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A Study on Butterfly Diversity of East and West Godavari Districts, Andhra Pradesh: An Appraisal for their Conservation

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A B S T R A C T

A study on butterfly diversity was carried out in East and West Godavari districts of Andhra Pradesh, India. Eight sites were selected, four in each district and survey was carried out, reporting 40 species of butterflies of five families. It was observed from the recorded 40 species, majority of species were from Nymphalidae family (17) followed by Pieridae (11), Papilionidae (6) and less number of species were recorded in both Lycaenidae and Hesperiidae with three species each. Among the species of butterflies observed in study area 17 species were common, 14 species were occasional and 9 were rare species. The study area is rich in butterfly diversity and further research could be conducted to obtain more details and documentation of butterfly diversity for appraising a comprehensive conservation strategy.

Introduction

The flora and fauna that form today's biodiversity are a snapshot of the earth's 3.8 billion year history of life representing just 0.1% of all the species that have lived on earth. Thus 99.9% or virtually all of life that has existed on earth has gone extinct (Raup, 1991).

Butterflies the lovely and graceful insects provide economic and ecological benefits to the human society. Having multihued colors on their wings, they enhance the earth's beauty incontestably and add immense aesthetic value to the ambient environment. They accomplish pollination, a key stone ecological process in natural sustainability throughout the world.

Butterflies are providing the best rapid indicators of habitat quality and they are the sensitive indicators of climatic change (Venkata Ramana, 2010). In the world, about 19,238 species were documented by Heppner (1998). There were about 1,504 species of

butterflies in Indian subcontinent (Gaonkar, 1996; Smetacek, 1992). 334 butterflies were reported from the Western Ghats (Tiple and Khurad, 2009) and 150 from the Eastern Ghats (Gunathilagaraj *et al.*, 1998). Monitoring of species diversity of a region enables estimation of the prospective functional roles of the species. Therefore, a study on the butterfly diversity by assessing their species composition, species richness and species abundance is vital for their conservation in their natural habitats.

Materials and Methods

Study area

The present study was carried out in East and West Godavari districts of Andhra Pradesh, India. East Godavari is situated between the North latitude 17.3213°N and at the longitude 82.0407° E and West Godavari is situated between the North latitude 16.9174° N and at the longitude 81.3399° E. East and West Godavari districts of Andhra Pradesh enjoys tropical humid type of climate with oppressive summer season and good seasonal rainfall. Both the districts flourishes with lands of fertile soils, good rainfall and balanced climatic conditions and possesses all the natured hand work like perennial rivers, mountains, forests, mangrove forests and also sea coast. The districts are enriched by huge water resources of river Godavari and major streams like Yeleru, Suddagadda, Pampa, Thandava in East Godavari and Yerrakalava, Tammileru, Ramileru and Guvvaleru in West Godavari district. West Godavari has the biggest fresh water lake in the country, Kolleru, which is a designated Ramsar wetland.

This varied ecological diversity of West and East Godavari districts of Andhra Pradesh, India invoked us to carry out butterfly diversity assessment survey and hence establish a checklist of collected data. In total of eight locations (Four locations in each district) were selected and was visited every week from June 2019 to December 2019. Darsiparru, Tadiparru, Suryaraopalem, Vijayarai villages were selected in West Godavari district and Yedida, Kadiyapulanka, Gopalapuram and Komarajulanka villages were selected in East Godavari districts. Observations were made through walking transects (Pollard, 1993; Caldas and Robbins, 2003) of 0.5 km to 0.7 km length with 2 m to 5 m on either side. Every week sixteen transects were covered from 0700-1130hr and 1500-1700hr. Some species were collected with the help of aerial nets and some species were photographed. The observations were made with the aid of digital cameras. Some species which are difficult to identify, were caught by hand net and released after identification with the use of reference books and literatures.

Results and Discussion

A total of 40 species of butterflies belonging to 27 genera and five families were recorded (Table 2-4). The families Nymphalidae and Pieridae were found dominant with 11 genera and 17 species and 7 genera and11 species respectively, followed by Papilionidae with 3 genera and 6 species and Hesperiidae and Lycaenidae with 3 genera and 3 species each. Maximum number of genera are found in Nymphalidae (11) followed by Pieridae (7) and then Papilionidae, Hesperiidae and Lycaenidae with 3 genera (Table 2 & 4).

Out of total 40 butterfly species, 17(42.5) were common, 14(35) were occasional and 9 (22.5) were rare species (Table.3 and Fig. 3).

In the present study, total 40 species of butterflies were recorded belonging to 27 genera and 5 families, Nymphalidae was the largest family comprised of maximum number of genera (11) and species (17). Survey report about Butterflies of Papikonda

National Park, Andhra Pradesh jointly conducted by Andhra Pradesh Forest Department (Papikonda National Park) and Warblers and Waders a Non-Governmental Organization, Thiruvananthapuram, Kerala, India from 12th to 15th December 2019 reveals that there are One Hundred and Thirty six (136) species of butterflies recorded from the National Park. The study agreed with the present observations regarding occurrence of maximum species (49) in Nymphalidae family. Guptha *et al.*, 2012 recorded a total of 50 species of butterflies belonging to 5 families in Seshachalam Biosphere Reserve, Eastern Ghats Andhra Pradesh, India. The family Nymphalidae (20 species) was found dominant followed by Lycaenidae (12 species), Pieridae (11 species), Papilionidae (5 species) and Hesperiidae (2 species).

Rao *et al.*, 2004 recorded a total of 89 species belonging to 64 genera, distributed over five families were collected from the monitoring sites, during the study period in Nagarjunasagar Srisailam Tiger Reserve, Andhra Pradesh. The family Nymphalidae dominated with 27 species followed by Lycaenidae (24 spp.), Pieridae (17 spp.), Hesperiidae (12 spp.) and Papilionidae (9 spp.).

Butterfly diversity in India varies in different parts like Visakhapatnam (68 species) (Solomonraju *et al.*, 2003), Prayagraj district (21 species) (Abdullahi *et al.*, 2019), Sri Lankamalleswara Reserve forest (75 species) (Harinath *et al.*, 2014), Nelapattu Bird Sanctuary, Nellore (44 species) (Gupta and Rao, 2013)Amravati (52 species) (Tiple *et al.*, 2007), Pune (103 species) (Kunte, 1997), Nagpur (92 species) (Patil and Shende, 2014).

The present study reveals that the study area provides favorable ecological conditions and habitat for butterflies. A total of 40 species of butterflies belonging to five families were identified from West and East Godavari districts, Andhra Pradesh, India.

The species richness and diversity of butterflies is higher in the study area. From our observations, we conclude that the butterfly community varied significantly among different habitats.

Fig.1 Butterflies of different families

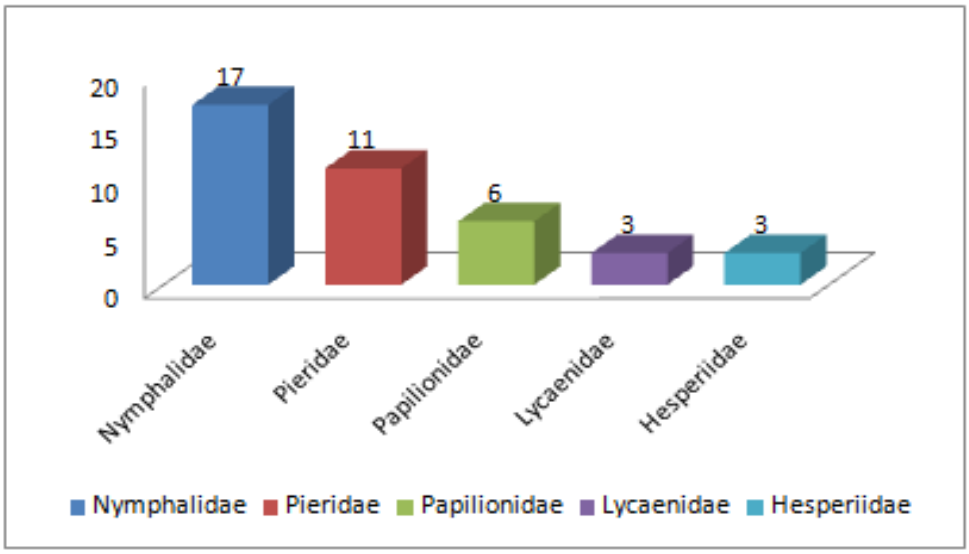

Table.1 Category-wise Distributions of Land use/Land Cover during 2015-16 (www.apmines.gov.in)

Land Use Categories Year 2015-16	Area in sq.km. (East Godavari)	% of area of East Godavari district	Area in sq.km. (West Godavari)	% of area of West Godavari district
Wet lands	148.88	1.16%	251.43	2.88%
Agricultural lands	5960.63	46.55%	6166.56	5.03%
Forest cover	5022.94	39.23%	1354.41%	15.92%
Water bodies	861.58	6.73%	310.75	3.65%

Fig.2 Distribution of genera and species of Butterflies in respective families

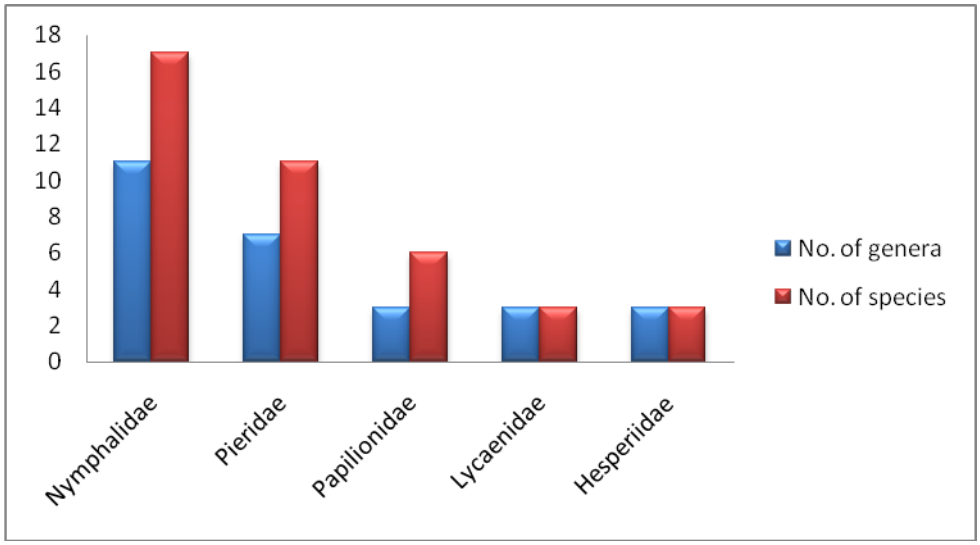

Fig.3 Status of Butterflies of Godavari districts

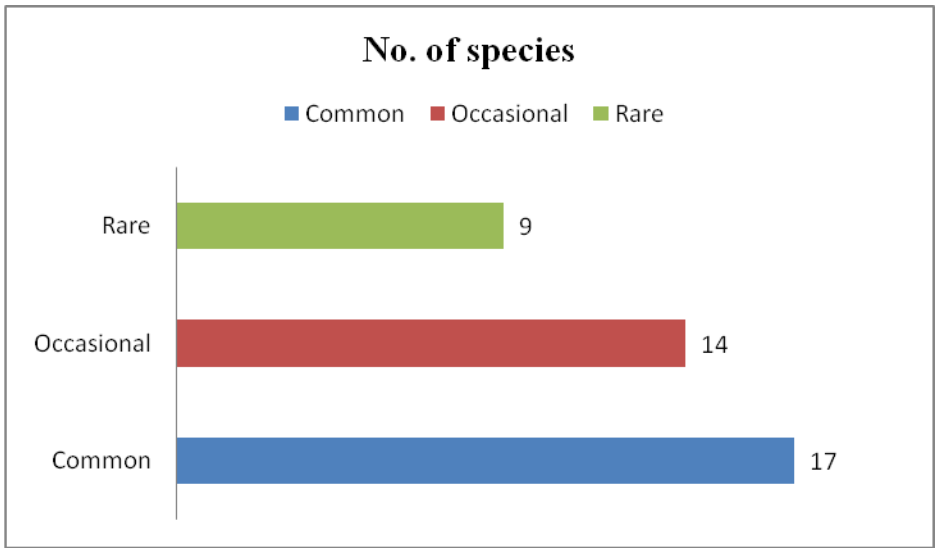

Table.2 Butterflies of Godavari district

S. No	Family	Common Name	Scientific Name	Status
1.	Nymphalidae (11 genera, 17 species)	Yellow Pansy	*Junonia hierta*	O
2.		Peacock Pansy	*Junoina almana*	O
3.		Lemon Pansy	*Junonia lemonias*	O
4.		Blue Pansy	*Junonia orithya*	R
5.		Great Eggfly	*Hypolimnas bolina*	O
6.		Danaid Eggfly	*Hypolimnas misippus*	O
7.		Plain Tiger	*Danaus chrysippus*	C
8.		Common Tiger/ Striped Tiger	*Danaus genutia*	O
9.		Angled Castor	*Ariadne ariadne*	C
10.		Common Castor	*Ariadne merione*	C
11.		Glassy Tiger	*Parantica aglea*	C
12.		Common Crow	*Euploea core*	C
13.		Tawny Coster	*Acraea violae*	C
14.		Joker	*Byblia ilithyia*	R
15.		Common Evening Brown	*Melanitis leda*	C
16.		Black Rajah	*Charaxes solon*	R
17.		Common Baron	*Euthalia aconthea*	R
18.	Pieridae (7 genera, 11 species)	Common Emigrant	*Catopsilia pomona*	C
19.		Mottled Emigrant	*Catopsilia pyranthae*	C
20.		Large Salmon Arab	*Colotis fausta*	O
21.		Small Salmon Arab	*Colotis amata*	O
22.		Crimson Tip	*Colotis danae*	C
23.		Pioneer	*Belenois aurota*	O
24.		Common Jezabel	*Delias eucharis*	C
25.		Kalinga Painted Jezebel	*Delias hyperete*	O
26.		Common Grass Yellow	*Eurema hecabe*	C
27.		Psyche	*Leptosia nine*	R
28.		White Orange Tip	*Ixias marianne*	O
29.	Papilionidae (3 genera, 6 species)	Common Rose	*Pachliopta aristolochiae*	C
30.		Crimson Rose	*Pachliopta hector*	C
31.		Common Mormon	*Papilio polytes*	C
32.		Lime Butterfly	*Papilio demoleus*	C
33.		Tailed Jay	*Graphium agamemnon*	R
34.		Common Blue Bottle	*Graphium sarpedon*	R
35.	Lycaenidae (3 genera, 3 species)	Gram Blue	*Euchrysops cnejus*	C
36.		Oriental Apefly	*Spalgius epeus*	R
37.		Common Guava Blue	*Virachola isocrates*	O
38.	Hesperidae (3 genera, 3 species)	Common Banded Awl	*Hasora chromus*	O
39.		Indian Palm Bob	*Suastus gremius*	R
40.		Grass Demon	*Udaspes folus*	O
	No. of families: 5	**No. of genera: 27**	**No. of species: 40**	

Abbreviations- C- Common; O- Occasional; R- Rare

Table.3 Status of Butterflies of Godavari district

S.No	Status	No. of species	% of species
1.	Common	17	42.5
2.	Occasional	14	35
3.	Rare	9	22.5
		40	**100**

Table.4 Distribution of genera and species of Butterflies in respective families

S.No	Family	No. of genera	No. of species
1.	Nymphalidae	11	17
2.	Pieridae	7	11
3.	Papilionidae	3	6
4.	Lycaenidae	3	3
5.	Hesperiidae	3	3
		27	**40**

Vegetation type played a major role in diversity patterns of butterfly community. Although, study area supports a good number of butterfly species but much has still to be explored. In addition, it is necessary to identify the rare butterfly species and conserve them by establishing conservatories or butterfly parks. Further studies should be initiated to aim at the species specific roles for monitoring the environmental changes and sustain the ecosystem integrity.

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