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Diversity and abundance of Odonata in Palamau Tiger Reserve, Jharkhand, India

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ABSTRACT

*The Odonata survey on diversity and abundance of Palamau Tiger Reserve was carried out for the first time to give a preliminary checklist of species within the reserve. Total 30 species of Odonata were recorded at seven different ranges of which 20 species from Anisoptera and 10 species from Zygoptera. The 54% species was recorded from Libellulidae family (16) followed by 13% Coenagrionidae (4), 10% from Calopterygidae (3), 7% from both Gomphidae and Aeshnidae and 9% from others families respectively. The Shannon index shows that Kutku and Baresanar ranges have maximum diversity, whereas Chhipadohar West and Betla having least diverse area. Jaccard index indicates the similarities between Baresanar and Kutku, Betla and Chhipadohar East, Garu East and Garu West respectively. Earlier 17 species recorded from this region by Zoological Survey of India. Out of four species *Rhyothemis flavescens*, *Trithemis pallidinervis*, *Potamarcha congener* and *Lestes viridula* have been not sighted this time. Current survey deals with 13 new records for this reserve.*

Key words: Odonata, Diversity, Abundance, Palamau Tiger Reserve, Jharkhand

INTRODUCTION

The order Odonata comprises with dragonflies (Anisoptera) and damselflies (Zygoptera) are primitive amphibiotic insects [10][5][13]. They are carnivorous insects inhabiting marshy areas. The males usually remain near water whereas the female come there to breed and lay eggs in aquatic habitat [1] beside that the nymphs are biological indicators of aquatic pollution [2]. Ecologically and economically these insects play a significant role in destroying noxious flies and mosquitoes, as well as the smaller moths which are regarded as pests [2] [3] [4][10]. Worldwide somehow 5500 species of 37 families are recorded in India about 500 species and subspecies of 17 families of Odonata are recorded [10][5][7]. The study of the Odonata fauna of Palamau Tiger Reserve (PTR) has been poorly studied by Prasad & Varshney [9]. After that there is no significant work has been done in this reserve.

MATERIALS AND METHODS

Study Area: Palamau Tiger Reserve (PTR) situated between latitude 23°25' N to 23°55' N and longitude 83°50' to 84°36' E, was notified in 1973 as one of India's first nine tiger reserves established under Project Tiger (Fig. 1). It is located in the western part of the Chhotanagpur Plateau and spans an area of 1129.93 square km comprising the Palamau Wildlife Sanctuary and Betla National Park is spread over Latehar, Palamau and Garhwa in Jharkhand. It is

also part of the Central India Landscape and extends into the Sanjay-Dubri Tiger reserve and Achanakmar-Kanha tiger landscape through the Jashpur and Mahan forest of Chhattisgarh. The vegetation types mainly categorized as Dry moist forest, dry Sal forest, moist Sal forest, high level plateau Sal forest and moist forest.

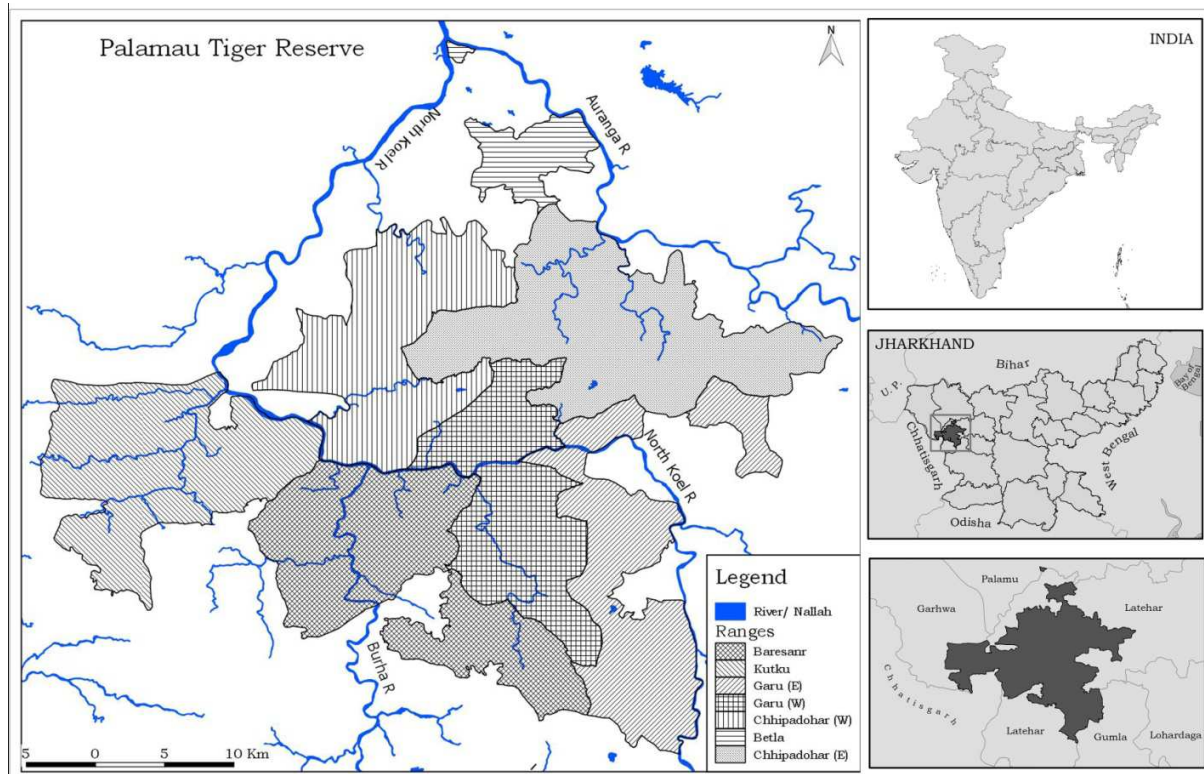


Fig. 1. Location map of study sites, indicating ranges and major rivers

Methods: The surveys were conducted in seven different ranges of Palamau tiger reserve during January–August, 2014 to study the diversity and distribution of Odonata in Kutku, Betla, Chhipadohar East, Chhipadohar West, Garu East, Garu West and Baresanar ranges (Table 1). Random samplings were carried out by direct searching methods by Sutherland [12]. We mainly focus on perennial rivers, water bodies, ponds, pools, swampy and forest areas of studies sites because of maximum probability of species observed [2] [3] [4][7]. Most species were photographed and doubtful species caught by sweep net for identification. Collected and photographed species were identified with the help of keys Fraser [2-4], Subramanian [11], Mitra[6] and Nair[7].

Diversity Measure: The Odonata data were quantitatively analyzed for Shannon-Wiener index of diversity (H'), Hill's diversity index (H_0), Margaleff's richness index and Simpson's diversity (D) were calculated to analyze the odonata community structure using Bio-Diversity Pro (Version 2) statistical software by McAlece et al. [8].

RESULTS AND DISCUSSION

The results of the current study reveal that total 30 species of Odonates belonging to 26 genera of two suborders and eight families were recorded from different ranges of PTR (Table.1). The 54% species was recorded from Libellulidae family (16) followed by 13% Coenagrionidae family (4) and 10% from Calopterygidae family (3) (Fig. 2). The Shannon index shows that Kutku and Baresanar ranges have maximum diversity, whereas Chhipadohar west and Betla having least diverse area (Fig. 3). Jaccard index indicate the similarities between Baresanar and Kutku, Betla and Chhipadohar East, GaruEast and Garu West respectively (Fig. 4). The relative abundance of individual species indicate that *Orthetrum sabina* are highly abundance. Whereas *Anax guttatus*, *Rhincocypha bisignata*, *Ischnuru aurora* and *Caconerura ramburi* are least abundance (Fig. 5).

Present study documented 30 species of Odonata from different ranges of the Palamau tiger reserve, whereas 13 species were recorded first time from this reserve. Earlier 17 species recorded by Prasad and Varshney [9] out of four species *Rhyothemis flavescens*, *Trithemis pallidinervis*, *Potamarcha congener* and *Lestes viridula* have been not sighted this time. *Vestalis apicalis*, *Vestalis gracilis*, *Agriocnemispygmaea*, *Ictinogomphusrapax*, *Paragomphuslineatus*, *Trithemisfestiva*, *Orthetrumglaucum*, *Rhyothemis variegata*, *Trithemis aurora*, *Orthetrumpruinatum*, *Bradinopyga geminata*, *Urothemissignata*, *Orthetrum Sabina* and *Crocothemisservilia* are common in all ranges, whereas, four species have been recorded from Kutku and Baresanar ranges. Viz. *Anaxguttatus*, *Psedagrionrubriceps*, *Trameabasilaris* and *Caconeruramburi*. In Palamau, numerous streams flowing over the entire reserve and join into perennial rivers Budha and North Koel in Kutku and Baresanar ranges which enrich the Odonata diversity in this area.

Table 1. List of Odonata recorded from different sites of Palamau Tiger Reserve, Jharkhand

SL No	Scientific Name	S1	S2	S3	S4	S5	S6	S7
1	<i>Anaximmaculifrons</i> Rambur, 1842	+	-	-	-	+	+	+
2	<i>Anaxguttatus</i> (Burmeister, 1839)	+	-	-	-	-	-	+
3	<i>Vestalisapicalis</i> Selys, 1874	+	+	+	+	+	+	+
4	<i>Vestalisgracilis</i> (Rambur, 1842)	+	+	+	+	+	+	+
5	<i>Neurobasischinansis</i> (Linnaeus, 1758)	+	-	-	+	+	+	+
6	<i>Rhinocyphabisignata</i> Hagen in Selys, 1853	+	-	-	-	+	+	+
7	<i>Ceriatagrioncoromandelica</i> (Fabricius, 1798)	+	-	+	-	+	+	+
8	<i>Ischnuru aurora</i> (Brauer, 1865)	+	-	-	-	+	+	+
9	<i>Agriocnemispygmaea</i> (Rambur, 1842)	+	+	+	+	+	+	+
10	<i>Psedagrionrubriceps</i> Selys, 1876	+	-	-	-	-	-	+
11	<i>Ictinogomphusrapax</i> (Rambur, 1842)	+	+	+	+	+	+	+
12	<i>Paragomphuslineatus</i> (Selys, 1850)	+	+	+	+	+	+	+
13	<i>Trithemisfestiva</i> (Rambur, 1842)	+	+	+	+	+	+	+
14	<i>Diplacodesnebulosa</i> (Fabricius, 1793)	+	-	-	-	+	+	+
15	<i>Orthetrumglaucum</i> (Brauer, 1868)	+	+	+	+	+	+	+
16	<i>Rhyothemisvariegata</i> (Linnaeus, 1763)	+	+	+	+	+	+	+
17	<i>Trithemis aurora</i> (Burmeister, 1839)	+	+	+	+	+	+	+
18	<i>Orthetrumpruinatum</i> (Burmeister, 1839)	+	+	+	+	+	+	+
19	<i>Brachythemiscontaminata</i> (Fabricius, 1793)	+	+	+	+	+	+	+
20	<i>Neurothemisfulvia</i> (Drury, 1773)	+	+	+	-	+	+	+
21	<i>Bradinopygageminata</i> (Rambur, 1842)	+	+	+	+	+	+	+
22	<i>Urothemissignata</i> (Rambur, 1842)	+	+	+	+	+	+	+
23	<i>OrthetrumSabina</i> (Drury, 1770)	+	+	+	+	+	+	+
24	<i>Brachydiplaxsabrina</i> (Rambur, 1842)	+	+	+	+	+	+	+
25	<i>Trameabasilaris</i> (Palisot de Beauvois, 1805)	+	-	-	-	-	-	+
26	<i>Neurothemisintermedia</i> (Rambur, 1842)	+	-	+	-	-	-	+
27	<i>Crocothemisservilia</i> (Drury, 1770)	+	+	+	+	+	+	+
28	<i>Orthetrumluzonicum</i> (Brauer, 1868)	+	+	+	+	+	+	+
29	<i>Coperamarginipes</i> (Rambur, 1842)	+	-	-	-	+	+	+
30	<i>Caconeruramburi</i> (Fraser, 1922)	+	-	-	-	-	-	+

Where, S1. Kutku, S2. Betla, S3. Chhipadohar East, S4. Chhipadohar West, S5. Garu East, S6. Garu West, S7. Baresanar

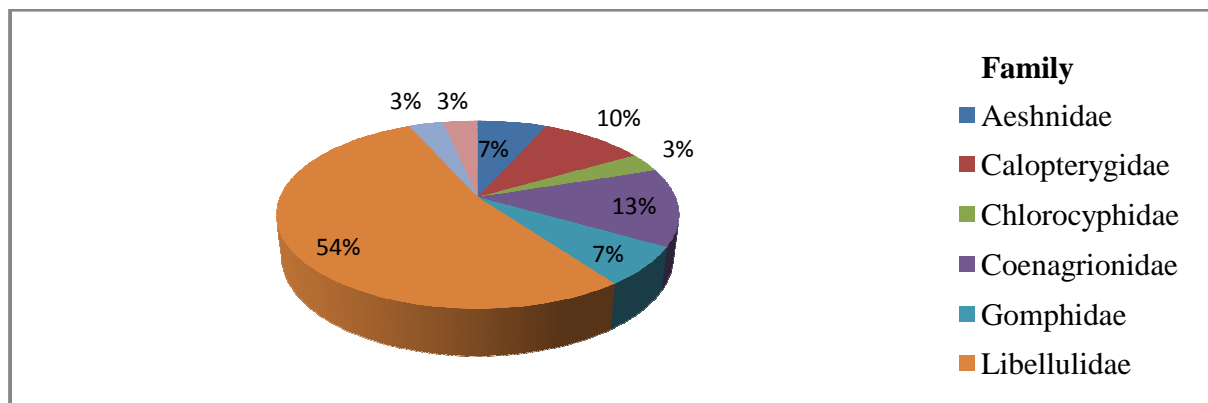


Fig.2. Percentage of occurrence of Odonata in Palamau Tiger Reserve

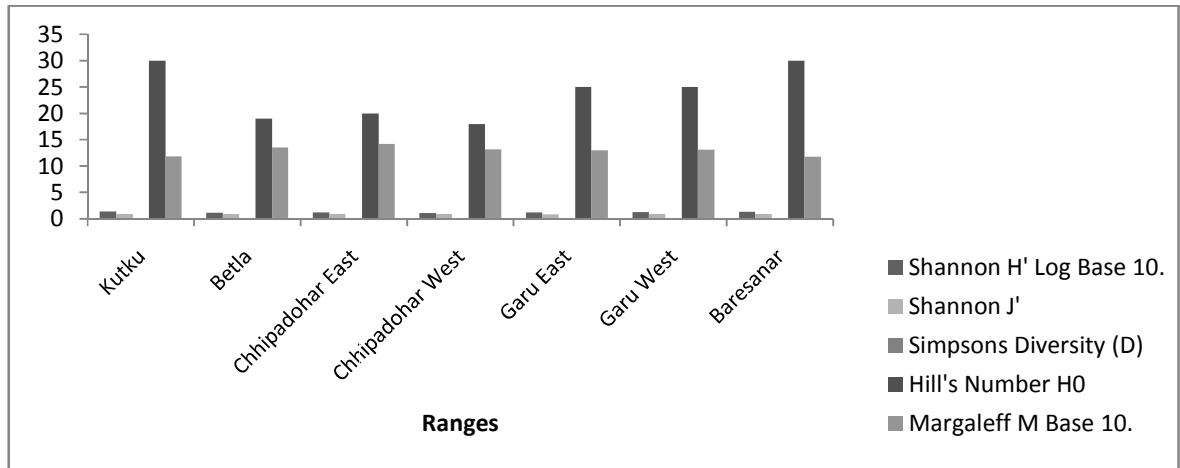


Fig.3. Comparison of species diversity indices of Odonata in Palamau Tiger Reserve

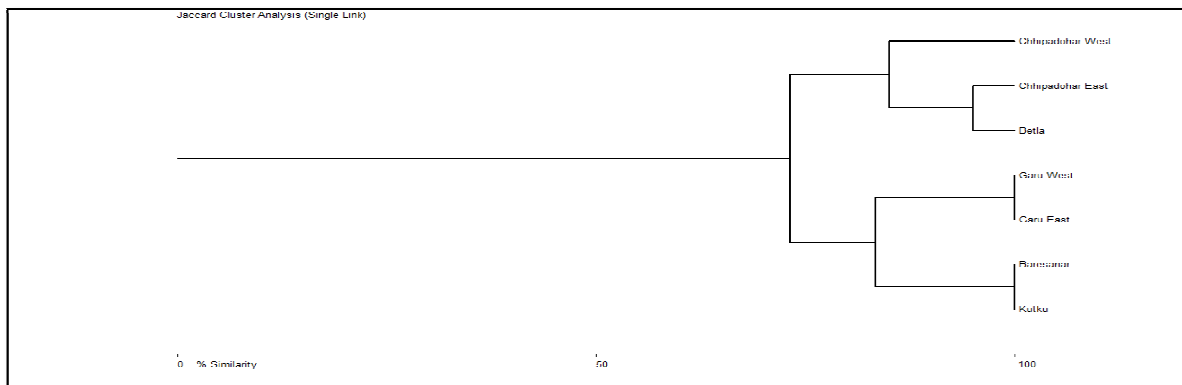


Fig. 4. Jaccard cluster similarity index of sampling sites

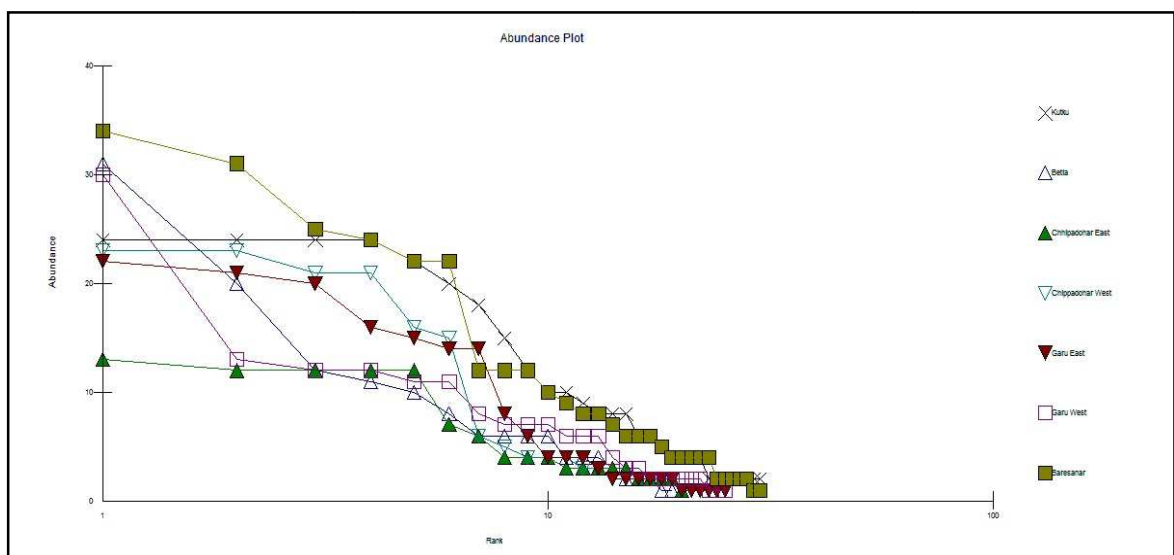


Fig.5. Species rank abundance plot of different sites of Palamau Tiger Reserve



Fig. 6. Some photographs of Dragonflies (A-D) and Damselflies (E-H). A- *Trithemis aurora*, B- *Trameabasilaris*, C- *Orthetrum luzonicum*, D- *Bradinopyga geminate*, E- *Rhinocyphabisignata*, F- *Vestalisapicalis*, G- *Caconeuramburi*, H- *Pseudagrion rubriceps* (Photographs: A,D, E by S. K. Sajan, B by Amrendra K. Singh, C by Manish K. Bakshi, F,G,H by Jenis R. Patel)

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