy to handle and serve as good indicators to check environmental condition of ecosystem [5].
There is a growing need to identify effective bio-indicators to advocate in wetlands management and protection activities [6-7]. Harinath [8] reported that insects are the largest active order in the animal world, participate a vital role in nutrient cycle, organic matter decomposition, pollination and soil aeration in aquatic ecosystem.

Materials and Methods
Study area

Fig. 1 Satellite map of Pulicat lagoon

Fig 2: Sampling locations of dragonflies and damselflies

Table 1: Geo coordinate of the Odonates sampling locations in Puilcat lagoon

Station	Location	Latitude and Longitude
1	Kunankupam	13º25'29''N,80º19'27''E
2	Light house kuppam	13 º12'07''N,80 º19'27"E
3	Arangakuppam	13 º25'12''N,80 º19'27"E
4	Koraikuppam	13º24'56"N,80º19'29"E
5	Towards sattankuppam	13º24'56"N,80º19'29"E
6	Sattankuppam	13 º24'40N,80 º19'30"E
7	Jamilabad	13º25'39''N,80º18'26
8	Kulathumedu	13º25' 31N,80 º19'32E

An attempt to explore the existing diversity of Odonates in and around Pulicat lagoon (Fig.1 & 2) with an extensive and regular (monthly) observation was carried out from September 2013 to December 2014 with sweep nets (Only voucher specimens were collected for photographs & identification). To carry out the study the lagoon and its surroundings were divided into eight locations (Table. 1). Out of which five spots were selected from each sector according to the maximum availability of Odonates. Dead individuals were transferred into insect collection paper packs and brought to the laboratory, properly stretched, pinned, oven dried for 72 hours at 60°C and kept in insect boxes prior to this identification was carried out using identification keys of Fraser [9].

Results and Discussion

Over nearly one year period a total of 3,468 individuals belong to 18 orders of Odonata 16 genera and 3 families were recorded (Table 2 Plate 1 & 2). No previous report was available on Odonata of this lagoon to compare with the present study. On the basis of identified species, Libellulidae was the most dominant family of Odonata represented by 12 species followed by Coenagrionidae 5 species and 1 species of Platycnemididae. The dominate family Libellulidae was reported by many earlier workers. Kumar and Mitra [10] recorded 42 species from Sahstradhara, Dehra Dun 18 species belong to the family Libellulidae. Kulkarani and Prasad [11] recorded 162 scies from Western Himalaya region including 42 species of Libellulidae. Kumar [12] recorded 109 species in Jharkhand where 40 species come under the family Libellulidae, Vashishth *et al*. [13] recorded 17 species from Rajaji National Park where 9 species belong to Libellulidae. Kandibane *et al*. [14] recorded 12 species of Odonates in an irrigated rice field of Madurai where 7 species belong to Libellulidae. Emiliyamma [15] observed 31 species of Odonates from Kottayam district where Libellulidae contributed 18 species. 137 species of Odonates from Kerala were also reported by her the family Libellulidae contributed 56 species.

Andrew *et al.* [16] stated that diversity of Odonata is far above the ground level in forest streams and rivers than in impounded wetlands such as ponds, lakes, and reservoirs. Odonata species are good bio-indicators effectively indicated the condition of the environment [17]. Subramanian [18] reported the order Odonata was reasonably large with worldwide distribution of approximately 5,952 species, of which 474 species out of 142 genera.

Libellulidae the most dominant family constituting 66.4% of the biomass followed by Coenagrionidae 31.8% and Platycnemididae 1.8% (Fig. 3).

Table 2 Distribution of Odonates in the Pulicat lagoon

AName of the family	S.No	Name of the species	S1	S2	S3	S4	S5	S6	S7	S8	IUCN Status
Libellulidae	1.	***Orthetrum Sabina,***	+	-	+	+	-	+	+	+	LC
	2.	*Brachythemiscontaminate* (Female)	+	+	-	+	+	-	+	+	LC
	3.	*Brachythemis contaminata* (Male)	-	-	+	-	+	+	+	+	LC
	4.	*Erythrodi plaxfervida*	+	+	+	+	+	-	+	-	DD
	5.	*Rhyothemis variegate*	+	+	+	-	+	+	+	+	LC
	6.	*Aethriamanta brevipennis*	-	+	+	-	+	+	+	+	LC
	7.	*Micrathyria aequalis*	+	-	+	+	+	-	+	+	DD
	8.	*Zyxomma petiolatum*	+	+	+	+	-	+	+	+	LC
	9.	*Macrodiplax cora* (Brauer,)	+	+	-	+	+	-	+	+	LC
	10.	Tramea limbata	+	-	+	+	-	+	-	+	LC
	11.	*Acisoma panorpoides*	-	+	-	+	-	+	+	+	LC
	12.	*Micrathyria tibialis*	+	-	+	+	+	+	+	-	LC
	13.	*Micrathyria aequalis*	-	+	-	+	+	+	+	+	DD
Coenagrionidae	14.	*Ischnura aurora* (Male)	+	+	-	+	+	+	+	+	LC
	15.	*Ischnura senegalensis*	-	+	+	-	+	+	+	+	LC
	16.	*Ceriagrion coromandelianum*	+	-	+	-	+	+	+	+	LC
	17.	*Agriocnemis pygmaea*	-	+	+	+	-	+	+	+	LC
	18.	Agriocnemis lacteola	-	+	-	+	+	+	+	+	LC
	19.	*Ceriagrion rubiae*	-	+	+	+	+	-	+	+	DD
Platycnemididae	20.	*Copera marginipes*	-	+	+	+	+	-	+	+	LC
		Total	11	14	14	15	15	14	17	18	

Present (+), Absent (–), Least Concern (LC), Data Deficient (DD).

Plate1: Dragonflies from Pulicat lagoon temporary water ditches: a. *Orthetrum Sabina,* b. *Brachythemis contaminat* (female), c. *Brachythemis contaminata* (male), d. *Erythrodiplax fervida*, e. *Rhyothemis variegata* (female), f. *Aethriamanta brevipennis,* g. *Micrathyria aequalis*, h. *Zyxomma petiolatum*, i. *Macrodiplax cora* j.*Tramea limbata,* k. *Acisoma panorpoides*, l. *Micrathyria tibialis*

Plate 2: Damsel flies in the Pulicat lagoon temporary water ditches: m. *Ischnura aurora* male, n. *Ischnura senegalensis,* o. *Ceriagrion glabrum*, p. *Ceriagrion coromandelianum,* q. *Copera marginipes,* r. *Agriocnemis pygmaea,* s. *Ceriagrion rubiae*, t. *Agriocnemis lacteola*

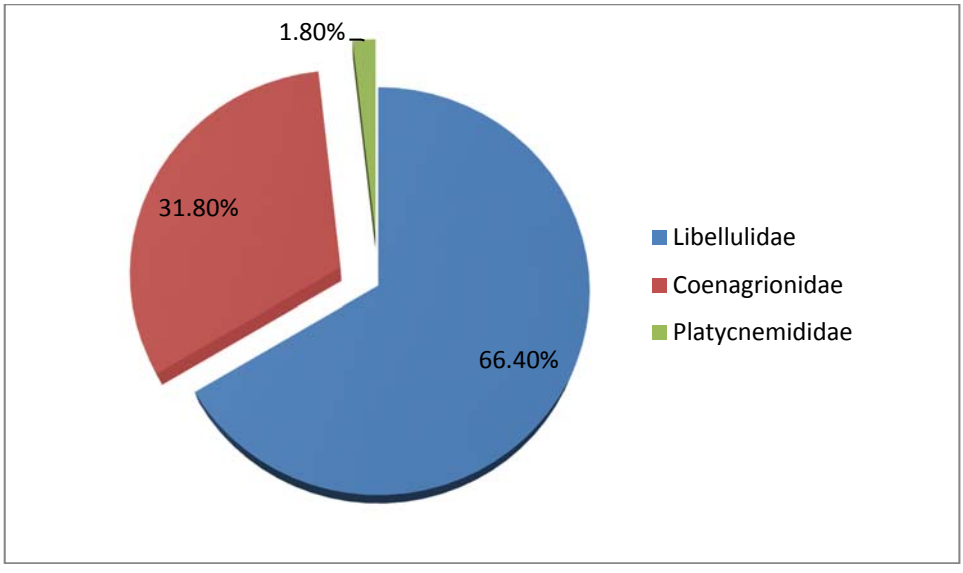

Fig 3: Percentage dominance of families of the order Odonata

Relative abundance (Table 3) indicated that seven species out of 18 were found to be occasional, one species very common, two species common, two species rare and one species very rare species. The IUCN red list status of Odonates described that 16 species were least concern and 4 species of Data Deficient under Moor [19] lower risk category of IUCN red list of threatened species, data deficient for one species.

Conclusion

Odonates are rapacious in nature and also serve as good source of energy for birds, other insects and spiders. Lack of previous reports or data on Odonates did not support any type of conclusion regarding native, invasive and extinct species of Odonates. Such situation warrented further indepth diversity studies to initiate and update Odonates diversity from Pulicat lagoon. A highly productive lagoon accommodate a variety of organisms needs a data base for any kind of environmental and integrated taxonomical study in the near future.

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