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A preliminary study of diversity of *Zygoptera* (Damselflies) of saundad lake Gondia district Maharashtra India

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Abstract
Odonates are diverse group of insect belongs to order *Zygoptera* showing remarkable diversity in aquatic biomes. To monitor the population of Odonates regular survey was conducted at Saundad Lake situated at National Highway 53 spread across 6 acres of land, surrounded by rice farm fields. Data were recorded for consecutive three years 2023-2025. During study, line transect method and direct visual count methods was applied. Results indicates variation in population of member of Order *Zygoptera* and Anisoptera due to anthropogenic action. Overall 38 species of Odonates are recorded belongs 4 families.
During study, we also found increases in anthropogenic activity as the season progress with high incidence of cattle grazing, fishing activity and removal of lotus during favourable seasons. Due to more and more anthropogenic activity, the lake area is shrinking lead to major destruction of habitat of odonates a cause of concern.

Keywords: Anthropogenic activity, *Zygoptera*, conservation

Introduction
Odonata belongs to Orthoptera class Insecta divided majorly into two categories such as Damselfies and Dragonflies. Silsby (2001) [19] reported nearly 6000 species of dragonflies all over the globe. Damselfies belongs to Order *Zygoptera* wheras Dragonflies belongs to Anisoptera. Damselflies are also known as Angel of Gods as their show remarkable beauty within. Damselflies consist of nearly 24 families. Odonates prefer to occupy both terrestrial and aquatic wetlands as bio indicator of healthy ponds ecosystem Smith *et al*., 2007. Odonates lifecycle includes egg, larvae (Nymph), pupa and adult. Larvae are voracious feeder. Adult of damselflies lays cylindrical and oblong eggs on leaf blades of marshy plants from where the larvae hatches and becomes voracious feeder feeding actively on zooplanktons and mosquito larvae Andrews *et al*., 2008., Tiple *et al*., 2008). Among observed species according to Subramanian (2009) [20, 21] nearly 267 species belong to 87 genera and 8 families were reported in India. As per abundance of population recorded in India major reporters are (Subramanian and Babu 2020., Tiple and Khoparde 2015. Tiple 2020.) [24, 27, 28] reported nearly 496 species from India. 134 species from Maharashtra.Thier preferred habitat includes ponds, lakes, rivers, ditches and wetlands marshy places with abundance of natural water and dams. Present study was undertaken to study the species abundance of Damselflies on naturally formed Saundad lake of Gondia District.

Materials and Methods
a. Study Area
Saundad lake flanked by national highway 53, we labelled it as Site A1 and site B2. This lake is dominated by large amount of aquatic flora and weeds make suitable habitat for prevalence of good number of populations of Odonates. Bank of Saundad Lake is densely surrounded by vegetation of aquatic phytoplankton, which include floating, and submerged phytoplankton's and Adjoining to backwater areas of Lake Paddy grower grows large amount of paddy crops in Rabi and Kharif season make ideal habitat for multiplication of members of *Zygoptera*.

b. Methodology and Identification:
Sampling methods includes manual operation of using sweeping nets; direct visual count and line transect methods to record existing population of odonates. For identification Field Guide Fraser *et al.*, 1993,1934, and 1936) [8, 9, 10]. During Line Transect Method, a stretch of 3 km area over bank of lake was survey by walk and capturing photographs of observed members *Zygoptera*. Photographs were taken by using Sony alpha 57 DSLR Camera with lens mounted of 55 -300 mm. Later on, photographs were analysed by using Field guide and Reference books. During observation body parameters of Odonates are considered which include variation of thoracic wing venation and body morphological feature. Based upon regular occurrence and baseline data observed odonates population were categorized into Rare (R), Common (C), Very Common (VC) and Occasional (O).

Result and Discussion
Result indicate total 34species of Odonates are recorded belongs to 4 families. Of which more abundance population is of *Zygoptera*. We do find the vegetation of Lake Make importance to monitor and success of population of Odonates.
In comparison to Lake of Right Side of Saundad Lake (Site A) other side (Site B) there is very less or nearly no vegetation found which remarkably shows drastic decline in the population of Odonates diversity.To compare the diversities among two sites Shannon-Weiner Diversity Index (Shannon,1949) considering a measure of average certainty in predicting to species chosen randomly among existing population at random, to be calculated as H= -∑(ni/N) ., ni = Number of Individual of a particular species and N = Total number of individual of all species. Similarly, Margalef's Richness Index (R) and Dominance Index (E)

was calculated with using SPSS software 26.0 version.

National Highway 53 considered to most busy highways there is regular movement of heavy vehicles which lead disturbance in habitat of odonates, similarly their flanks lake is other anthropogenic activity such as bathing, grazing of Cattle's like buffaloes, cows in lake area lead to disturbance in existing vegetation of phytoplankton. It is necessary to take major steps in conservation and restoration of such wetland ecosystem, which not only helps us to conserve nature but also helps us to keen our environment enrich with biodiversity. Talmale S.S. & P.P Kulkarni, (2003) [25] also reported diversity of Rice ecosystem showing abundance of damselflies population ideal in rice agroecosystem field. According to (Corbet 2004, Jacob *et al*., 2017) [6] status of lake health can be improvised by the status of dragonflies hovering over lake. Presence of Dragon flies are bio indicator of wetlands health, in terms of abundance of flora and Fauna. As if very less anthropogenic activity water quality and vegetation is ideal for breeding of damselflies larvae and diversity abundance.

Aciagrion pallidum

Argiocnemis rubescens rubeola

Agriocnemis femina

Ceriagrion coromandelianu Golden Dartlet (Ischnura aurora Pseudagrion rubriceps Ceriagrion fallax

Table 1: Checklist of Damselflies of Saundad Lake Dist Gondia Maharashtra (Nomenclature by Subramanian *et al*., 2009b).

Sr. No.	Family	Genus	Common Name	S*	Habitat
1	Platycnemididae (5 Genra)	*Copera marginipes (Rambur,1842)*	Yellow Bush Dart	C	Bank of Ponds at ground level
2		*Copera vittata 1(Selys,1917)*	Blue Bush Dart	C	Marshy habitat
		Copera vittata deccanensis (Laidlaw,1917)	Blue Bush Dart	C	
3		*Disparoneura quadrimaculata (Rambur,1842)*		C	
		Copera ciliata (Selys,1963)		C	
4	Lestidae (3 Genera)	*Lestes elatus (Selys,1862)*	Emerald Spreadwig	R	
5		*Lestes umbrinus (Selys,1891)*	Brown Spreadwing	C	
6		*Lestes viridulus (Rambur,1842)*	Emerald Striped Spreadwing	R	
7	Coenagrionidae (27 Genera)				
		Aciagrion hisopa	Violet Striped Slender Dartlet	C	
		Aciagrion pallidium		C	
8		*Aciagrion occidentale*	Green Striped Slender Dartlet	VR	
9		*Agriocnemis femina (Brauer,1868)*	Pruinosed darlet	C	
10		*Agriocnemis kalinga*		R	
11		*Agriocnemis lacteola*	Milky Dartlet	R	
12		*Agriocnemis pygmaea*	Pigmy Dartlet	VC	
13		*Agriocnemis splendidissima*	Splendid darlet	C	
14		*Ceriagrion cerinorubellum*		R	
15		*Ceriagrion coromandelianum (Fabricius,1798)*	Coromandel Marsh Dart	VC	
16		*Ceriagrion olivaceum*	Rusty Marsh Dart	R	
17		*Ceriagrion rubiae*	Orange marsh Dart	R	
		Paracericion calamorum		R	
		Paracericion malayanum		R	
18		*Ischnura aurora (Brauer,1865)*	Golden Dartlet	C	
		Ischnura senegalensis (Rambur, 1842)	Senegal Golden Dartlet	C	
19		*Onychargia atrocyana*	Black marsh Dartlet	R	
20		*Enallagma parvum*	Azure Dartlet	C	
21		*Pseudogrion decorum*	Three Lined Dartlet	C	

		Pseudagrion hypermelas		R	
		Pseudagrion malabaricum		C	
		Pseudagrion microcephalum (Rambur, 1842)	Blue Grass dartlet	R	
		Pseudagrion rubriceps (Selys,1876)	Saffron faced Blue Dart	VC	
		Pseudagrion spencei		C	
		Pseudagrion nursei		VC	
		Rhodischnura spencei		VC	
		Mortonagrion varralli		R	
	Protoneuridae				
		Caconeura ramburi		VR	
		Disparoneura quadrimaculata		C	
		Prodasineura verticalis		C	

Abbreviations: C- Common., R- Rare. VR- Very Rare.

Conclusion

It is first time-recorded data for such huge lakes flanked by National Highways, lead to significant record of existing biodiversity of Odonates forming a baseline database for Saundad Lake. Higher numbers of Odonates in site A significantly evaluate the potential and ecological health of lake as if odonates are good indicator of pollution in comparison to Site B hampered by large anthropogenic activity. Diversity analysis of Site A is more significant (1.68) then site B (1.53). whereas Dominance Index of site A are highest (0.46) and low in site B (0.12). Thus, Diveristy indices showed that site A is less diverse and having Dominance Index due to availability of ideal habitat. From the above study, we can conclude Odonates are significant biological indicator of wetland and aquatic biomes.

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