



ISSN 2320-7078
JEZS 2014; 2 (2): 39-44
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Received: 13-02-2014
Accepted: 21-03-2014

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Butterflies Diversity of Sunabeda Wildlife Sanctuary, Odisha, India

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ABSTRACT

Sunabeda Wildlife Sanctuary was east while in Kalahandi district and now in Nuapada district of Odisha. The topography of the sanctuary is mostly dominated by dry deciduous forest on hill slopes, valley, stream, river and waterfall, riparian vegetation along nala and grassland, meadows in plateaus and eleven beautiful water fall on seasonal streams of the Sanctuary. The survey yielded of 101 butterfly species, belonging to the families Nymphalidae, Pieridae, Lycaenidae, Papilionidae and Hesperidae. Butterflies survey was undertaken along five different transect in the sanctuary for a period of five months. A total number of 101 species of having documented in five families. Maximum number of species were observed in the family Nymphalidae (39%, n=101), followed by Pieridae (11%), Lycaenidae (22%) and Papilionidae (14%) and Hesperidae (14%) respectively.

Keywords: Butterfly, random sampling, species diversity, Sunabeda Wildlife Sanctuary, Odisha, India.

1. Introduction

The butterfly is a diverse insect, belonging to the class insecta and order Lepidoptera, There are five families in the class namely, Papilionidae, Pieridae, Lycaenidae, Nymphalidae and Butterflies are generally very colorful winged insects with an overlay of tiny scales which are arranged much as the tiles of a roof with each scale having a single colour pattern They are found in many colors and sizes. Worldwide, there are more than 28,000 species of butterflies, out of which about 80 percent found in tropical regions. The butterfly plays an important role in ecosystems, acting as a strong pollinator, a food source and an indicator of the ecosystem's well-being.

The Indian sub-region hosts about 1,504 species of butterflies of which peninsular India hosts 351, and the Western Ghats 334. In central India, the butterfly diversity reported by totaled 177 species occurring in the erstwhile Central Provinces (now Madhya Pradesh, Chhattisgarh & Vidarbha). Although many pioneer workers carried out research on the butterflies species diversity in different parts of India [11-12] and [13], Few works has been undertaken for documenting the butterflies diversity in Odisha [10] and [7] Most of the butterfly studies have been carried out Similipal Tiger Reserve, [8] Butterflies diversity in Nandankanan Wildlife Sanctuary.

2. Study Area

The Sunabeda WildLife Sanctuary located between longitude 82 degree 20'00"E and 82 degree 34'42"E & latitude 20 degree 24'N and 24 degree 44'N in Nuapada District of Odisha, sharing common border with Chhattisgarh State, is an excellent natural habitat of endangered flora and fauna. It was declared as Sanctuary in the year 1983 with total geographical area of 600 sq. KM. Mostly, dry deciduous forests with enchanting hill ranges, the heart-throbbing cliffs, extensive plateau, scattered grasslands, magnificent waterfalls & gorges, and primitive tribes are fascinating attraction of Sunabeda Sanctuary. Besides, the Maraguda Valley, with traces of ancient civilization and River Jonk are adding to rich cultural heritage of Odisha. (Fig. 1). During summer the temperature is more than 40 °C, the minimum temperature is recorded during winter was 12 °C. The average rainfall of the sanctuary and the nearby areas varies from 1100 mm to 1500 mm. The forest ranges from the dry deciduous, dry peninsular, dry teak forest with small patches of grass land. The vegetation type though dominated by teak both natural and plantation in the Sanctuary.

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The forest is dominated by Bija (*Pterocarpus marsupium*), Teak (*Tectona grandis*), Sisoo (*Dalbergia latifolia*), Asan (*Terminalia tomentosa*), Dharua (*Anogeissus latifolia*), Mahul (*Madhuca indica*), Char (*Buchanania lanzan*), Mundi (*Mitragyna parviflora*), Kumbhi (*Careya arborea*), Moi (*Lannea coromandelica*), Haldu

(*Adina cordifolia*), Bahada (*Terminalia bellerica*), Harida (*Terminalia chebula*), Amla (*Embllica officinalis*), Sandal wood (*Santalum album*), Sidha (*Lagerstroemia parviflora*), Arjuna (*Terminalia arjuna*), Ban-khajur (*Phoenix acaulis*).

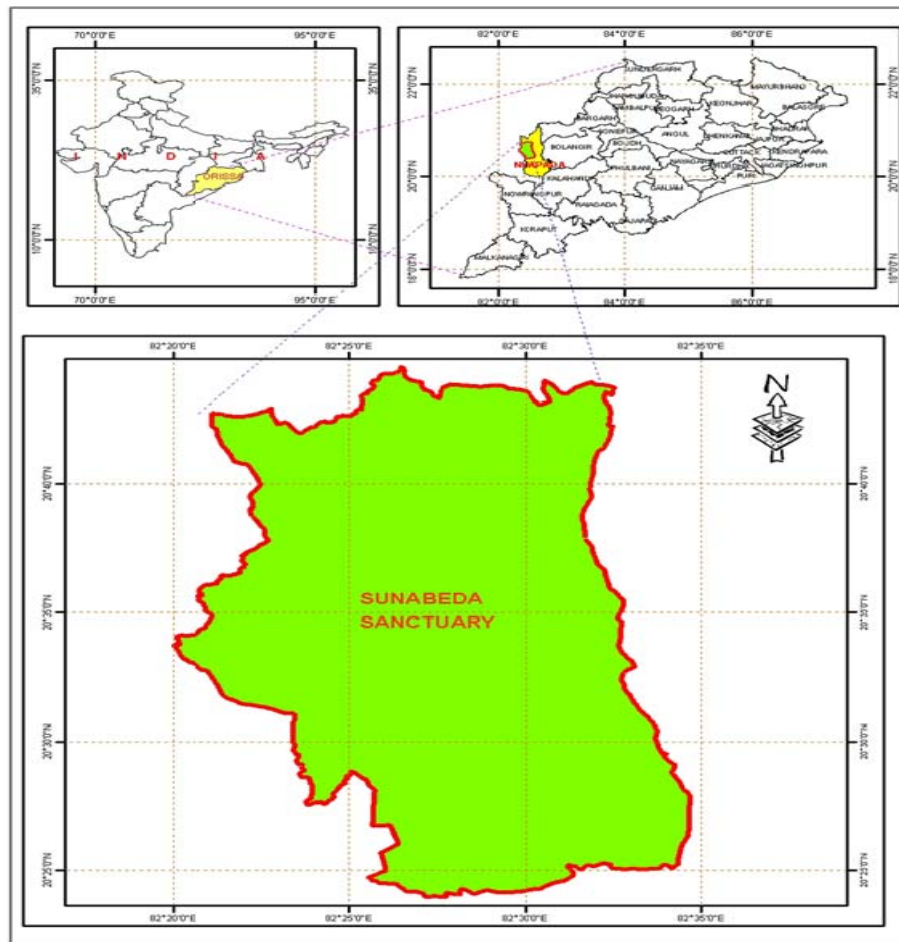


Fig 1: Location Map of Sunabeda Wildlife Sanctuary

3. Materials and Methods

During five month study Sunabeda Wildlife Sanctuary in survey of butterflies was under taken along five different transect. the butterflies were recorded using standard transect counting method [4], (Ishic 1993) They were counted while walking along selected transect out of 1 km in each of the five selected location during morning hour 6.30 to 10.30 hr. All the transect served were segments existing open paths such as road and footpath shall the butterflies encounter at a radial distance of five meters from the observed were recorded during counts butterflies were identified to the species level the different transect during the study the transect selected for survey were 1. Sunabeda Forst Rest House to Boras 2. Gadvatta to Gadvatta Nala 3. Sunabeda Forest Rest House to Chakatia Bhunjia Development Dam 4. Sunabeda Forest Rest House to Thelkobeda 5. Sunabeda grassland to Monikagarh. Species diversity was calculated using the Shannon Index, which combines the number of species within a site with the relative abundance of each species [9].

(H) as given below:

$$H = - \sum_{i=1}^N P_i \log P_i$$

Where, H = species diversity index

P_i = the proportion of individuals in the ⁱth species

N = total number of species

i = species 1, 2, 3... N

To determine abundance, field work was carried out from March 2006 to August 2006 using the line transect count method as per [5] with minor modification. In this method five permanent 400-lines transect were set up in each plot using Global Positioning System (GPS) (Garmin, 72). Transects covered all microhabitats including gardens, scrub, riparian corridors, sandy areas and plantation. Each transect was slowly traversed at a uniform pace for 60 minutes from 0730 to 0830 hr during good weather periods (no heavy rain and strong wind). This is a suitable method adopted by others for

surveying butterflies in a wide range of habitats Individuals were identified in the field using standard guides [1, 2]. The butterflies

were identified and verified following methods by [3, 6, 14].

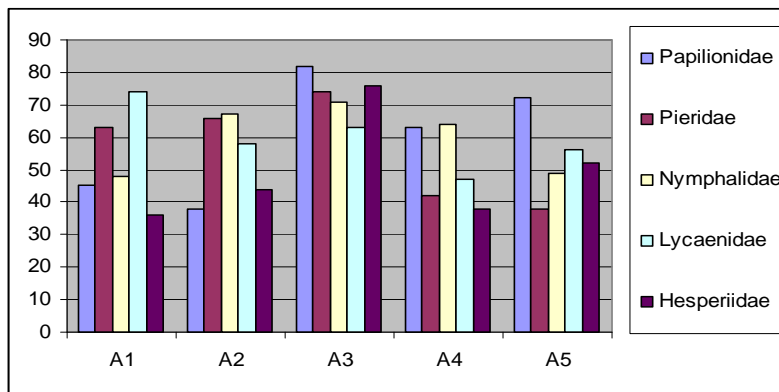


Fig 2: Graph showing site species Diversity at Sunabeda Wildlife Sanctuary.

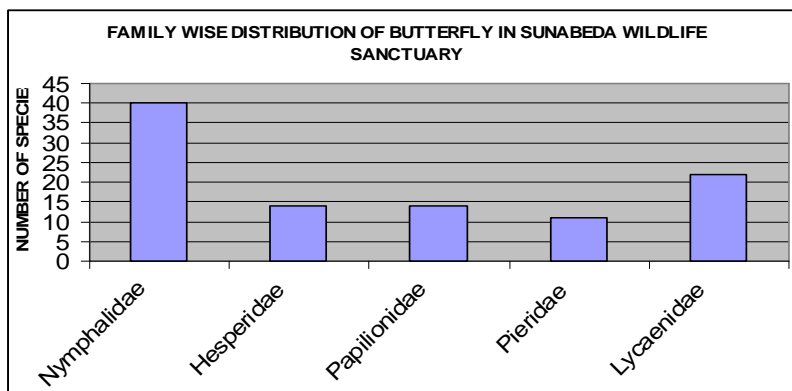


Fig 3: Graph showing number of butterflies in Sunabeda Wildlife Sanctuary.

4. Result and Discussion

During five month study Sunabeda Wildlife Sanctuary in survey of butterflies was under taken along five different transect. A total number of 1011 species of butterflies belonging to 5 families were recorded. Maximum numbers of species were observed in the family Nymphalidae (39%, n=101), followed by Pieridae (11%), Lycaenidae (22%) and Papilionidae (14%) and Hesperidae (14%) respectively (Table 1).

(Table 2) shows the values of the index calculated by the Shannon-Weiner equation. Maximum diversity was observed during the last weeks of winter and during spring, while a comparatively low diversity was observed during the rainy season and summer. The number of butterfly species varied with the Sanctuary (Table 1). The maximum number of butterflies was observed during the month of July. Species richness showed a reduction at the end of the rainy season (September) and during the warmest part of summer (April to May).

When species diversity by family in each month was considered (Fig. 2), Nymphalidae and Pieridae attained maximum species richness during the June and July with a slight decrease during summer. Pieridae showed a slight decrease during the rainy season (June and July), whereas Papilionidae showed an increase in the diversity value of species during July.

When the each block site is compared Sunabeda Forest Rest House distribution of forest butterflies and other wildlife in the area. Through in the recent time forest the management control fire but still there may parts are neglected, watch tower can be made to

to Thelkobeda has the highest species diversity during the second fortnight of July (1.85), It suggest possible aggregation of the animal due to forest fire in the adjacent areas.

The Diversity Index of all the five transect shows that transect Sunabeda Forest Rest House to Chakatia Bhunjia Development Dam (A3) has more species diversity and transect Sunabeda Forest Rest House to Thelkobeda (A4) has comparatively less diversity. However the abundance of these family were recorded during the count observed abundance of butterflies recorded during survey of given (Table 1) Nymphalidae is the most abundant and species rich family in Sunabeda wildlife sanctuary.

Butterflies are most sensitive to the habitat disturbance and environment alternation. A little change in the environment or habitat affect the distribution pattern of the species. The presence of all these species indicates that these forest tracts are rich and unique habitats that hold animal diversity that is typical of ‘undisturbed tropical Dry deciduous forests’, The study show the loss of suitable habitat due to forest fire strongly affect the numerical strength as well as diversity of each species, Also the anthropogenic pressure construction of several civil structures, diversion of water courses, movement of heavy vehicles, labour, firewood collection, etc. would cause disturbance in these habitats . These activities can result in habitat fragmentation, population loss and cause local extinctions that would seriously affect the locate forest fire quick action should be taken after getting information about spread of fire.

Table 1: List of Butterfly in Sunabeda wildlife Sanctuary.

	Family Nymphalidae			
	Common Name	Scientific Name	Habitat	Larva Food Plant
1	Tawny Coster	<i>Acraea violae</i>	OF, GL	Passifloraceae plants
2	Common Evening Brown	<i>Melanitis leda</i>	SEG, MDF	Oryza, Panicus,
3	Common Palmfly	<i>Elymnias hypermnestra</i>	MDF	Bamboos and Palms
4	White-bar Bushbrown	<i>Mycalesis anaxias</i>	SEG	Oryza, and other Grasses
5	Common Bushbrown	<i>Mycalesis perseus</i>	SEG, MDF, OF	Oryza, and other Grasses
6	Dark brand Bush brown	<i>Mycalesis mineus</i>	MDF	Microstegium,
7	Nigger	<i>Orsotrioena medus</i>	MDF	Oryza, Imperata sp.
8	Common Fivering	<i>Ypthima baldus</i>	MDF, SEG	Grasses
9	Common Fourring	<i>Y. hubenri</i>	MDF, SEG	Grasses
10	Tawny Rajah	<i>Charaxes polyxena</i>	SEG	Tamarindus (Leguminosae),
11	Black Rajah	<i>Charaxes solon</i>	SEG, MDF	Tamarindus (Leguminosae)
12	Common Nawab	<i>Polyura athamas</i>	SEG, MDF	Acacia, Delonix, Albizia,
13	Angled Castor	<i>Ariadne ariadne</i>	MDF, OF	Ricinus communis
14	Common castor	<i>Ariadne merione</i>	MDF	Ricinus communis, Tragia
15	Common Leopard	<i>Phalantha phalantha</i>	MDF, SEG	Flacourtia, Smilax
16	Indian Fritillary	<i>Argyreus hyperbius</i>	GL, MDF	Violaceae herbs
17	Yellow Pansy	<i>Precis hierta</i>	OF, GL	Barleria, Hygrophila
18	Blue Pansy	<i>Junonia orithya</i>	OF, GL	Justicia, Lepidagathis
19	Lemon Pansy	<i>Junonia lemonias</i>	MDF, GL	Barleria, Sida
20	Peacock Pansy	<i>Junonia almana</i>	MDF, OF	Acanthus, Barleria,
21	Grey Pansy	<i>Junonia atlites</i>	MDF, OF	Barleria, Hygrophila
22	Chocolate Soldier	<i>Junonia iphita</i>	SEG, MDF	Justicia, Hygrophila
23	Danaid Eggfly	<i>Hypolimnas misippus</i>	MDF	Portulaca oleracea
24	Great Eggfly	<i>Hypolimnas bolina</i>	SEG, MDF	Sida, Portulaca,
25	Common Map	<i>Cyrestis thyodamas</i>	SEG	Ficus sp
26	Common Sailor	<i>Neptis hylas</i>	SEG, MDF, OF	Bombax, Helicteres, Grewia,
27	Chestnut-streaked	Sailor <i>N. jumbah</i>	SEG	Grewia, Bombax, Xylia
28	Common Lascar	<i>Pantoporia hordonia</i>	SEG, MDF	Acacia, Albizia
29	Colour Sergeant	<i>Parathyma nefte</i>	SEG, MDF	Glochidion
30	Common Sergeant	<i>P. perius</i>	MDF	Glochidion
31	Baronet	<i>Symphaedra nais</i>	MDF, OF	Shorea, Diospyros
32	Common Baron	<i>Euthalia aconthea</i>	MDF, OF	Mangifera, Anacardium
33	Grey Count	<i>Tanaecia lepidea</i>	OF, GL	Melastoma Careya arborea
34	Commander	<i>Moduza procris</i>	SEG, MDF	Mussaenda,
35	Glassy Tiger	<i>Parantica aglea</i>	MDF	Cryptolepis, Calotropis
36	Blue Tiger	<i>Tirumala limniace</i>	SEG	Vallisneria, Dregea
37	Common Tiger	<i>Danaus genutia</i>	SEG, MDF, OF	Marsdenia, Asclepias
38	Plain Tiger	<i>Danaus chrysippus</i>	SEG, MDF	Calotropis, Cryptolepis,
39	Common Crow	<i>Euploea core</i>	SEG, MDF	Ficus, Sreblus ,
40	Common Beak	<i>Libythea lepita</i>	MDF, OF	Celtis sp.
	Family Hesperidae			
1	Common Banded Awl	<i>Hasora chromus</i>	MDF, SEG, OF	Derris sp.
2	Brown Awl	<i>Badamia exclamationis</i>	MDF, SEG, OF	Combretum extensum,
3	C.Spotted Flat	<i>Celaenorrhinus leucocerca</i>	MDF, SEG, OF	(Combretaceae)
4	Suffused Snow Flat	<i>Tagiades gana</i>	MDF, SEG	Eranthemum sp.
5	Water Snow Flat	<i>Tagiades litigiosa</i>	SEG	Dioscorea sp.
6	Common Small Flat	<i>Sarangesa dasahara</i>	MDF, OF	Dioscorea sp.
7	Indian Skipper	<i>Spialia galba</i>	GL, OF	sp.(Liliaceae)
8	Chestnut Bob	<i>Iambrix salsala</i>	MDF, GL	Acanthaceae plants ,.
9	Indian Palm Bob	<i>Suastus gremius</i>	GL , OF	Waltheria indica
10	Grass Demon	<i>Udaspes folus</i>	GL, OF	Grasses and bamboo

11	Common Redeye	<i>Matapa aria</i>	OF, GL	Phoenix acaulis
12	Giant Redeye	<i>Gangara thyrasis</i>	MDF, OF	Curcuma sp., Zingiber sp. (Zingiberaceae)
13	Dark Palm Dart	<i>Telicota ancilla</i>	SEG, MDF	Bamboos (Gramineae)
14	Rice Swift	<i>Borbo cinnara</i>	GL, OF	Palms (Palmaceae)
	Family Papilionidae			
1	Common Bluebottle	<i>Graphium sarpedon</i>	SEG, MDF	Polyalthia longifolia, Miliusa sp., Michelia doltsopa
2	Tailed Jay	<i>Graphium agamemnon</i>	SEG, MDF	Polyalthia longifolia, Michelia doltsopa, Annona
3	Common Jay	<i>G. doson</i>	SEG, MDF	squamosa
4	Common Rose	<i>Pachliopta aristolochiae</i>	MDF, OF	Polyalthia sp., Michelia sp., Trachelospermum
5	Common Birdwing	<i>Troides helena</i>	SEG	asiaticum
6	Spot Swordtail	<i>Graphium nomius</i>	MDF, OF	Aristolochia sp.
7	Fivebar Swordtail	<i>Graphium antiphates</i>	SEG	Aristolochia sp.
8	Lime Butterfly	<i>Papilio demoleus</i>	MDF, OF	Miliusa tomentosum,
9	Common Mime	<i>Chilasa clytia</i>	SEG, MDF	Annona sp., Miliusa sp.
10	Common Mormon	<i>Papilio polytes</i>	SEG, MDF, OF	Citrus sp. (Rutaceae)
11	Blue Mormon	<i>Papilio polymnestor</i>	MDF, OF	Litsea sp, Alseodaphne sp.
12	Yellow Helen	<i>Papilio nephelus</i>	SEG	Citrus sp. , Murraya sp., Zanthoxylum sp. (Rutaceae)
13	Common Banded Peacock	<i>Papilio crino</i>	MDF, OF	Citrus sp, Glycosmis sp.
14	Paris Peacock	<i>Princeps paris</i>	SEG	Citrus sp Zanthoxylum sp. (Rutaceae)
	Family Pieridae			
1	Psyche	<i>Leptosia nina</i>	MDF, OF	Capparis sp., Crataeva sp. Capparidaceae
3	Indian Cabbage White	<i>Pieris canidia</i>	MDF, OF	Capparidaceae plants
4	Common Gull	<i>Cepora nerissa</i>	MDF, OF	Capparis sp., Capparidaceae
5	Common Wanderer	<i>Pareronia valeria</i>	SEG, MDF, OF	Capparis sp., Crataeva sp. Capparidaceae
6	Chocolate Albatross	<i>Appias lyncida</i>	SEG	Loranthus sp.
7	Painted Jezebel	<i>Delias hyparete</i>	MDF, MDF	Loranthus sp., Viscum sp.
8	Common Jezebel	<i>Delias eucharis</i>	MDF, OF	Cassia sp., Butea sp., Bauhinia sp. (Leguminosae)
9	Common Emigrant	<i>Catopsila pomona</i>	MDF, OF	Cassia sp., Butea sp., Bauhinia sp. (Leguminosae)
10	Mottled Emigrant	<i>Catopsilia pyranthe</i>	MDF, OF	Cassia sp., Acacia sp.,
11	Common Grass Yellow	<i>Eurema hecabe</i>	MDF, OF, GL	Sp.(Leguminosae)
	Family Lycaenidae			
1	Common Acacia Blue	<i>Surendra quercetorum</i>	MDF, OF	Acacia sp.
2	Common Silverline	<i>Spindasis vulcanus</i>	OF	Clerodendrum, Zizyphus
3	Common Leaf Blue	<i>Amblypodia anita</i>	SEG, MDF, OF	Olacaceae plants
4	Yamfly	<i>Loxura atymnus</i>	SEG, MDF	Dioscorea sp.
5	Common Imperial	<i>Cheritra freja</i>	SEG	Numerous food plants
6	The Monkey Puzzle	<i>Rathinda amor</i>	MDF, OF	Ixora sp.
7	Common Red Flash	<i>Rapala jarbas</i>	SEG, MDF	Rubus sp.
8	Common Caerulean	<i>Jamides celeno</i>	SEG, MDF, OF	Derris, Xylia, Abrus and other Legumes
9	Dark Caerulean	<i>Jamides bochus</i>	SEG, MDF	Xylia xylocarpa
10	Zebra Blue	<i>Syntarucus plinius</i>	OF	Plumbago, Indigofera, Albizia, Sesbania
11	Common Pierrot	<i>Castalius rosimon</i>	MDF, OF, GL	Zizyphus sp.

12	Angled Pierrot	<i>Caleta caleta</i>	SEG,MDF	<i>Zizyphus rugosa</i>
13	Rounded Pierrot	<i>Tarucus nara</i>	OF,GL	<i>Zizyphus sp.</i>
14	Grass Jewel	<i>Zizeeria trochilus</i>	OF,GL	<i>Oxalis sp</i>
15	Pale Grass Blue	<i>Pseudozizeeria maha</i>	GL	<i>Oxalis, Legumes,</i>
16	Common Hedge Blue	<i>Acetolepis puspa</i>	SEG,MDF	<i>Schleichera oleosa,</i>
17	Lime Blue	<i>Chilades laius</i>	OF	<i>Citrus sp.</i>
18	Pea Blue	<i>Lampides boeticus</i>	OF	<i>Legumes</i>
19	Plains Cupid	<i>Chilades pandava</i>	GL	<i>Xylia xylocarpa, Cycas sp.</i>
20	Forget-me-not	<i>Catochrysops strabo</i>	MDF,GL	<i>Desmodium sp.</i>
21	Red Pierrot	<i>Talicauda nyseus</i>	OF,MDF	<i>Kalanchoe sp</i>
22	Slate Flash	<i>Rapala manea</i>	SEG,MDF	<i>Acacia sp.</i>
		Total -101 species		

Habitat Codes

SEG: Dense forests (Semi-evergreen & Moist-deciduous forests)

MDF: Moist deciduous forests with

OF: Dry deciduous forests and degraded forests with scrub

GL: Grasslands and Edges of grassland-forests

Table 2: Species diversity Index (H) for various group in different block

S. No	Block Site	March		April		May		June		July	
1	A1	0.94	0.98	0.92	0.89	0.92	1.10	0.98	1.21	1.18	1.71
2	A2	0.91	0.89	0.93	0.94	0.89	0.87	1.10	1.21	1.81	1.51
3	A3	0.73	0.78	0.92	0.98	0.97	1.31	1.14	1.13	1.53	1.83
4	A4	0.87	0.91	1.11	0.97	1.13	1.09	1.21	1.17	1.38	1.85
5	A5	0.72	0.74	0.96	0.99	1.01	0.91	0.89	0.98	1.39	1.27

(A1-Sunabeda Forest Rest House) to Boras,A2-Gadvatta to Gadvatta Nala, A3-Sunabeda Forest Rest House to Chakatia Bhunjia Development Dam, A4-Sunabeda Forest Rest House to Thelkobeda ,A5-Sunabeda grassland to Monikargarh.

5. Acknowledgements

We express to our sincere thanks to S.C Mohanty (Principal Chief Conservator of Forest (Wildlife), Odisha for granting me the permission to undertake the study in Sunabeda Wildlife Sanctuary, thankful to the Mr. Santosh Kumar Banchur, D.F.O Sunabeda Wildlife Sanctuary for his kind permission and technical advice. especially thanks Range Officer Sunabeda Mr. Devapriya Kampa. Authors express gratitude to Mr. Mallik (F.G), Mr. Biswal (F.G), and Mr. Arun for their helps during the field work. and thanks to Prem Kumar (FRH Watch Man) for their unfailing helps during the field work.

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