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Diversity of damselfly (Suborder-Zygoptera) in the jam lake, Katol, District-Nagpur (Maharashtra), India

Pawan N Chankapure and Vikas G BarsagadeDOI: <https://doi.org/10.22271/j.ento.2020.v8.i4aj.9077>**Abstract**

Diversity of damselflies belongs to the insects order Odonata use as an ecological indicator for health of water resources. Ecological importance of these insects makes them valuable to examine the environmental impact of various kinds in the ecosystem. The present study was carried out to assess the diversity of damselflies around Jam Lake, Katol Taluka in the Nagpur district of Vidarbha (21°13'20.7"N 78°37'54.1" E). Observations were made through transverse lines along the edge of Lake and nearby areas. Diversity study for damselflies was carried out around the Jam Lake during the winter and rainy seasons from 2017 up to 2020 period. A checklist of 19 species of damselflies belonging to 11 genera (*Agriocnemis*, *Aciagrion*, *Ceriagrion*, *Enallagma*, *Ischnura*, *Pseudagrion*, *Rhodischnura*, *Alloccnemis*, *Copera*, *Disparoneura*, *Lestes*) and 3 families (Coenagrionidae, Lestidae and Platycnemididae) were prominently identified. Total 52.63% are common, 5.26% are occasional and 42.10% are rare species were examined. Present study suggested that, species richness indicates the stable ecology and healthy water resources nearby the lake areas needs to be conserve with necessary protection measures.

Keywords: Damselflies diversity, jam lake, resources, species richness**Introduction**

Studies from the decades added the importance of odonates with respect to the ecological system. Odonates occupying both aquatic and terrestrial habitats and are vital biological indicators (Smith *et al.* 2007) ^[21] of the health of freshwater habitats. There are 6,324 described extant species within Odonata, grouped in two suborders: An *Anisoptera* (dragonflies), and *Zygoptera* (damselflies) (<https://www.indianodonata.org/>). Suborder *Zygoptera* consists of 24 families describing the beautifully colored damselfly. Damselflies and dragonflies earliest fossils so far discovered from Upper Carboniferous (Pennsylvanian) sediments in Europe formed about 325 million years ago. However, some of the modern families of these insects fossils reported from upper Jurassic and Cretaceous periods (150-60 million years ago) (Westfall and May, 1996) ^[20].

While both dragonflies and damselflies belong to the Odonata and share many common features, there are a number of noticeable differences as well. Dragonflies (*Anisoptera*) from damselflies (*Zygoptera*) share differences in the eggs morphological, dragonfly eggs are round and about 0.5 mm long, whereas damselfly eggs are cylindrical and longer, about 1 mm long (Rostand, 1935, Matushkina and Lambret 2011) ^[13, 9]. Aquatic gills of the damselfly nymphs are three leaf-like structures and swims by undulating their bodies, and their gills function similarly to a fish's tail. They are voracious feeder (Andrew *et al.* 2008) ^[17]. When the nymphs are fully developed; it crawls up out the water usually on the plant stem or rock and undergo final molt. The two sexes are different in colored are observed in damselflies and male usually more brightened than female. Nymphal stage are controlled the causative agent of malaria and filaria throughout the world (Tiple *et al.* 2008) ^[1]. In India 496 species, 27 subspecies, 154 genera, and 18 families have been reported (Subramanian and Babu 2020) ^[16]. Maharashtra's Odonata fauna is well-documented, with 134 species (Tiple and Koparde 2015) ^[18]. Recently, a total of 72 Odonata species from 8 families were recorded in Bor Wildlife Sanctuary, Wardha (Ashish Tiple, 2020) ^[19]. Studies added the role of dragonflies and damselflies, as an ecological indicator is well known for water quality because of its close relationship with Aquatic ecosystems (Ekestubbe and Sahlén 2001, Corbet, 2004, Jacob *et al.*, 2017) ^[14, 3, 8].

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Inhabiting around the freshwater resources and reproductive nature of the damselflies imparts their high abundance in an area is a good indication of the quality of freshwater (Corbet, 1999) [2]. Due to unstable ecosystem and urban expansion it is necessary to check the species richness and diversity to indicate the health of fresh water systems. Till date, no published checklist of damselfly species of Jam Lake region is available hence, the present work was initiated to conduct preliminary damselfly observations and carry out the checklist, occurrence, and richness inhibiting the Jam Lake during May, 2017 to April, 2020.

Materials and Methods

Jam Lake is located at Ridhora in the Katol Taluka of the Nagpur district, Vidarbha, (21°13'20.7"N 78°37'54.1" E) (Fig.1). The length of dam is 3460 m. The damselflies were

collected from Jam Lake and surrounding area of Jam Lake and static bodies of water. From May 2017 to April, 2020, each week survey was done during the monsoon and post-monsoon seasons. Walking transects of 0.6 km to 1.0 km area with 5-6 m were selected for the observation from either side of the lake border. Observations were recorded from visited sites during morning and evening times using binocular and digital camera (Cannon). The identification keys provided by Fraser (1933, 1934, and 1936) [5-7] were used to identify the damselfly species. The odonates were classified based on their abundance in Jam Lake that are seen frequently are classified as common (C), while those that are not seen frequently are occasional (O), and Rare- (R) (Table.1).



Fig 1: Jam Lake, (Coordinates: 21.2177452°N 78.645308°E) Courtesy: Google Map

Observations

Table 1: Damselfly species of Jam Lake, Katol. (C- Common, O- Occasional, R- Rare)

Sr. No.	Species	Status	Family
1.	<i>Agriocnemis pygmaea</i> (Rambur, 1842)	C	Coenagrionidae
2.	<i>Agriocnemis femina</i> (Brauer, 1868)	R	
3.	<i>Aciagrion approximans</i> (Selys, 1876)	C	
4.	<i>Aciagrion hisopa</i> (Selys, 1876)	O	
5.	<i>Ceriagrion coromandelianum</i> (Fabricius, 1798)	C	
6.	<i>Ceriagrion rubiae</i> (Laidlaw, 1916)	C	
7.	<i>Ceriagrion olivaceum</i> (Laidlaw, 1914)	R	
8.	<i>Enallagma parvum</i> (Selys, 1876)	C	
9.	<i>Ischnura rubilio</i> (Selys, 1876)	C	
10.	<i>Ischnura senegalensis</i> (Rambur, 1842)	C	
11.	<i>Pseudagrion decorum</i> (Rambur, 1842)	R	
12.	<i>Pseudagrion microcephalum</i> (Rambur, 1842)	R	
13.	<i>RhodIschnura nursei</i> (Morton, 1907)	R	
14.	<i>Allocnemis leucosticta</i> (Selys, 1863)	R	
15.	<i>Copera marginipes</i> (Rambur, 1842)	C	
16.	<i>Copera vittata</i> (male) (Selys, 1917)	C	
17.	<i>Disparoneura quadrimaculata</i> (Rambur, 1842)	R	Lestidae
18.	<i>Lestes umbrinus</i> (Selys, 1891)	C	
19.	<i>Lestes latus</i> (Selys, 1862)	R	

Table 2: Dragonfly Species percentage in Jam Lake Katol

Sr. no	Status	no. species	% of species
1	Common	10	52.63
2	Occasional	01	5.26
3	Rare	08	42.10

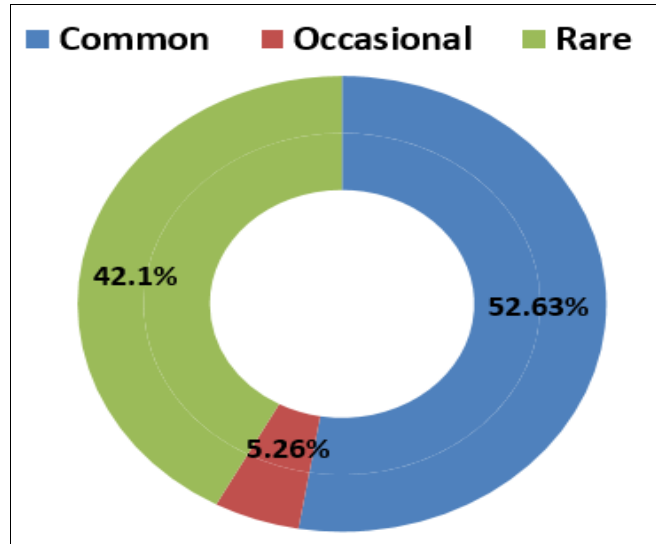


Fig 2: Damselfly species percentage in Jam lake Katol

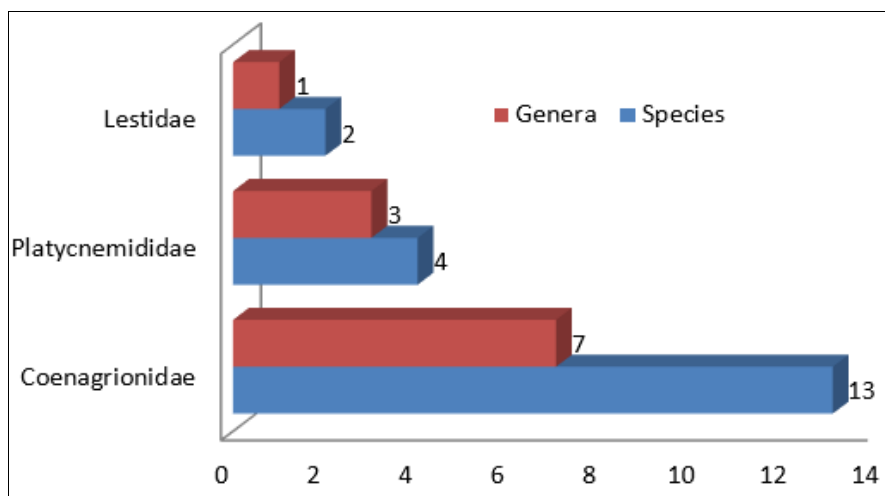


Fig 3: Damselfly distribution in general, species and families





Fig 4: Field photographs showing the diversity of damselfly- A) *Agriocnemis pygmaea*, B) *Ceriagrion coromandelianum*, C) *Copera marginipes*, D) *Copera vittata*, E) *Disparoneura quadrimaculata*, F) *Ischnura aurora*, G-H) *Ischnura senegalensis*

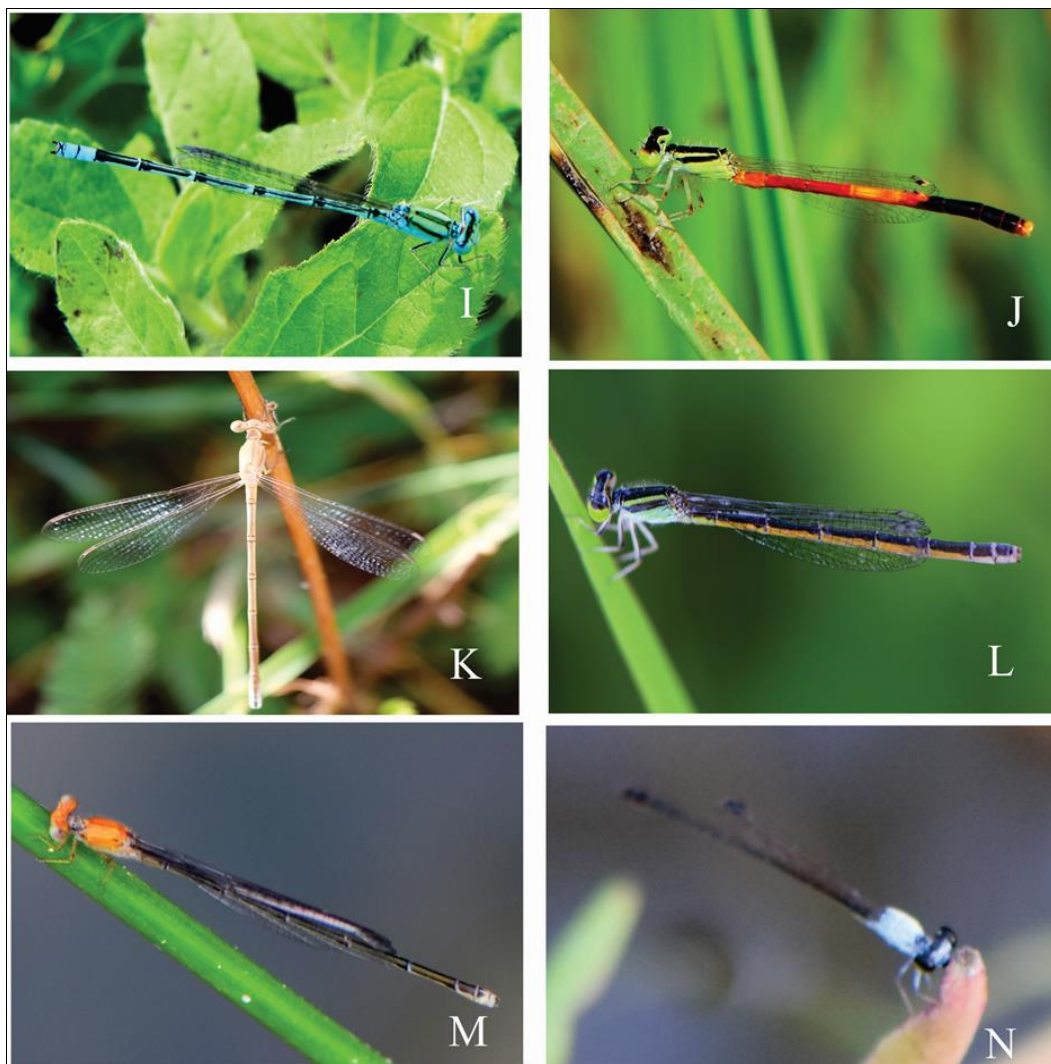


Fig 5: Field photographs showing the diversity of damselfly- I) *Pseudagrion decorum*, J) *RhodIschnura marsei*, K) *Lestes umbrinus*, L) *Aciagrion hisopa*, M) *Pseudagrion microcephalum* N) *Agriocnemis femina*

Results

Jam lake and nearby areas provides ample amount of diversification in the flora and fauna. The lake is important for all the nearby villages and Katol city due to its major water source and marshy shore (figure 1). This lake is rich in aquatic vertebrates and invertebrates which includes micro and macro-organisms, fishes and protein-rich invertebrates. Moreover, Lake Site is suitable for feeding and resting for many creatures due to the abundance of food throughout the year. Addition to this, Lake also provides appropriate environment for the growth and development of odonates.

In the present study 19 species of damselflies belonging to 11 genera (*Agriocnemis*, *Aciagrion*, *Ceriagrion*, *Enallagma*, *Ischnura*, *Pseudagrion*, *Rhodischnura*, *Allocnemis*, *Copera*, *Disparoneura*, *Lestes*) and 3 families (Coenagrionidae, Lestidae and Platycnemididae) have been reported (Table 1; figure 4,5). Coenagrionidae are narrow winged damselflies occur in variety of habitat, two sexes are different color, in most wings is transparent. In family Coenagrionidae we found 13 species belong to 7 genera (*Agriocnemis*, *Aciagrion*, *Ceriagrion*, *Ischnura*, *Enallagma*, *Pseudagrion* and *Rhodischnura*). Most of the damselflies observed with small and slender with a long abdomen and transparent wings. Family Platycnemididae species are black colored medium-sized damselflies with yellow markings and wings are transparent with round-tips. Hind wings are shorter than the abdomen (Table 1; Figure 4, 5). Platycnemididae family is consisting of 4 species belonging to 3 genera (*Copera*, *Allocnemis*, *Disparoneura*). Family Lestidae is consists of one genus *Lestes*. The members of these species are large sized showing spread-wings. We have found 2 species such as *umbrinus* and *latus* within the lake site (Figure 4; Table 1). The largest family is Coenagrionidae, has the most genera and species were examined, followed by Platycnemididae and Lestidae. As per analysis out of total 19 damselflies species we have noted 10 (52.63%) are common, 1 (5.26%) are occasional and 8 (42.10%) are rare species (Table 2; Figure. 2).

Discussion

Several studies already reported the importance of Dragonflies and damselflies for the health of the environment (Corbet, 2004, Jacob *et al.*, 2017)^[3, 8]. This species indicator mostly determines the wetland's health. For reproduction and survival, damselflies need the appropriate kind of flora and water. This species is no longer present if there is pollution or less aquatic vegetation. Although Jam Lake is generally favorable habitat for damselfly population but gradual anthropogenic activity and unstable ecosystem in and around water bodies has an adverse effect on survival of the Damselflies. By careful observation it is found that minute changes in the water quality and climate ultimately affect the vegetation and character of the water and may influence on the diversity and abundance of the Damselflies. Hence, it is important to protect this precious insect by conserving lake habitats and neighboring sites.

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