

OPEN ACCESS



The Journal of Threatened Taxa is dedicated to building evidence for conservation globally by publishing peer-reviewed articles online every month at a reasonably rapid rate at www.threatenedtaxa.org. All articles published in JoTT are registered under [Creative Commons Attribution 4.0 International License](https://creativecommons.org/licenses/by/4.0/) unless otherwise mentioned. JoTT allows unrestricted use of articles in any medium, reproduction, and distribution by providing adequate credit to the authors and the source of publication.



Journal of Threatened Taxa

Building evidence for conservation globally

www.threatenedtaxa.org

ISSN 0974-7907 (Online) | ISSN 0974-7893 (Print)

ARTICLE

BUTTERFLIES ASSOCIATED WITH MAJOR FOREST TYPES IN ARUNACHAL PRADESH (EASTERN HIMALAYA), INDIA: IMPLICATIONS FOR ECOTOURISM AND CONSERVATION PLANNING

Arun P. Singh

26 April 2017 | Vol. 9 | No. 4 | Pp. 10047–10075
10.11609/jott.2765.9.4.10047-10075



For Focus, Scope, Aims, Policies and Guidelines visit http://threatenedtaxa.org/About_JoTT

For Article Submission Guidelines visit http://threatenedtaxa.org/Submission_Guidelines

For Policies against Scientific Misconduct visit http://threatenedtaxa.org/JoTT_Policy_against_Scientific_Misconduct

For reprints contact info@threatenedtaxa.org

Partner



Publisher/Host





BUTTERFLIES ASSOCIATED WITH MAJOR FOREST TYPES IN ARUNACHAL PRADESH (EASTERN HIMALAYA), INDIA: IMPLICATIONS FOR ECOTOURISM AND CONSERVATION PLANNING

Arun P. Singh

Forest Entomology Division, Forest Research Institute, P.O. New Forest, Dehradun, Uttarakhand 248006, India
ranoteaps@gmail.com

ISSN 0974-7907 (Online)
ISSN 0974-7893 (Print)

OPEN ACCESS



Abstract: A three year study (from December 2011 to December 2014 and in June 2015) on butterflies covering four major forest sub-types as classified by H.G. Champion & S.K. Seth in 1968 in 'Forest Types of India', which occupy 60% of the forest area lying below 2,500m across Arunachal Pradesh State in the eastern Himalaya of India, revealed 415 taxa belonging to six families (Hesperiidae: 74 species of 42 genera; Papilionidae: 37 species of 10 genera; Pieridae: 36 species of 15 genera; Lycaenidae: 85 species of 49 genera; Riodinidae: 7 species of 3 genera & Nymphalidae: 176 species of 71 genera, respectively). These included many endemic and rare species typical of these forest sub-types, i.e., (i) 2B/1S1 Sub-Himalayan Light Alluvial Semi-Evergreen Forest (32 species), (ii) 2B/ C1(a) Assam Alluvial Plains Semi-Evergreen Forests (5 species), (iii) 2B/2S2 Eastern Alluvial Secondary Semi-Evergreen Forests- (15 species) and (iv) 3/1S2 (b) Terminalia-Duabanga (3 species), respectively. The relative number of species and individuals sampled were the highest at altitudes below 500m, and gradually declined as the altitude increased to 2,000m, and above 2,500m species richness declined sharply. The number of species and their relative abundance were the highest during July–August (Monsoon-first peak) and then again in November–December (Autumn-second peak), while the numbers were lowest during winter. These findings suggest that these four forest types are important both for the purpose of ecotourism as well as conservation of endemic and rare taxa found in the eastern Himalaya and northeastern India at altitudes below 2,000m. A complete list of all the taxa sampled is given along with relative abundance status during sampling, Indian Wildlife (Protection) Act, 1972 status, and distribution in different forest types in the state. Ten potential butterfly ecotourism zones are suggested for the state. Planning land-use for biodiversity conservation based on butterfly-forest type associations, by taking forest sub-types as units of conservation, is suggested as an option for the eastern Himalaya.

Keywords: Broad-leaved species, conservation planning, eastern Himalaya, ecotourism, endemism, Indo-Burma biodiversity hotspot, Lepidoptera, northeastern India, protected species, rare, semi-evergreen forest.

DOI: <http://doi.org/10.11609/jott.2765.9.4.10047-10075> | **ZooBank:** <urn:lsid:zoobank.org:pub:F4F4F2D7-7EC8-4843-AAFD-6E7A767F5A34>

Editor: James Young, Hong Kong Lepidopterists Society, Hong Kong.

Date of publication: 26 April 2017 (online & print)

Manuscript details: Ms # 2765 | Received 20 April 2016 | Final received 31 January 2017 | Finally accepted 22 March 2017

Citation: Singh, A.P. (2017). Butterflies associated with major forest types in Arunachal Pradesh (eastern Himalaya), India: implications for ecotourism and conservation planning. *Journal of Threatened Taxa* 9(4): 10047–10075; <http://doi.org/10.11609/jott.2765.9.4.10047-10075>

Copyright: © Singh 2017. Creative Commons Attribution 4.0 International License. JoTT allows unrestricted use of this article in any medium, reproduction and distribution by providing adequate credit to the authors and the source of publication.

Funding: Indian Council of Forestry Research & Education.

Competing interests: The author declares no competing interests.

Author Details: ARUN P. SINGH is currently working as a scientist with the Forest Research Institute, Dehradun. His experience pertains to the conservation and ecology of butterflies and birds across the Himalaya, over the last two decades.

Acknowledgements: The present study was part of a project being carried out by the author at the Rain Forest Research Institute (RFRI), Jorhat, Assam during 2011-2015. I am thankful to the Director General, ICFRE and Director, RFRI for providing the necessary facilities & funds to carry out the project (Ecological studies on monitoring the distribution patterns and food plant resources of butterflies along altitudinal gradients in different forest ecosystems of the eastern Himalaya (Arunachal Pradesh) RFRI-36/2020-11/EB). I am thankful to Dhruba J. Das, Geo-informatics laboratory, RFRI, for his help in drawing the GIS maps of Arunachal Pradesh and to Raman Nautiyal, Statistician, ICFRE, Dehradun for analysis of data. The efforts put in by Abhijit Medhi, Jis Sebastian, Lina Gogoi, Sirjita Ganguly and Riyaz Ahmed, during field surveys, data compilation & entry from time to time, are highly appreciated. I would also like to thank Monsoon Jyoti Gogoi, Sanjay Sondhi, Krushnamegh Kunte and Paul Van Gasse, for their help in identification of butterflies. I would also like to acknowledge the help received from the Arunachal Pradesh District Administration, Forest Department, and local people during the field surveys.



INTRODUCTION

The World Wide Fund for Nature (WWF) has identified the entire eastern Himalaya as a priority Global 200 Eco-region while Conservation International has upscaled the eastern Himalaya hotspot to the Himalaya Hotspot. The Indian state of Arunachal Pradesh is located between 26°50'42"–29°25'02"N and 91°31'51"–97°28'16"E in the eastern Himalaya, has its borders with the Indian states of Assam and Nagaland to the south, and shares international borders with Bhutan in the west, Myanmar in the east and China (Tibet) in the north. Arunachal Pradesh covers an area of 83,743km² of which approximately 67,905km² is under forest (Forest Survey of India 2013). The forests of Arunachal Pradesh have been classified into 16 different forest sub-type classes as per the Champion & Seth (1968) classification: 2B/1S1 Sub-Himalayan Light Alluvial Semi-Evergreen Forests (31.05% area) followed by 2/2S1 Secondary Moist Bamboo Brakes (12.40%); 14/C2 East Himalayan Sub-Alpine Birch/Fir Forests (10.3%); 2B/C1(a) Assam Alluvial Plains Semi-Evergreen Forests (8.72%); 2B/2S2 Eastern Alluvial Secondary Semi-Evergreen Forests (8.42%); 2B/C1(b) Eastern Sub-Montane Semi-Evergreen Forests (8.16%); 12/C3(a) East Himalayan Mixed Coniferous Forests (7.43%); 3/1S2(b) Terminalia-Duabanga (5.24%); 8B/C1 East Himalayan Sub-Tropical Wet Hill Forests (3.35%); 13/C6 East Himalayan Dry Temperate Coniferous Forests (1.51%); 1B/C2(a) Kayea Forests (1.46%); 15/C1 Birch/Rhododendron Scrub Forests (0.92%); 9/C2 Assam Sub-Tropical Pine Forests (0.84%); 16/C1 Dry Alpine Scrub (0.05%); 1/2S1 Pioneer Euphorbiaceous Scrub (0.02%); 3C/2S2 Secondary Euphorbiaceous Scrub (0.11%) and Plantations (0.05%), respectively (Forest Survey of India 2011). Out of all of these forest types, 11 are more prominent than others (Table 1).

Arunachal Pradesh is one of richest states in India in terms of biodiversity, with over 4,200–5,000 species of flowering plants of which 243 species are endemic to the state (Chowdhery 1999; Baishya et al. 2001; Chatterjee et al. 2006), over 545 species of orchids (Baishya et al. 2001; Rao 2010), 61 species of rhododendrons (Mao et al. 2001) and over 50 species of bamboos (Haridasan 1987; Naithani 2008). Faunal richness is equally diverse with over 650 avian species identified in 28 important birding areas (IBA's) (Zafar-ul-Islam & Rehmani 2004). Perhaps this is the only region in the world known to harbor all the three extant species of Goral: *Nemorhaedus goral* Hardwicke, 1825 (Himalayan Goral); *N. griseus* Milne-Edwards, 1874 (Chinese Goral)

and *N. baileyi* Pocock, 1914 (Red Goral). Both Chinese and Red gorals have been recognized as Vulnerable in the International Union for Conservation of Nature's (IUCN) Red List of Threatened species (Paul et al. 2005). New taxa are still being discovered in the state, e.g., *Macaca munzala* Sinha et al., 2005 (Arunachal Macaque); *Liocichla bugunorum* Athreya, 2006 (Bugun Liocichla); *Leptobrachium bompu* Sondhi & Ohler, 2011 (Bomphu Litter Frog); *Zoothera salimalii* Alström et al. 2016 (Himalayan Forest Thrush), and recently two species of butterflies, *Callerebia dibangensis* Roy, 2013 (Bright-eyed Argus) was described from one male specimen collected in 1987 while Singh (2015) described its female and studied its ecology in Dibang Valley; and most recently *Hypolycaena narada* Kunte, 2015 (Banded Tit) was discovered from Namdapha National Park in the State.

Studies on butterflies in Arunachal Pradesh started as early as 1845 by Doubleday (1845) followed by Moore (1857), Evans (1912), South (1913), Betts (1950). Recent records are by Arora & Mondal (1981), Gupta & Shukla (1988), Varhsney & Shukla (1988), Radhakrishnan (1988), Borang et al. (2008), Gogoi (2012), Singh (2013), Sondhi & Roy (2013), Sondhi & Kunte (2014), and Sondhi et al. (2016); however, all these records are mainly area-specific checklists or dealt with species taxonomy. There is no information available on the association of butterflies with different forest types as per Champion & Seth (1968) classification in Arunachal Pradesh State. In this study, the associations/linkages between butterflies and 11 forests sub-types are examined across the state for the first time and zones identified for conservation and ecotourism in the state.

MATERIAL AND METHODS

Sampling

Random sampling surveys for collecting data on butterflies were carried out covering all the seasons of the year (January–February: winter; March–April: spring; May–June: pre-monsoon; July–August: monsoon; September–October: post monsoon; & November–December: autumn) for three years from 17 December 2011 to 15 December 2014 and also from 3–4 June 2015 (Fig. 1). A total of 196 transect walks were undertaken besides random point sampling on survey routes covering 11 major forest types (Table 1) for individuals of each species of butterflies. Two-thousand-nine-hundred-and-sixteen (2,916) GPS point locations in 16 Districts of the state (Fig. 1) were thus

Table 1. Plant species composition of 11 forest sub-types surveyed in Arunachal Pradesh.

	Forest Sub-type	% of total State Forest cover	Major tree and shrub species	Districts of major distribution
1	2B/1S1 Sub-Himalayan Light Alluvial Semi-Evergreen Forests	31.05	<i>Terminalia myriocarpa</i> Van Heurck & Muller Argoviensis, <i>T. bellirica</i> (Gaertn.) Roxb., <i>Altingia excelsa</i> Noronha, <i>Magnolia</i> Linnaeus, <i>Ailanthus grandis</i> Prain, <i>Duabanga grandiflora</i> (Roxb. ex DC) Walpers, <i>Phoebe goalparensis</i> Hutchinsonson, <i>P. cooperiana</i> P.C. Kanj. & Das, <i>Tetrameles nudiflora</i> R.Br., <i>Agalia spectabilis</i> (Miq.) Jain & Bennet, <i>Syzygium cumini</i> (L.) Skeels., <i>Dysoxylum binectiferum</i> Hook.f. ex Bedd., <i>Artocarpus chama</i> Buch.-Ham., <i>Kydia calycina</i> (Roxb.), <i>Dillenia indica</i> L., <i>Meliosma</i> Blume, <i>Bambusa pallida</i> (L.) Voss, <i>Gynocardia odorata</i> R.Br., <i>Mesua ferrea</i> L., <i>M. assamica</i> (King & Prain) Kosterm., <i>Calamus</i> (L.), <i>Clerodendrum wallichii</i> Merr., <i>Alpinia</i> Roxb., <i>Clinogyna</i> sp., <i>Ehertia acuminata</i> R.Br., <i>Mangifera sylvatica</i> Roxb., <i>Dendrocnide sinuata</i> (Bl.) Chew.	Lohit, Changlang, Tirap, Dibang Valley, Siang-Upper, Siang West and Siang East.
2	2/2S1 Secondary Moist Bamboo Brakes	12.40	Bamboo brakes are scattered throughout tropical evergreen forests. <i>Dendrocalamus hamiltonii</i> Gamble, <i>Bambusa pallida</i> (L.) Voss, <i>Bambusa tulda</i> Roxb., <i>Cephalostachyum capitatum</i> Munro.	Lohit, Changlang, Tirap, Dibang Valley, Siang Upper, Siang West and Siang East.
3	14/C2 East Himalayan Sub-Alpine Birch/Fir Forests	10.30	<i>Abies densa</i> Griff., <i>Juniperus wallichiana</i> Hook.f. & Thomson ex Brandis, <i>Rhododendron wightii</i> Hook.f., <i>R. lepidotum</i> Wallich ex G. Don, <i>Betula utilis</i> D. Don, <i>Sorbus aucuparia</i> (L.), <i>Salix wallichiana</i> Andersson, <i>Spiraea</i> L., <i>Juniperus recurva</i> Buch.-Ham. ex D. Don	Mainly above 3000m, Tawang, Siang Upper, Siang West, Lohit and Dibang Valley.
4	2B/C1(a) Assam Alluvial Plains Semi-Evergreen Forests	8.72	<i>Altingia excelsa</i> Noronha, <i>Amoora wallichii</i> King, <i>Ailanthus grandis</i> Prain, <i>Bischofia javanica</i> Blume, <i>Cinnamomum cecidophne</i> Meissn., <i>Magnolia</i> L., <i>Chukrasia tabularis</i> M. Roem., <i>Castanopsis indica</i> Roxb. ex Lindl., <i>Elaeocarpus</i> L., <i>Michelia champaca</i> (L.) Baill. ex Pierre, <i>Phoebe attenuate</i> (Nees) Nees, <i>Terminalia myriocarpa</i> Van Heurck & Muller Argoviensis, <i>T. bellirica</i> (Gaertn.) Roxb., <i>T. chebula</i> Retz., <i>Canarium rinisiferum</i> King, <i>Castanopsis tribuloides</i> (Sm.) A. DC., <i>Duabanga grandiflora</i> (Roxb. ex DC) Walpers, <i>Bombax cieba</i> L., <i>Sterculia villosa</i> Roxb., <i>Syzygium formosum</i> (Wall) Masam, <i>Mangifera indica</i> L., <i>Phoebe hainesiana</i> Brandis, <i>Syzygium cumini</i> (L.) Skeels., <i>Dysoxylum binectiferum</i> Hiern., <i>Mesua ferrea</i> L., <i>Dillenia indica</i> L., <i>Kydia calycina</i> Roxb., <i>Tetrameles nudiflora</i> R.Br., <i>Magnolia hodgsonii</i> Hook.f. & Thomson, <i>Sapium baccatum</i> Roxb., <i>Olea dioica</i> Roxb., <i>Vatica lancifolia</i> (Roxburgh) Blume, etc.	Kameng East, Kameng West, Papumparey, Siang East and Siang West.
5	2B/2S2 Eastern Alluvial Secondary Semi-Evergreen Forests	8.42	<i>Terminalia myriocarpa</i> Van Heurck & Muller Argoviensis, <i>Tetrameles nudiflora</i> R.Br., <i>Sterospermum personatum</i> (Hassk.), <i>Dipterocarpus pilosus</i> (Roxb.), <i>Artocarpus chaplasha</i> Roxb., <i>Castanopsis hystrix</i> Miq., <i>Aquilaria agallocha</i> , <i>Macaranga Thouars</i> , <i>Mesua ferrea</i> L., <i>Amoora wallichii</i> King, <i>Pseudostachyum polymorhum</i> Munro, <i>Ailanthus grandis</i> Prain, <i>Pterospermum acerifolium</i> (L.) Willd., <i>Albizia Durazz</i> and <i>Terminalia citrina</i> (Gaertn.) Roxb. ex Fleming.	Lohit, Changlang, Tirap and Dibang Valley.
6	2B/C1(b) East Sub-Montane Semi-Evergreen Forests	8.16	<i>Ailanthus grandis</i> Prain, <i>Terminalia myriocarpa</i> Van Heurck & Muller Argoviensis, <i>Castanopsis indica</i> (Roxb. ex Lindl.), <i>Duabanga grandiflora</i> (Roxb. ex DC.) Walpers, <i>Schima wallichii</i> (D.C.) Korth., <i>Altingia excelsa</i> Noronha, <i>Pterospermum acerifolium</i> (L.) Willd., <i>Albizia procera</i> (Roxb.) Benth., <i>Dysoxylum binectiferum</i> (Roxb.) Hook.f. ex Bedd., <i>Syzygium cumini</i> (L.) Skeels, <i>Kydia calycina</i> (Roxb.), <i>Tetrameles nudiflora</i> R.Br., <i>Bauhinia purpurea</i> L., <i>Toona ciliata</i> M. Roem., <i>Gmelina arborea</i> Roxb., <i>Stereospermum chelonoides</i> (L. fil.) DC., <i>Actinodaphne obovata</i> (Nees), <i>Meliosma</i> Blume, <i>Turpinia pomifera</i> (Roxb.) DC., <i>Gracina stipulata</i> T. Anderson, <i>Phoebe lanceolata</i> (Nees) Nees, <i>Magnolia hodgsonii</i> (Hook.f. & Thomson) H. Keng.	Occurs up to 760m in Lower Subansari and Upper Subansari.
7	12/C3 (a) East Himalayan Mixed Coniferous Forests	7.43	<i>Abies densa</i> Griff., <i>Tsuga demosa</i> (D. Don) Eichler, <i>Acer campbellii</i> Hook.f. & Thomson, <i>A. pectinatum</i> Wall. ex G. Nicholson, <i>Betula utilis</i> D. Don, <i>Magnolia campbellii</i> Hook.f. & Thomson, <i>Quercus lineata</i> (Bl.) Oerst, <i>Q. pachyphylla</i> , <i>Rhododendron arboreum</i> , <i>R. grande</i> Wight, <i>Taxus baccata</i> L., <i>Brassaiopsis alpina</i> C. B. Clarke, <i>Berberis aristata</i> DC, <i>Daphne cannabina</i> Wall., <i>Rubus niveus</i> Thunb., <i>Piptanthus nepalensis</i> (Hook.) D. Don.	2,300–3,000 m. Kameng East and Kameng West and Papumparey.
8	3/1S2(b) Terminalia-Duabanga	5.24	<i>Terminalia myriocarpa</i> Van Heurck & Muller Argoviensis, <i>Pterospermum acerifolium</i> (L.) Willd., <i>Duabanga grandiflora</i> (Roxb. ex DC.) Walpers, <i>Vatica lanceifolia</i> (Roxburgh) Blume, <i>Vitex peduncularis</i> Wall. ex Schauer, <i>Elaeocarpus rugosus</i> Roxb., <i>Ailanthus grandis</i> Prain, <i>Bombax cieba</i> L., <i>Chukrasia tabularis</i> M. Roem., <i>Gruga</i> spp. and <i>Morus laevigata</i> Wall. ex Brandis	Lohit, West Kameng, Papumparey, Changlang, Tirap, Siang East and Dibang Valley.
9	13/C6 East Himalayan Dry Temperate Coniferous Forests	1.51	<i>Picea spinulosa</i> (Griff.) A. Henry, <i>Pinus wallichiana</i> (A. B. Jacks.), <i>Tsuga dumosa</i> (D. Don) Eichler, <i>Juniperus wallichiana</i> Hook.f. & Thomson ex Parl., <i>Rhododendron</i> spp., etc.	Upper Subansari, Lower Subansari, Tawang and East Kameng
10	1B/C2(a) Kayea Forests (Assam Valley Tropical Evergreen Forests)	1.46	<i>Mesua assamica</i> (King & Prain), <i>M. ferrea</i> L., <i>Echinocarpus dasycarpus</i> Benth., <i>Dysoxylum</i> Blume, <i>Pterospermum acerifolium</i> (L.) Willd., <i>Terminalia chebula</i> Retz., <i>Amoora wallichii</i> King, <i>Agalia spectabilis</i> (Miq.) Jain & Bennet, <i>Canarium</i> L.	Kameng West
11	15/C1 Birch – Rhododendron Scrub Forests	0.92	Mainly Rhododendrons with Birch and other deciduous species. <i>Rhododendron wightii</i> Hook.f., <i>R. campanulatum</i> D. Don, <i>R. thomsonii</i> Hook.f., <i>R. setosum</i> D. Don, <i>R. anthopogon</i> D. Don, <i>R. lepidotum</i> Wallich ex G. Don, <i>Betula utilis</i> D. Don, <i>Quercus semecarpifolia</i> Sm., <i>Pyrus</i> spp., <i>Mahonia</i> spp., <i>Hypericum</i> spp. etc.	Found above 3,500 m in Tawang District.

Source: (Forest Survey of India 2011). Other forest types occurring in Arunachal Pradesh - 8B/C1 East Himalayan Sub-Tropical Wet Hill Forests; 9/C2 Assam Sub-Tropical Pine Forests; 16/C1 Dry Alpine Scrub; 1/2S1 Pioneer Euphorbiaceous Scrub; 3C/2S2 Secondary Euphorbiaceous Scrub and Plantations are omitted from sampling surveys.

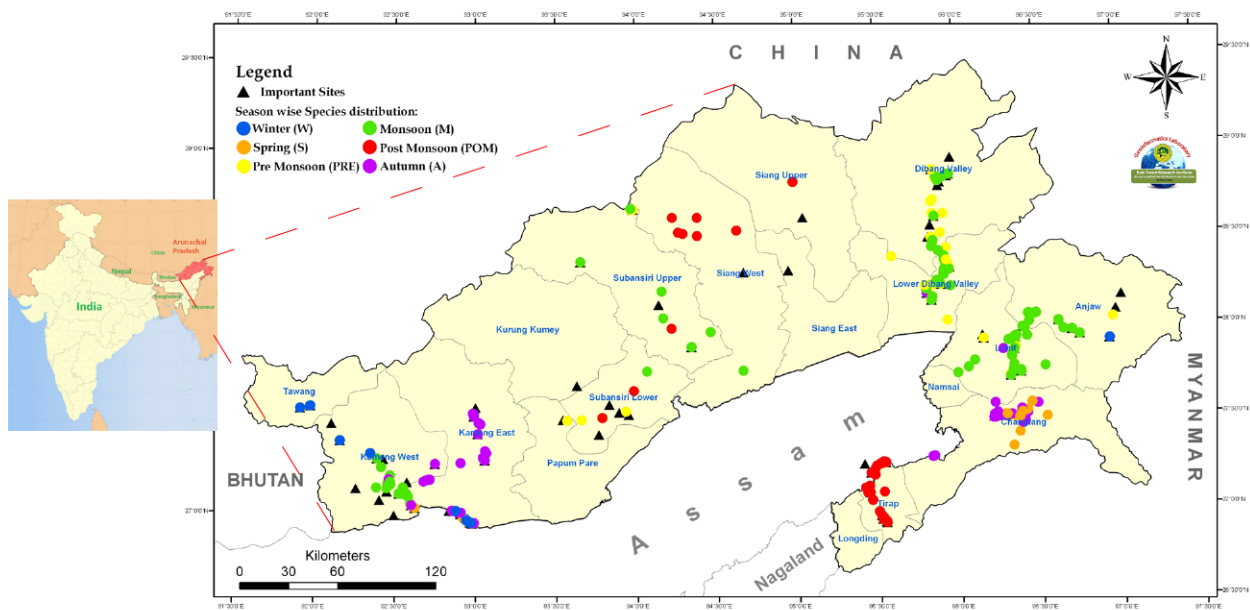


Figure 1. Butterfly sampling locations showing the seasonality of surveys across Arunachal Pradesh.

covered. The routes and locations, dates and forest sub-types covered during the survey are given for each trip in Appendix 1. The altitudinal gradient covered was from the lowest 135m at Deomali in Tirap District in the southeast to the highest 4,000m at Sela Pass on the border between Tawang and West Kameng Districts in the west. Pollard's walk methodology (Pollard & Yates 1993) was adopted to gather data on butterfly abundance for each species encountered on the transect walk which was done for one hour in a stretch by walking on the roads/trails for 1–2 km. Data was also collected on individual butterfly species/congregations encountered while travelling between sites, base line parameters of forest stands where data was collected using a GPS for coordinates (latitude, longitude and altitude). Data on temperature and relative humidity was taken during the time of sampling of butterflies for only 83 transects from 28 August 2013 to 11 December 2014 using a weather meter. The linkages between butterflies and forest sub-types were determined by over-laying the sampling point locations of each individual of butterfly species sampled on the forest sub-type map of the state (Fig. 1 & 3; FSI 2011) on a GIS platform using ArcGIS 7 software at the Geo-informatics laboratory at Rain Forest Research Institute, Jorhat, Assam, India.

Identification of butterflies was carried out on the spot at the sampling site. Most species were photographed and only a few specimens of unidentified species were collected. For identification field guides (Evans 1932;

Wynter-Blyth 1957; D'Abrera 1982, 1985, 1986; Smith 1989; Haribal 1992; Smith 2006, Kehimkar 2008; Singh 2011; Gogoi 2012, 2013; Sondhi et al. 2013; Sondhi & Kunte 2014; Smetacek 2015) were used along with web resources (<<http://www.ifoundbutterflies.org/>>; <<http://flutters.org/>> and <<http://yutaka.it-n.jp/>>). Comparison of images/specimens was also done with the specimens at the National Forest Insect Collection at Forest Research Institute, Dehradun, Uttarakhand, India. Nomenclature followed using the website <http://www.nic.funet.fi/pub/sci/bio/life/insecta/lepidoptera/ditrysia/papilionoidea/>.

The relative abundances of all the species were pooled and ranked from lowest to the highest. All the taxa were then divided into four equal classes or categories with equal number of species. Based on the quartile divisions of their relative abundances, all the taxa sampled were ranked into four categories (i) Uncommon = Q1 (minimum abundance), (ii) Fairly Common = Q2; (iii) Common = Q3 and (iv) Very Common = Q4 (maximum abundance) respectively.

RESULTS AND DISCUSSION

A total of 415 taxa (413 species + 2 subspecies) of butterflies were recorded and identified in the state during the three year's sampling period. Based on the quartile divisions of their relative abundances,

415 taxa were ranked as Uncommon (Q1=1; minimum abundance); Fairly Common (Q2=2-4); Common (Q3=5-14); and Very Common (Q4 =15- 238; maximum abundance) (Median value=4) (Appendix 2).

a. Butterfly species associations of different forest sub-types of Arunachal Pradesh

Linkages between butterfly communities and 11 major forest sub-types were examined by analyzing relative abundance data of 415 taxa of butterflies found in these forests (Fig. 2).

It is evident that the butterfly community of 2B/1S1 Sub-Himalayan Light Alluvial Semi-Evergreen Forests, which is the dominant forest sub-type in the state, was most unique as it lay at one extreme of the dendrogram showing most dissimilarity with the rest but being closely linked to 2B/C1(a) Assam Alluvial Plains Semi-Evergreen Forests, followed by 2B/2S2 Eastern Alluvial Secondary Evergreen Forests, 3/1S2(b) Terminalia-Duabanga and others, respectively.

b. Species richness and relative abundance of butterflies in different forest-sub-types

The Highest number of species were also recorded in 2B/1S1 Sub-Himalayan Light Alluvial Semi-Evergreen Forests followed by 2B/2S2 Eastern Alluvial Secondary Evergreen Forests, 2B/1C1(a) Assam Alluvial Plains Semi-Evergreen Forests, 3/1S2(b) Terminalia-Duabanga, 12/C3(a) East Himalayan Mixed Coniferous Forests, 2/2S1 Secondary Moist Bamboo Brakes, 1B/C2(a) Kayea Forests, respectively (Fig.3).

Relative abundance of butterflies (Fig. 4) followed the same pattern in different forest sub-types as of species richness, except that 2B/2S2 Eastern Alluvial Secondary Evergreen Forests and 2B/1C1(a) Assam Alluvial Plains Semi-Evergreen Forests had almost similar abundance of butterflies.

Amongst the major forest sub-types the maximum proportion of the number of species in total was found in 2B/1S1 Sub-Himalayan Light Alluvial Plains Semi-Evergreen Forests, which also occupy the maximum proportion of land area under forest cover in the State (Fig.5).

c. Distribution of specialists and generalists in forest sub-types

Amongst the forest type specialists, species which were restricted to single or two forest sub-types (Figs. 6 & 7; blue bars), the most preferred habitat was 2B/1S1 Sub-Himalayan Light Alluvial Plains Semi-Evergreen

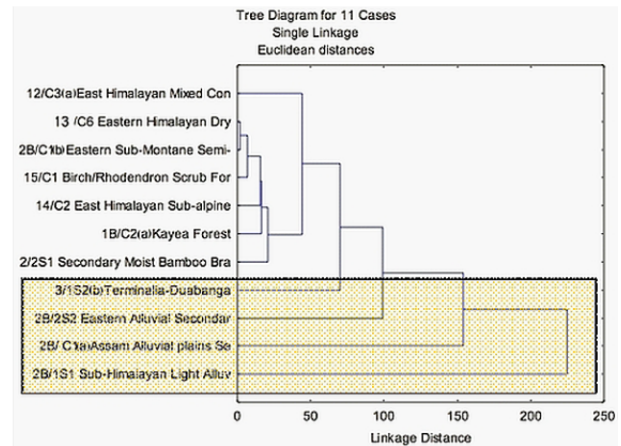


Figure 2. Butterfly species similarity of 11 forest sub-types sampled for butterflies in Arunachal Pradesh with 4 major butterfly forest sub-types highlighted.

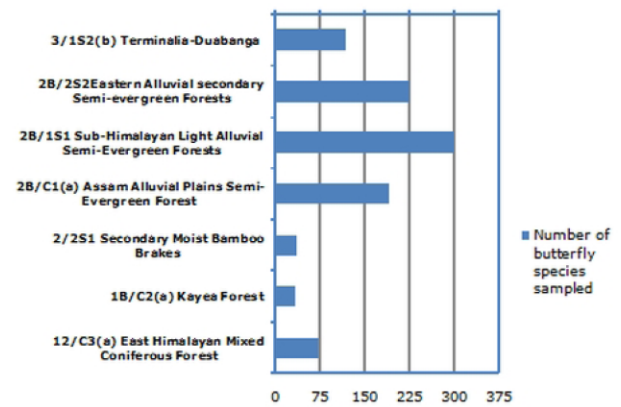


Figure 3. Number of butterfly species recorded in seven major different forest sub-types in Arunachal Pradesh

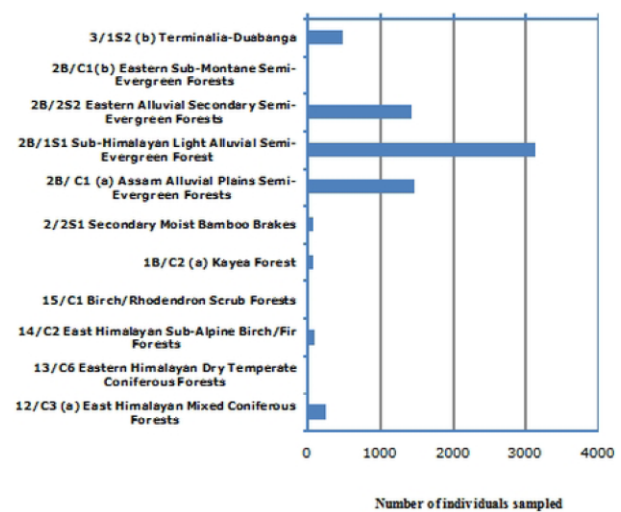


Figure 4. Number of individuals recorded in 11 major different forest sub-types in Arunachal Pradesh

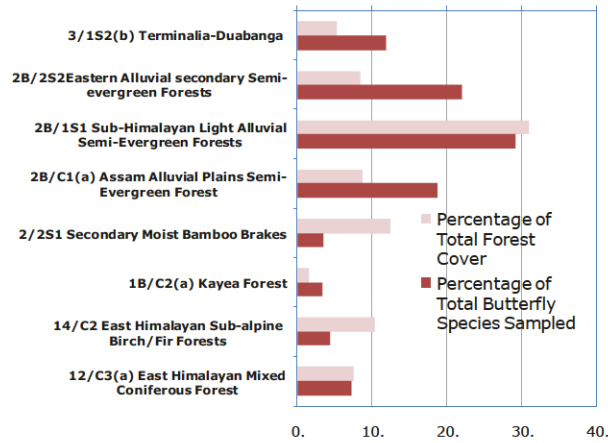


Figure 5. Relative proportion of total forest-area covered and the proportion butterfly species sampled in 8 forest sub-types in Arunachal Pradesh.

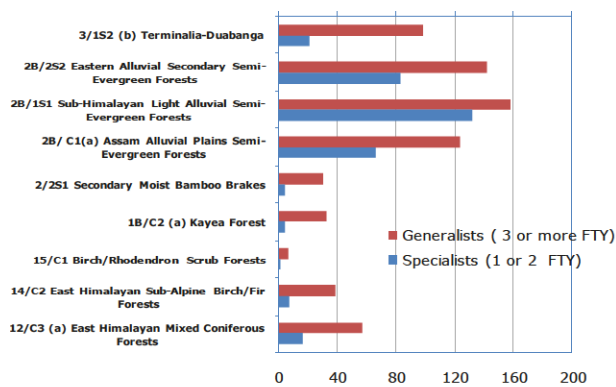


Figure 6. Species richness of habitat generalists and specialists in nine forest sub-types (FTY)

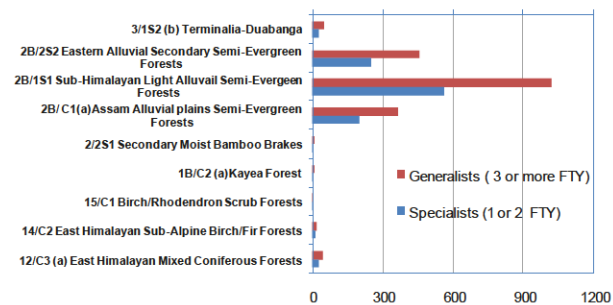


Figure 7. Relative abundance of habitat generalists and specialists in different forest sub-types (FTY).

Forests, followed by 2B/C1(a) Assam Alluvial Plains Semi-Evergreen Forests, 2B/2S2 Eastern Alluvial Secondary Semi-Evergreen, 3/1S2(b) Terminalia-Duabanga, 12/C3(a) East Himalayan Mixed Coniferous Forests, 14/C2 East Himalayan Sub-Alpine Forests, respectively. Other forest sub-types had less than 10 individuals of less than 10 species, i.e., 1B/C2 (a) Kayea Forests, while other

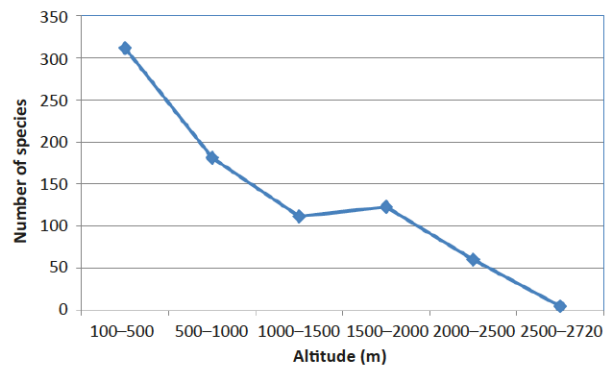


Figure 8. Species richness of butterflies across different altitudes in Arunachal Pradesh

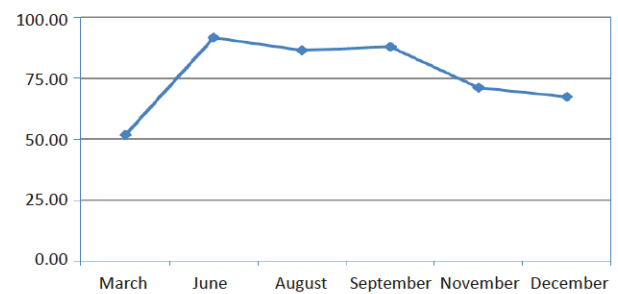


Figure 10. Average relative humidity during the study period (August 2013–December 2014) at sampling locations during the time of sampling in Arunachal Pradesh

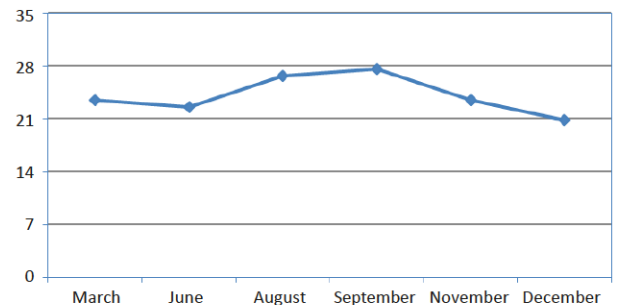


Figure 9. Mean temperature (°C) during the study period (August 2013 – December 2014) at sampling locations during the time of sampling in Arunachal Pradesh

forest sub-types had only a few species and individuals.

Species which preferred three or more forest sub-types, generalists, were also abundant in 2B/1S1 Sub-Himalayan Light Alluvial Semi-Evergreen Forests followed by 2B/C1(a) Assam Alluvial Plains Semi-Evergreen Forests, 2B/2S2 Eastern Alluvial Secondary Semi-Evergreen Forests, 3/1S2(b) Terminalia-Duabanga, 12/C3(a) East Himalayan Mixed Coniferous Forests respectively, while other habitats had only few species and individuals.

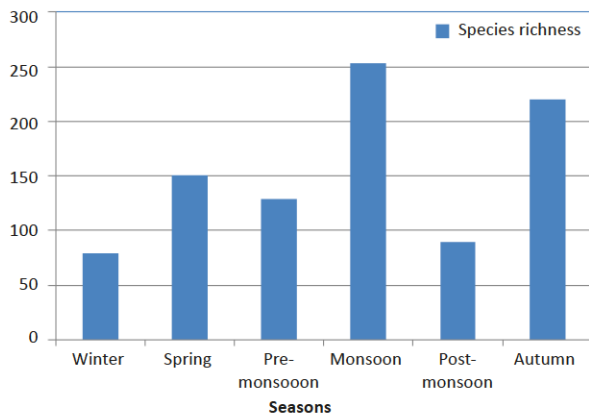


Figure 11. Number of species of butterflies sampled in Arunachal Pradesh during different seasons of the year under review (December 2011–December 2014).

d. Species richness at different altitudes

Species richness of butterflies was higher at lower elevations in the State and gradually declined and reduced significantly above 2000m (Fig.8). The major 4 forest types 2B/1S1 Sub-Himalayan Light Alluvial Plains Semi-Evergreen Forests, 2B/2S2 Eastern Alluvial Secondary Semi-Evergreen Forests, 2B/C1(a) Assam Alluvial Plains Semi-Evergreen Forests and 3/1S2(b) Terminalia-Duabanga are represented mainly below 2000m elevation (Fig.9).

e. Seasonality

Arunachal Pradesh receives heavy rainfall of 2,000–4,100mm annually, mostly between May and September. The relative humidity (Fig. 9) and temperature (Fig. 10) were both high from June to November during the study period (2013–2014). The Maximum temperature was recorded during August–September (monsoon and post monsoon) while maximum relative humidity was recorded during June–September (pre-monsoon, monsoon and post monsoon seasons).

The number of species of butterflies in flight was highest during Monsoon season (Fig. 11) (first peak-253 species) followed by Autumn (second peak-220) while it was lowest during post monsoon and winter (79) in Arunachal Pradesh. However, the number of species was never low in any season, suggesting that butterflies are in flight all year round in the state, mainly at lower elevations.

Similarly, the relative abundance of butterflies was also highest during Monsoon season (Fig. 12) and Autumn while it was lowest during winter in Arunachal Pradesh.

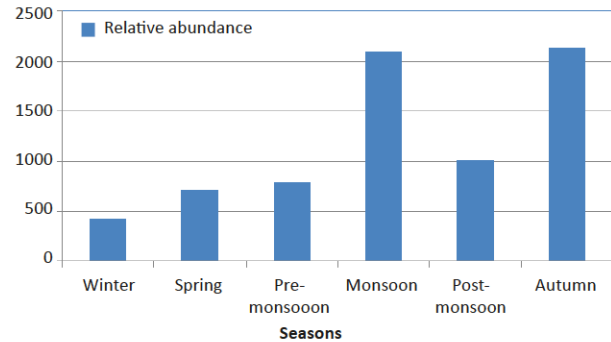


Figure 12. Relative abundance of butterflies sampled in Arunachal Pradesh during different seasons of the year under review (December 2011–December 2014).

CONCLUSION

The findings of the study suggest that there are linkages between butterflies and forest sub-types found in the eastern Himalaya in Arunachal Pradesh. Four major forest types, namely 2B/1S1 Sub-Himalayan Light Alluvial Plains Semi-Evergreen Forests, 2B/ C1(a) Assam Alluvial Plains Semi-Evergreen Forests, 2B/2S2 Eastern Alluvial Secondary Semi-Evergreen Forests, and 3/1S2(b) Terminalia-Duabanga, account for approximately 60% of the total forest area under 2,000m in the state and where the butterfly fauna is most diverse. Undoubtedly, July–August followed by November–December in altitudes below 2,000m in Arunachal Pradesh are the best time for butterflies when they can be seen in large numbers both in terms of species richness and abundance. The forest sub-type, '2B/1S1 Sub-Himalayan Light Alluvial Plains Semi-Evergreen Forests' being most distinct in terms of butterfly diversity than the rest, is also the most diverse in terms of butterfly numbers and species richness. This area is widely spread over in the eastern and the central part of the state covering approximately 31% of the forest area (Fig. 13a). It therefore has priority over the other forest sub-types in the state for conservation as well as ecotourism. Many species that prefer this forest type are either uncommon, rare or endemic to the eastern Himalaya and northeastern India. These are, *Rhinopalpa polynice birmana* Fruhstorfer, 1897 (Wizard), *Papilio paradoxa telearchus* Hewitson, 1852 (Great Blue Mime), *Athyma pravara acutipennis* Fruhstorfer, 1906 (Unbroken Sergeant), *Athyma kanwa phorkys* Fruhstorfer, 1912 (Dot-dash Sergeant), *Bassarona durga durga* Moore, 1857 (Blue Duke), *Dercas verhuelli doubledayi*, Moore 1905 (Tailed Sulphur), *Aporia harrietae* (de Nicéville, 1892) (Great Blackvein), *Lethe sura* Doubleday, 1849 (Lilac Fork), *Elymnias peali* Wood-Mason, 1883 (Peal's Palmfly), *Penthema*

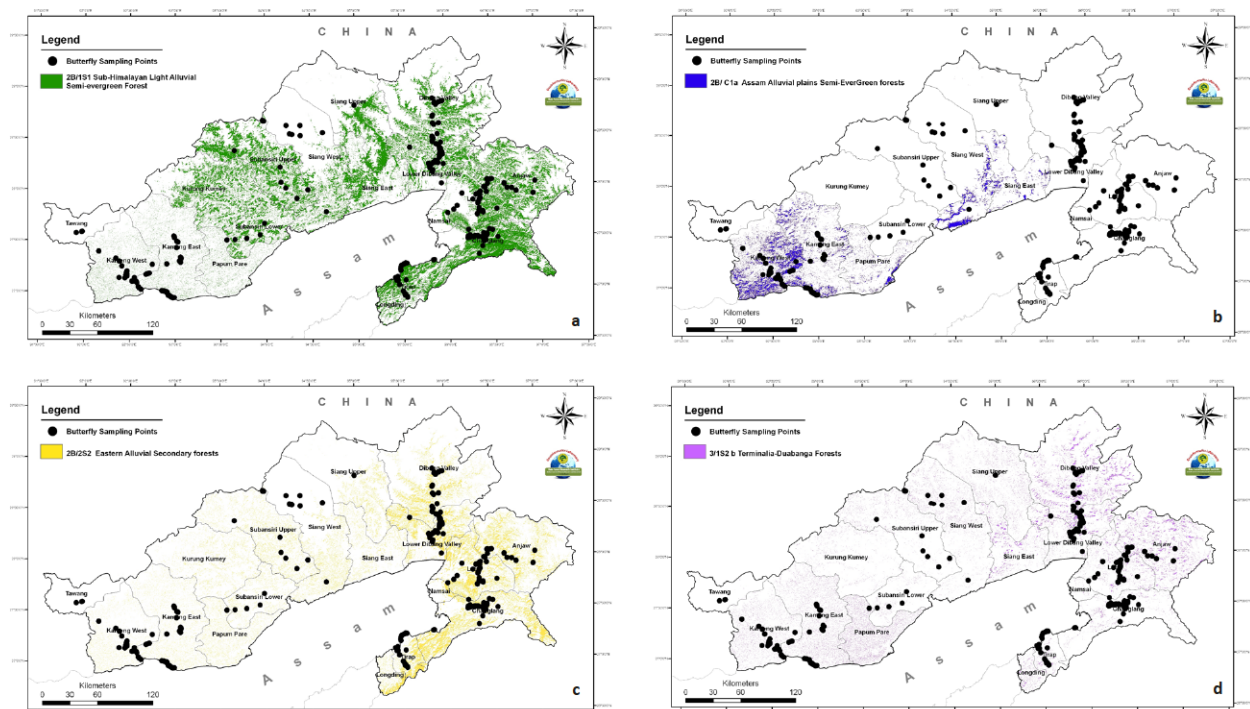


Figure 13. Distribution of four prominent forest sub-types depicted with different colours in Arunachal Pradesh, India. a - Sub-Himalayan light alluvial forests; b - Alluvial plains semi-evergreen forest; c - Eastern Alluvial secondary forest; d - Terminalia-Diabanga forests

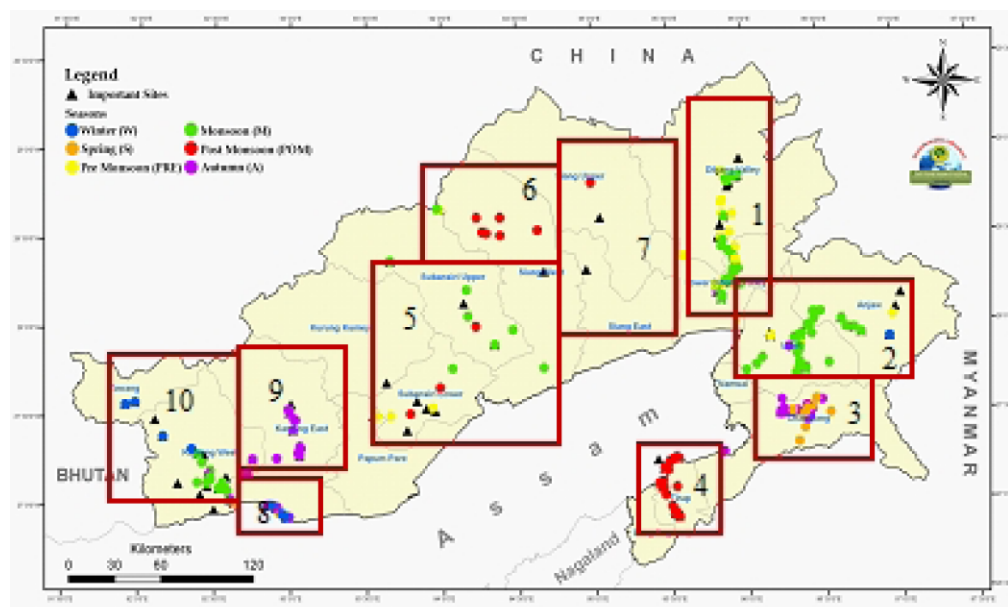


Figure 14. Butterfly ecotourism zones across Arunachal Pradesh, India depicted against butterfly sampling locations

lisarda lisarda Doubleday, 1845 (Yellow Kaiser), *Letha scanda* Moore, 1857 (Blue Forester), *Thaumantis diores diores* Doubleday, 1845 (Jungle Glory), *Euthalia francae raja* Felder & Felder, 1859 (French Duke), *Euthalia phemius phemius* Doubleday, 1848 (White-

edged Blue Baron), *Stichopthalma camadeva nicevillei* Röber, 1900 (Northern Jungle Queen), *Callerebia dibangensis* (Roy, 2013) (Bright-eyed Argus), *Chonala masoni* Elwes, 1882 (Chumbi Wall), *Delias acalis pyramus* Wallace, 1867 (Redbreast Jezebel), *Euthalia*

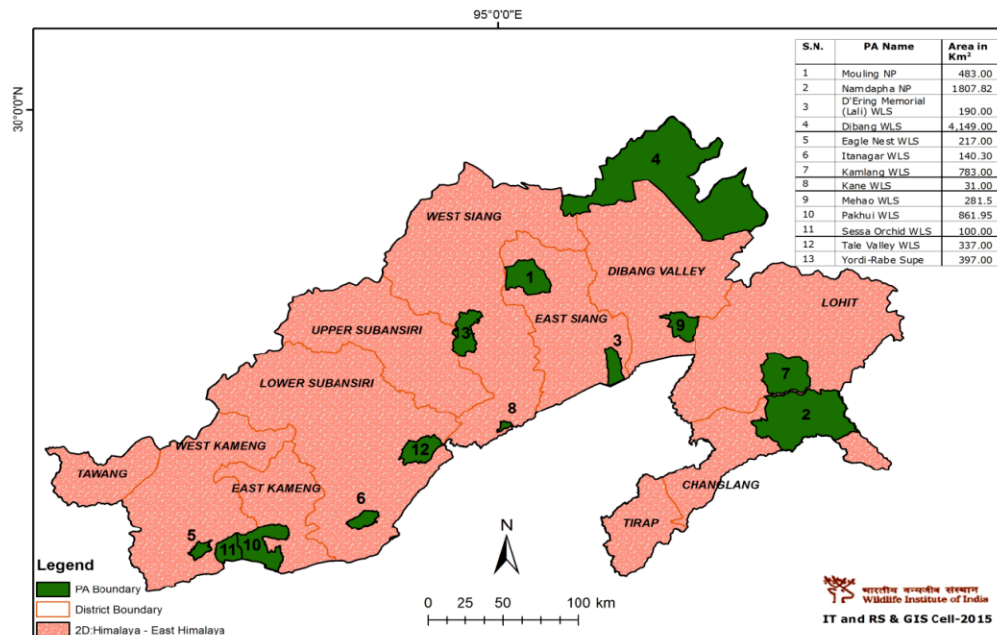


Figure 15. Existing protected areas of Arunachal Pradesh, India. (http://wiienvs.nic.in/WriteReadData/UserFiles/image/PAs_Map_Database/images/arunachal_pradesh.jpg)

sahadeva sahadeva Moore, 1859 (Green Duke), *Hasora anura anura* de Nicéville, 1889 and *Hasora anura china* Evans, 1949 (Slate Awl), *Mycalesis misenus misenus* de Nicéville, 1889 (Salmon-branded Bushbrown), *Mycalesis gotama charaka* Moore, 1874 (Chinese Bushbrown), *Arhopala silhetensis silhetensis* Hewitson, 1862 (Sylhet Oakblue), *Athyma jina jina* Moore, 1857 (Bhutan Sergeant), *Charaxes delphis delphis* Doubleday, 1843 (Jewelled Nawab), *Curetis saronis saronis* Moore, 1857 (Burmese Sunbeam), *Delias sanaca bhutya* Talbot, 1937 and *Delias sanaca perspicua* Fruhstorfer, 1910 (Pale Jezebel), *Enispe euthymius euthymius* Doubleday, 1845 (Red Caliph), *Euthalia anosia anosia* Moore, 1857 (Grey Baron), *Lethe distans* Butler, 1870 (Scarce Red Forester), *Mooreana trichoneura pralaya* Moore, 1865 (Yellow Flat), *Pantoporia paraka paraka* Butler, 1877 (Perak Lascar), *Pudicitia pholus* de Nicéville, 1889 (Spotted Redeye), *Rapala reactivita* Moore, 1879 (Shot Flash), *Rapala sphinx* (Brilliant Flash), *Rohana parvata parvata* Moore, 1857 (Brown Prince), *Sasakia funebris funebris* Leech, 1891 (Empress), *Sinthusia virgo* Elwes, 1887 (Pale Spark), *Thoressa cetata* Hewitson, 1876 (Northern Spotted Ace), and *Zophoessa jalaurida* Hewitson, 1876 (Small Goldenfork), all worth mentioning.

In the second forest sub-type, 2B/C1(a) Assam Alluvial Plains Semi-Evergreen Forests (Fig. 13b) which is mainly restricted to the western part of the state, typical species endemic and rare are, *Arhopala eumolpus eumolpus* Cramer, 1780 (Green Oak Blue), *Mycalesis*

anaxias aemate Fruhstorfer, 1911 (White-bar Bush Brown), *Rapala dienece* Hewitson, 1878 (Scarlet Flash), *Appias galba* Wallace, 1867 (Orange Albatross), *Caltoris tulsii tulsii* de Nicéville, 1883 (Purple Swift), *Elymnias nesaea* Linnaeus, 1764 (Tiger Palmfly), *Meandrusa payeni evan* Doubleday, 1845 (Yellow Gorgon), *Rapala varuna orseis* Hewitson, 1863 (Indigo Flash), etc.

The third most prominent forest sub-type is the “2B/2S2 Eastern Alluvial Secondary Semi-Evergreen Forests” (Fig. 13c) which lies intermixed with the first forest type in the eastern part of the State but extends at higher elevation than the former. The typical species in this forest type are, *Lamproptera meges indistincta* Tytler, 1912 (Green Dragontail), *Caleta elna noliteia* Fruhstorfer, 1918 (Elbowed Pierrot), *Callerebia scanda opima* Watkins, 1927 (East Himalayan Pallid Argus), *Rapala tara* de Nicéville, 1888 (Assam Flash), *Phengaris atroguttata* Oberthür, 1876 (Great Spotted Blue), *Dichorragia nesimachus nesimachus* Doyère, 1840 (Constable), *Graphium xenocles phrontis* de Nicéville, 1897 (Great Zebra), *Sephisa chandra chandra* Moore, 1857 (Eastern Courtier), *Zipetis scylax scylax* Hewitson, 1863 (Dark Catseye), *Mycalesis adamsoni* Watson, 1897 (Watson's Bush Brown), *Orthomiella pontis pontis* Elwes, 1887 (Straight winged Blue), *Cylogenes janetae* de Nicéville, 1887 (Scarce Evening Brown), *Derca lycorias lycorias* Doubleday, 1842 (Plain Sulphur), *Meandrusa lachinus lachinus* Fruhstorfer, 1902 (Brown Gorgon), *Phaedyma aspasia aspasia* Leech, 1890 (Great

Hockeystick Sailer), *Celaenorrhinus ratna tytleri* Evans, 1926 (Tytler's Multi-spotted Flat), *Polyura moori* Distant, 1883 (Malayan Nawab), *Kallima knyvettii* de Nicéville, 1886 (Scarce Blue Oakleaf), *Neurosigma siva siva* Westwood, 1850 (Panther), *Neorina hilda* Westwood, 1850 (Yellow Owl), *Shijimia moorei moorei* Oberthür, 1876 (Moores' Cupid), and *Taraka hamada mendesi* Fruhstorfer, 1918 (Forest Pierrot).

There were very few species typical to 3/1S2(b) Terminalia-Duabanga Forests (Fig. 13d), however. Rare or uncommon and endemic species sampled in these forests were *Chitoria sordida sordida* Moore, 1865 (Sordid Emperor), *Athyma whitei* Tytler, 1940 (Tytler's Sergeant), *Prioneris philonome clemante* Doubleday, 1846 (Red-spot Sawtooth), as these occupy mainly small pockets at lower elevations.

Seventy-four species amongst 415 taxa are protected as they are listed under various schedules of the Indian Wildlife (Protection) Act (IWPA, 1972) (Appendix 2) while the IWPA, 1972 status of two important rare and endemic species to Eastern Himalaya, one new to science, *Callerebia dibangensis* found in Dibang Valley district and the other *Bhutanitis ludlowi* Gabriel, 1942 endemic to Bhutan, has now recently been recorded in Eaglenest Sanctuary, Eastern Arunachal Pradesh, though yet to be specified.

Based on logistics and connectivity of road networks with the Indian mainland to Arunachal Pradesh and the existence of the four major forest types supporting major butterfly diversity in the state as seen in this study, 10 major butterfly inclusive ecotourism zones are identified (Fig. 14) in the state that can be taken up independently as follows:

1. Dibang Valley (Lower and Upper)—2B/1S1 Sub-Himalayan Light Alluvial Plains Semi-Evergreen Forests and 2B/2S2 Eastern Alluvial Secondary Semi-Evergreen Forests and 3/1S2(b) Terminalia-Duabanga;
2. Lohit and Anjaw Districts—2B/1S1 Sub-Himalayan Light Alluvial Plains Semi-Evergreen Forests and 2B/2S2 Eastern Alluvial Secondary Semi-Evergreen Forests and 3/1S2(b) Terminalia-Duabanga;
3. Changlang District (Namdapha Tiger Reserve & Kamlang WLS)—2B/1S1 Sub-Himalayan Light Alluvial Plains Semi-Evergreen Forests and 2B/2S2 Eastern Alluvial Secondary Semi-Evergreen Forests and 3/1S2(b) Terminalia-Duabanga;
4. Tirap & Longding districts—2B/1S1 Sub-Himalayan Light Alluvial Plains Semi-Evergreen Forests and 2B/2S2 Eastern Alluvial Secondary Semi-Evergreen Forests and 3/1S2(b) Terminalia-Duabanga;

5. Upper and Lower Subansari & Kurung Kumey -2B/1S1 Sub-Himalayan Light Alluvial Plains Semi-Evergreen Forests;
6. West Siang—2/2S1 Secondary Moist Bamboo Brakes;
7. East Siang and Upper Siang—2B/1S1 Sub-Himalayan Light Alluvial Plains Semi-Evergreen Forests, 2/2S1 Secondary Moist Bamboo Brakes & 2B/C1(a) Assam Alluvial Plains Semi-Evergreen Forests;
8. East Kameng District (Pakke Tiger Reserve)—2B/C1(a) Assam Alluvial Plains Semi-Evergreen Forests;
9. West Kameng-Papumparey—2B/C1(a) Assam Alluvial Plains Semi-Evergreen Forests, 12/C3(a) East Himalayan Mixed Coniferous Forests, 3/1S2(b) Terminalia-Duabanga; and
10. Kameng Zone and Tawang—2B/C1(a) Assam Alluvial Plains Semi-Evergreen Forests, 3/1S2(b) Terminalia-Duabanga, 13/C6 East Himalayan Dry Temperate Coniferous Forests; 1B/C2(a) Kayea Forests.

Major threats to forest habitats and biodiversity in Arunachal Pradesh today are still prevalent mainly from degradation of primary forests, destruction of habitats due to human activities like construction of roads, hydroelectric power projects, shifting cultivations and loggings; however, the threat from urbanization and pollution in this state is still minimal due to low population, unlike other areas in India. Owing to its rich biological diversity, 10,074.59km² area (12.03% of the geographical area of the State) has already been brought under protected area networks comprising 13 national parks and wildlife sanctuaries representing diverse ecosystems and wildlife habitats (Paul et al. 2005; Borang et al. 2008) (Fig. 15). As most part of the state is still under forest cover, the primary focus of conservation should be protection of larger areas that are still under different forest sub-types each having unique biodiversity. Establishing a network of protected areas of forest sub-types by interlinking them with the help of corridors and filling the gaps by identification of conservation sites by including more areas would be more useful for long term conservation at landscape level in the state. Further, interlinking the protected/forest areas of Arunachal Pradesh with adjoining forest areas of Bhutan, Myanmar, China and adjoining states of Assam and Nagaland in India will ensure long-term conservation at the landscape level for this Himalayan Hotspot, before development takes its toll in the coming years.

REFERENCES

- Alström, P., P.C. Rasmussen, C. Zhao, J. Xu, S. Dalvi, T. Cai, Y. Guan, R. Zhang, M.V. Kalyakin, F. Lei & U. Olsson (2016). Integrative taxonomy of the Plain-backed Thrush (*Zoothera mollissima*) complex (Aves, Turdidae) reveals cryptic species, including a new species. *Avian Research* 7 (1): 1–39; <http://doi.org/10.1186/s40657-016-0037-2>
- Arora G.S. & D.K. Mondal (1981). On the Papilionidae (Papilionidae: Lepidoptera) from Arunachal Pradesh & adjoining areas of Assam in North-Eastern India. *Records of Zoological Survey of India - Occasional paper No. 29*: 63pp+7pls.
- Athreya, R. (2006). A new species of *Liocichla* (Aves: Timaliidae) from Eaglenest Wildlife Sanctuary, Arunachal Pradesh, India. *Indian Birds* 2(4): 82–94.
- Baishya A.K., S. Haque, P.J. Bora & N. Kalita (2001). Flora of Arunachal Pradesh: An overview. *Arunachal Forest News* 19(1&2): 1–31.
- Bettes F.N. (1950). On collection of butterflies from Blipura Frontier Tract and the Subansiri area (Northern Assam). *Journal of the Bombay Natural History Society* 49(3): 488–502.
- Borang A., B.B. Bhatt, M. Tamuk, A. Borkotoki & J. Kalita (2008). Butterflies of Dihang-Dibang Biosphere Reserve of Arunachal Pradesh, Eastern-Himalaya, India. *Bulletin of Arunachal Forest Research* 24(1&2): 41–53.
- Champion, H.G. & S.K. Seth (1968). A revised survey of forest types of India. Delhi, xxvii+404pp.
- Chatterjee, S., A. Saikia, P. Dutta, D. Ghosh, G. Pangging & A.K. Goswami (2006). Background paper on Biodiversity Significance of Northeast India for the study on Natural Resources, Water and Environment Nexus for Development and Growth in North-eastern India. *Forest Conservation Programme*, WWF-India, New Delhi, 71pp.
- Chowdhery, H.J. (1999). Arunachal Pradesh, pp. 547–614. In: Mudgal, V. & P.K. Hajra (eds.). *Floristic Diversity and Conservation Strategies in India 2*. Botanical Survey of India, Calcutta.
- D’Abrera, B. (1982). *Butterflies of the Oriental Region - Part I. Papilionidae, Pieridae & Danaidae*. Hill House, Victoria, Australia, 244pp.
- D’Abrera, B. (1985). *Butterflies of the Oriental Region - Part II. Nymphalidae, Satyridae & Amathusiidae*. Hill House, Victoria, Australia, 534pp.
- D’Abrera, B. (1986). *Butterflies of the Oriental Region - Part III. Lycaenidae & Riodinidae*. Hill House, Victoria, Australia, 672pp.
- Doubleday, E. (1845). Description of new or imperially described diurnal Lepidoptera. *Annals and Magazine of Natural History* 16: 304–308.
- Evans, W.H. (1912). Lepidoptera collected on the Abor expedition. *Records of Indian Museum* 8(1–3): 61–65.
- Evans, W.H. (1932). *The Identification of Indian Butterflies - 2nd Edition*. Bombay Natural History Society, Bombay, x+454pp+32pls.
- Forest Survey of India (2011). *Atlas-Forest Types of India*. Forest Survey of India, Ministry of Environment and Forests, Govt. of India, Dehradun, 210pp.
- Forest Survey of India (2013). *India State of Forest Report*. Forest Survey of India, Ministry of Environment and Forests, Govt. of India, Dehradun, 252pp.
- Gasse, P.V. (2013). Butterflies of India-Annotated checklist. Retrieved from <http://www.ifoundbutterflies.org/Checklists>.
- Gogoi, M.J. (2012). Butterflies (Lepidoptera) of Dibang Valley, Mishmi Hills, Arunachal Pradesh, India. *Journal of Threatened Taxa* 4(12): 3137–3160; <http://doi.org/10.11609/JoTT.o2975.3137-60>
- Gogoi, M.J. (2013). A preliminary checklist of butterflies recorded from Jeyore-Dehing forest, eastern Assam, India. *Journal of Threatened Taxa* 5(2): 3684–3696; <http://doi.org/10.11609/JoTT.o3022.3684-96>
- Gogoi, M.J., Bhatt, B.B. & A. Sarmah (2015). Notes on the Eastern Comma *Polygonia c-album agnicula* Moore, 1872 (Lepidoptera: Nymphalidae: Nymphalinae) from Tawang District, Arunachal Pradesh, India. *Journal of Threatened Taxa* 7(11): 7836–7838; <http://doi.org/10.11609/JoTT.o3775.7836-8>
- Gupta, I.J. & J.P.N. Shukla (1988). Butterflies of Arunachal Pradesh and adjoining areas. *Records of Zoological Survey of India. Occasional Paper No.109*: 115pp+I-XXII+1map.
- Haribal, M. (1992). Butterflies of Sikkim Himalaya and their Natural History. Sikkim Nature Conservation Foundation, Gangtok, Sikkim, India, 217pp.
- Haridasan, K., Beniwal B.S. & M.L. Deori (1987). Bamboos in Arunachal Pradesh - distribution and utilization: a preliminary appraisal. *Arunachal Forest News* 5(1): 23–27.
- IWPA (1972). The Wildlife Protection Act, 1972 (Amended up to 2002). Wildlife Trust of India, New Delhi, Natraj Publishers, Dehradun, 235pp.
- Kehimkar, I. (2008). *The Book of Indian Butterflies*. BNHS, Oxford University. Delhi Press, 497pp.
- Pollard, E. & T.J. Yates (1993). *Monitoring Butterflies for Ecology and Conservation*. Chapman & Hall, London, 274pp.
- Kunte, K. (2015). A new species of *Hypolycaena* (Lepidoptera: Lycaenidae) from Arunachal Pradesh, north-eastern India. *The Journal of Research on the Lepidoptera* 48: 21–27.
- Mao, A.A., K.P. Singh & P.K. Hajra (2001). Rhododendrons, pp. 2167–2202. In: Singh, N.P. & D.K. Singh (eds.). *Floristic Diversity and Conservation Strategies in India - IV*. Botanical Survey of India, Kolkata.
- Moore, F. (1857). A Catalogue of the Lepidopterous Insects in the Museum of the Hon. East-India Company in Horsfield & Moore. 1: 1–278pp+pls. 1–12.
- Naithani, H.B. (2008). Diversity of Indian bamboos with special reference to north-east India. *Indian Forester* 134(6): 765–788.
- Paul, A., M.L. Khan, A. Arunachalam & K. Arunachalam (2005). Biodiversity and conservation of rhododendrons in Arunachal Pradesh in the Indo-Burma biodiversity hotspot. *Current Science* 89(4): 623–634.
- Pollard, E. & T.J. Yates (1993). *Monitoring Butterflies for Ecology and Conservation*. London, Chapman and Hill, London, 274pp.
- Rao, A.N. (2010). Orchid flora of Arunachal Pradesh-an update. *Bulletin of Arunachal Pradesh* 26 (1&2): 82–110.
- Radhakrishnan, C. (1988). On a collection of butterflies from Tipi, West Kameng District, Arunachal Pradesh. *Arunachal Forest News* 6(2): 45–51.
- Roy, P. (2013). *Callerebia dibangensis* (Lepidoptera: Nymphalidae: Satyridae), a new butterfly species from the eastern Himalaya, India. *Journal of Threatened Taxa* 5(13): 4725–4733; <http://doi.org/10.11609/JoTT.o3293.4725-33>
- Singh, A.P. (2011). *Butterflies of India*. Om Books International, 183pp.
- Singh, A.P. (2013). Rediscovery of the Empress, *Sasakia funebris* Leech (Lepidoptera: Nymphalidae: Nymphalinae: Apaturini) after 88 years in India. *Journal of Threatened Taxa* 5(10): 4514–4516; <http://doi.org/10.11609/JoTT.o3428.4514-6>
- Singh, A.P. (2015). On the female morphs, ecology and male genitalia of *Callerebia dibangensis* Roy (Lepidoptera: Nymphalidae: Satyridae) recorded near Mayodia Pass in lower Dibang Valley, Arunachal Pradesh, India. *Journal of Threatened Taxa* 7(5): 7168–7174; <http://doi.org/10.11609/JoTT.o4035.7168-74>
- Sinha, A., A. Datta, M.D. Madhusudan & C. Mishra (2005). *Macaca munzala*: a new species from western Arunachal Pradesh, northeastern India. *International Journal of Primatology* 26(977): 989.
- Smetacek, P. (2015). *Papilionid Butterflies of the Indian Sub-Continent*. Butterfly Research Centre, Bhimtal, Uttarakhand and Indinov Publishing, New Delhi, 120pp.
- Smith, C. (1989). *Butterflies of Nepal (Central Himalaya)*. Tecpress Service L.P., Bangkok, 352pp.
- Smith, C. (2006). *Illustrated Checklist of Nepal's Butterflies*. Craftman press, Bangkok, 129pp.
- Sondhi, S. & P.K. Roy (2013). Sightings of *Gonepteryx amintha tibetana* Nekrutenko, 1968 (Lepidoptera: Pieridae: Coliadinae) from Arunachal Pradesh, India: an addition to Indian butterfly

- fauna erroneously placed in southeastern Tibet earlier. *Journal of Threatened Taxa* 5(12): 4687–4692; <http://doi.org/10.11609/JoTT.o3278.4687-92>
- Sondhi, S. & A. Ohler (2011). A Blue-eyed Leptobranchium (Anura: Megophryidae) from Arunachal Pradesh, India. *Zootaxa* (2912): 28–36.
- Sondhi, S., K. Kunte, G. Agavekar, R. Lovalekar & K. Tokekar (2013). *Butterflies of the Garo Hills*. Samrakshan Trust (New Delhi), Titli Trust (Dehradun), and Indian Foundation for Butterflies (Bengaluru), xvi, 200pp.
- Sondhi, S. & K. Kunte (2014). *Butterflies and Moths of Pakke Tiger Reserve*. Title Trust (Dehradun), and Indian Foundation for Butterflies (Bengaluru), vi+202pp.
- Sondhi, S., T. Karmakar, Y. Sondhi, R. Jhaveri & K. Kunte (2016). Re-discovery of *Calinaga aborica* Tytler, 1915 (Lepidoptera: Nymphalidae: Calinaginae) from Arunachal Pradesh, India. *Journal of Threatened Taxa* 8(3): 8618–8622; <http://doi.org/10.11609/jott.2354.8.3.8618-8622>
- South, R. (1913). A list of butterflies collected by Capt. F.M. Bailey in Western China, South-Eastern Tibet and the Mishmi hills, 1911. *Journal Bombay Natural History Society* 22: 345–365.
- Varshney, R.K. & J.P. Shukla (1988). Studies on the butterflies of Arunachal Pradesh and adjoining areas (Lepidoptera: Acraenidae, Satyridae, Nymphalidae, Riodinidae and Lycaenidae). *Record Zoological Survey India, Occ.Paper* No. 109: 1–117+23pls.
- Wynter-Blyth, M.A. (1957). *Butterflies of the Indian Region*. Bombay Natural History Society, Bombay, xx+523pp+72pl.
- Zafar-ul-Islam, M. & A.R.Rahmani (eds.) (2004). *Important Bird Areas in India: Priority Sites for Conservation*. Indian Bird Conservation Network, Mumbai, xviii+1133pp.

Appendix 1. Details of sampling sites with dates of surveys - district wise.

1. East Kameng District

(i) Pakke Wildlife Sanctuary

Survey route and dates

1. Seijosa-Khari-Upper Dekorai-Rhino Camp (01–03/02/2012).
2. Seijosa-Duna nala-Khari-Upper Dekorai-Rhino Camp -Sukhna Nala- I (04–06/02/2013).
3. Seijosa-Duna nala-Khari-Upper Dekorai-Rhino Camp (18–20/12/2013).

Coordinates, altitude and forest type of surveyed points

- Seijosa (26°56'17.6N & 92°58'39.7E; 132m; Assam Alluvial Plains Semi-Evergreen Forests).
- Duna Nala (26°56'33.7N & 92°57'59.8E; 185m; Assam Alluvial Plains Semi-Evergreen Forests).
- Near Khari (26°59'20.5N & 92°54'31.9E; 165m; Assam Alluvial Plains Semi-Evergreen Forests).
- Tarzan nala/Romoni (26°59'49.9N & 92°54'23.6E; 235m; Assam Alluvial Plains Semi-Evergreen Forests).
- Dikori Camp (27°00'22.0N & 92°52'38.9E; 176m; Assam Alluvial Plains Semi-Evergreen Forests).
- Upper Dekorai anti poaching Camp (27°08'36.9N & 92°51'40.6E; 167m; Assam Alluvial Plains Semi-Evergreen Forests).
- Tinga Nala (27°00'28.7N & 92°51'15.7E; 183m; Assam Alluvial Plains Semi-Evergreen Forests).
- Rhino Anti poaching Camp. (27°00'28.6N & 92°50'17.7E; 140m; Assam Alluvial Plains Semi-Evergreen Forests).
- Near Sukhna nala I (27°00'23.6N & 92°51'56.2E; 141m; Assam Alluvial Plains Semi-Evergreen Forests).

(ii) Seppa

Survey route and dates

- Tipi – Khuppi – Seppa- Itanagar road- Seppa-Pulsang Village-Sanchi-Morang Village) (10–15/12/2014).

Coordinates, altitude and forest type of surveyed points

- Tipi (27°02'20.1N & 92°36'13.3E; 193m; Assam Alluvial Plains Semi-Evergreen Forests).
- Khuppi (27°15'59.4 N & 92°45'01.8E; 1107m; Assam Alluvial Plains Semi-Evergreen Forests).
- Seppa (27°25'48.5N & 93°00'51.8E; 449m; Assam Alluvial Plains Semi-Evergreen Forests).
- Pulsang Village (27°31'38.6N & 92°59'26.8E; 721m; East Himalayan Mixed Coniferous Forests)
- Sanchi-Morang Village(27°34'31.8N & 93°00'04.7E; 532m; Assam Alluvial Plains Semi-Evergreen Forests).
- Itanagar Road (last point - 27°17'07.8N & 93°03'31.2E; 1156m; Assam Alluvial Plains Semi-Evergreen Forests).

2. West Kameng & Tawang districts (Sessa, Eaglenest Sanctuary and Sela Pass)

Survey route & dates

1. Tippi (Dazling RF)- Sessa Orchid Sanctuary-Nechi phu-Tenga- Eaglenest WLS- Lama Camp – Sunder View - Bomphu. (04–07/02/2012).
2. Tippi- Sessa Orchid Sanctuary-Nechi phu-Tenga- EaglenestWLS- Lama Camp – SunderView/ Tenzing Gaon-Shergaon (09–15/07/2012).
3. Tippi- Sessa Orchid Sanctuary-Nechi phu-Tenga- EaglenestWLS- Lama Camp – SunderView -Bomdila - Sela Pass - Tawang-back Tippi (28/07/2013–03/08/2013).

Coordinates, altitude and forest type of surveyed points

- Tipi (27°01'21.4N & 92°37'31.1E; 183m; *Kayea* Forest/ Terminalia-Duabanga).
- Sessa (27°06'00.8N & 92°31'38.9E; 1076m; Assam Alluvial Plains Semi-Evergreen Forests / East Himalayan Mixed Coniferous Forests).
- Nechi Phu (27°09'55.8N & 92°34'38.3E; 1736m; East Himalayan Mixed Coniferous Forests).

- Tenga-Ramalingam Village (27°11'47.8N & 92°27'55.9E; 1695m; Assam Sub-Tropical Pine Forests / East Himalayan Mixed Coniferous Forests).
- Eaglenest Sanctuary-Lama Camp (27°09'25.4N & 92°27'38.4E; 2335m; Kayea Forests).
- Eaglenest Sanctuary -Sunder View (27°06'46.1N & 92°26'67.0E; 2480m; East Himalayan Mixed Coniferous Forests).
- Eaglenest Sanctuary -Bomphu (27°03'58.5N & 92°24'22.1E; 1953m; Assam Alluvial Plains Semi-Evergreen Forests / East Himalayan Mixed Coniferous Forests).
- Shergaon/Tenzing Gaon (27°07'50.1N & 92°15'38.8E; 1988m; Assam Sub-Tropical Pine Forests).
- Bomdila (27°17'35.8N & 92°25'46.0E; 2200m; East Himalayan Mixed Coniferous Forests).
- Bomdila-Dirang (27°17'47.9N & 92°23'25.2E; 1746m; Assam Alluvial Plains Semi-Evergreen Forests).
- Near Dirang (27°23'41.1N & 92°09'43.2E; 1750m; Assam Sub-Tropical Pine Forests).
- Sela Pass (27°29'21.9N & 92°06'27.3E; 3960m; East Himalayan Mixed Coniferous Forests).
- Shyro (Tawang) (27°34'28.8N & 91°54'46.7E; 2440m; East Himalayan Sub-Alpine Forests/Birch, Rhododendron Scrub Forests).
- Jang Waterfall (Tawang)(27°35'12.9N & 91°58'41.4E; 2139m; East Himalayan Sub-Alpine Forests).

4. Changlang District

1. Namdapha Tiger Reserve (NTR) and surrounding areas

Survey route & dates

- Miao- Mpen-Deban-Haldibari- Hornbill; Deban-Camera Point; Miao-Noa-Dehing-Devpuri Road (17–22/12/2011).
- Miao- Mpen-Deban-Haldibari- Hornbill; Deban-Camera Point; Miao-Noa-Dehing-Devpuri Road (26–30/03/2012)
- Miao- Mpen-Deban-Haldibari- Hornbill; Deban-Camera Point; Miao-Noa-Dehing-Devpuri Road (10–15/12/2012).
- Miao- Mpen-Deban-Haldibari- Hornbill; Deban-Camera Point; Miao-Noa-Dehing-Devpuri Road (18–22/03/2013).
- Miao- Mpen-Deban-Haldibari- Hornbill; Deban-Camera Point; Miao-Noa-Dehing-Devpuri Road (26–29/11/2013).

Coordinates, altitude and forest type of surveyed points

- Miao (27°29'43.8N & 96°12'59.2E; 240m; Eastern Alluvial Secondary Forests).
- Mpen entrance gate to NTR (27°29'51.6N & 96°16'53.3E; 267m; Eastern Alluvial Secondary Semi-Evergreen Forests).
- 10 Mile (27°30'08.2N & 96°19'54.1E; 318m; Sub-Himalayan Light Alluvial Semi-Evergreen Forests).
- Deban (27°29'50.1N & 96°23'9.7E; 331m; Sub-Himalayan Light Alluvial Semi-Evergreen Forests).
- Haldibari (27°31'24.4N & 96°24' 09.7E; 513m; Sub-Himalayan Light Alluvial Semi-Evergreen Forests).
- Nr. Hornbill (27°31'49.5N & 96°25' 34.2E; 583m; Sub-Himalayan Light Alluvial Semi-Evergreen Forests).
- Gandhigram range on Vijay nagar Rd. From Deban (27°29'31.3N & 96°23' 48.9E; 566m; Terminalia-Duabanga).
- Neo-Dehing- Devapuri (27°30'23.0N & 96°13' 39.5E; 395m; Sub-Himalayan Light Alluvial Semi-Evergreen Forests).
- Neo-Dehing- Devapuri end point (27°31'24.5N & 96°14' 37.7E; 360m; Sub-Himalayan Light Alluvial Semi-Evergreen Forests).

5. Lower Subansari district, Papumpare and Kurung Kumey districts

Survey route & dates

1. Yachuli-Yazuli-Hapoli-Ziro-TaleValley-Hapoli-Yazuli-Mengio-Yazuli-New Palin-Yachuli (11–17/05/2012)

Coordinates, altitude and forest type of surveyed points

- Yazuli-Hapoli (27°25'32.7N & 93°45'59.2E; 972m; Eastern Sub-Montane Semi-Evergreen Forests)

- Ziro (27°35'23.42N & 93°49'52.4E; 1659m; Eastern Sub-Montane Semi-Evergreen Forests / Agriculture).
- Pange (27°32'49.89N & 93°53'33.5E; 1889m; Secondary Moist Bamboo Brakes).
- Tale Valley (27°32'02.81N & 93°57'05.40E; 2376m; Sub-Himalayan Light Alluvial Semi-Evergreen Forests).
- Mengio (27°30'28.4N & 93°32'37.3E; 1380m; Sub-Himalayan Light Alluvial Semi-Evergreen Forests / East Himalayan Mixed Coniferous Forests)
- New Palin (27°41'43.52N & 93°37'50.46E; 923m; Sub-Himalayan Light Alluvial Semi-Evergreen Forests / Secondary Moist Bamboo Brakes)-sampling not done.

6. Upper Subansari, West Siang, Upper Siang and East Siang districts

Survey route & dates

1. Ziro-Daporijo - Lime King –Daporijo -Along -Menchuka-Along-Boleng-Yingkiong-Boleng -Pasighat (09–15/08/2012).

Coordinates, altitude and forest type of surveyed points

- Gongo Village, Daporijo (27°54'15.2N & 94°20'39.4E; 480m; Sub-Himalayan Light Alluvial Semi-Evergreen Forests)
- Daporijio-Menga Caves-Jaring Village (28°08'19.9N & 94°08'33.1E; 490m; Sub-Himalayan Light Alluvial Semi-Evergreen Forests)
- 15 km before Lime King Village (28°22'42.9N & 93°39'18.5E; 2700m; Sub-Himalayan Light Alluvial Semi-Evergreen Forests).
- Peri Village, Along (28°18'49.9N & 94°40'30.2E; 375m; Secondary Moist Bamboo Brakes)
- Sagong Gurudwara, Mechuka Valley (28°37'40.7N & 95°02'22.4E; 1985m; Sub-Himalayan Light Alluvial Semi-Evergreen Forests)
- Yingkiong (28°36'40.28N & 95°02'50.78E; 471m; Sub-Himalayan Light Alluvial Semi-Evergreen Forests / Secondary Moist Bamboo Brakes)
- Boleng (28°19'16.77N & 94°57'14.49E; 390m; Assam Alluvial Plains Semi-Evergreen Forests).

7. Upper and lower Dibang Valley districts

Survey route & dates

1. Roing - Tiwari Gaon - Mayodia Pass - Hunli – Elatin – Anini-Maroli & Anini – Dambuine (05-16/08/2012)
2. Roing - Tiwari Gaon - Mayodia Pass - Hunli –Reyali (27/08/2013-01/09/2013)
3. Roing - Tiwari Gaon - Mayodia Pass - Hunli – Elatin- Anini-Maroli (11/03/2014–16/03/2014)
4. Tezu-Parshuram Kund- Roing -Tiwari Gaon - Mayodia Pass - Hunli - Elatin - Anini- Mippi (06–11/06/2014).

Coordinates, altitude and forest type of surveyed points

- Tezu (27°55'40N & 96°09'45.9E; 212m; Eastern Alluvial Secondary Semi-Evergreen Forests / Terminalia-Duabanga).
- Roing (28°08'40.N & 95°50'36.0E; 426m; Sub-Himalayan Light Alluvial Semi-Evergreen Forests / Eastern Alluvial Secondary Semi-Evergreen Forests).
- River bed near Roing (28°09'45N & 95°50'52.3E; 473m; Terminalia-Duabanga).
- Tiwari Gaon (28°10'57N & 95°48'57.1E; 556m; Terminalia-Duabanga).
- Mayodia Pass (28°13'54.3N & 95°54' 16.3E; 2424m; Eastern Alluvial Secondary Semi-Evergreen Forests).
- Hunli (28°19'27.1N & 95°57'33.5E; 1269 m; Eastern Alluvial Secondary Semi-Evergreen Forests).
- Angolian (28°33'28.1N & 95°50'36.3E; 772m; Terminalia-Duabanga).
- Anzan (28°29'27.7N & 95°49'39.2E; 683m; Eastern Alluvial Secondary Semi-Evergreen Forests).
- Reyalli (28°27'00.4N & 95°51'15.7E; 786m; Sub-Himalayan Light Alluvial Semi-Evergreen Forests).
- Etalin (28°36'21.8N & 95°52'05.3E; 673m; Eastern Alluvial

- Secondary Semi-Evergreen Forests).
- Amboli (28°46'27.2N & 95°53'44.4E; 1226m; Terminalia-Duabanga).
- Anini (28°47'42.9N & 95°54'26.9E; 1640m; Sub-Himalayan Light Alluvial Semi-Evergreen Forests / Eastern Alluvial Secondary Semi-Evergreen Forests).
- Maroli-Mippi (28°51'47.9N & 95°51'23.8E; 1373m; Sub-Himalayan Light Alluvial Semi-Evergreen Forests).
- Alinye Valley (28°49'39.8N & 95°57'09.3E; 1389 m; Sub-Himalayan Light Alluvial Semi-Evergreen Forests).
- Awapani Mill (28°50'09.0N & 95°57'53.7E; 1440m; Sub-Himalayan Light Alluvial Semi-Evergreen Forests).
- Dambunie (28°55'51.2N & 95°58'29.3E; 1719m; Sub-Himalayan Light Alluvial Semi-Evergreen Forests).

8. Lohit & Anjaw districts

Survey route & dates

1. Namsai – Kamlang – Wakro - Parshuram Kund -Tezu- Udyak Pass – Hayulang –Chaguin- Sathkilo – Walong-Tilam (28/04/2012-04/05/2012)
2. Namsai – Kamlang – Wakro - Parshuram Kund -Tezu- Udyak Pass – Hayulang –Chaguin (05–09/08/2014)

Coordinates, altitude and forest type of surveyed points

- Wakro (27°46'50.2N & 96°20'55.3E; 447m; Terminalia-Duabanga).
- Wakro-Diban Road (27°43'10.3N & 96°19'34.7E; 440m; Eastern Alluvial Secondary Semi-Evergreen Forests).
- Kamlang Sanctuary (27°44'25.3N & 96°23'21.2E; 457m; Sub-Himalayan Light Alluvial Semi-Evergreen Forests).
- Parshuram Kund (27°52'02.2N & 96°21'05.3E; 344m; Eastern Alluvial Secondary Semi-Evergreen Forests).
- Udyak Pass (27°56'01.1N & 96°21'17.5E; 1640m; Sub-Himalayan Light Alluvial Semi-Evergreen Forests).
- Ajan (27°59'12.4N & 96°24'19.4E; 531m; Eastern Alluvial Secondary Semi-Evergreen Forests).
- Hayuliang (28°01'04.1N & 96°37'46.2E; 648m; Eastern Alluvial Secondary Semi-Evergreen Forests).
- Knifing-Khesung (27°58'05.5N & 96°42'42.1E; 833m; Eastern Alluvial Secondary Semi-Evergreen Forests / Terminalia-Duabanga).
- Before Chaguin (27°56'27.7N & 96°45'32.8E; 837m; Eastern Alluvial Secondary Semi-Evergreen Forests).

- Sath Kilo (27°54'50.4N & 96°56'40.0E; 960m; Terminalia-Duabanga).
- Hawaii Forest nr Walong (27°54'44.9N & 96°56'33.8E; 919m; Terminalia-Duabanga).
- Walong (28°04'39.4N & 96°59'10.6E; 1108m; Sub-Himalayan Light Alluvial Semi-Evergreen Forests).
- Tilam (28°09'28.2.7N & 97°01'21.9E; 1332m; Sub-Himalayan Light Alluvial Semi-Evergreen Forests).

9. Tirap District

Survey routes and dates

1. Dihing Patkai-Deomali – Borduria –Pullung- Khonsa – Khetti-Thinsa –Sanlium- Lazu Rd.(10-14/09/2014).
2. Margerita –Changlang District (06/11/2014).
3. Jeypore-Deomali (03–04/06/2015)

Coordinates, altitude and forest type of surveyed points

- Dihing Patkai (27°14'49.4 N & 95°24'40.8E; 117m; Sub-Himalayan Light Alluvial Semi-Evergreen Forests) (Assam Border).
- Deomali (27°11'50.8N & 95°26'58.0E; 135m; Sub-Himalayan Light Alluvial Semi-Evergreen Forests).
- Deomali -R.K.Mission Rd (27°15'16.0N & 95°32'30.0E; 127m; Sub-Himalayan Light Alluvial Semi-Evergreen Forests).
- Borduria (27°07'35.1 N & 95°26'16.7E; 268m; Sub-Himalayan Light Alluvial Semi-Evergreen Forests).
- Pullung (27°05'16.3 N & 95°26'31.7"E; 323m; Sub-Himalayan Light Alluvial Semi-Evergreen Forests).
- Khonsa (26°58'58.0 N & 92°29'45.7E; 1026m; Assam Alluvial plains Semi-Evergreen Forests).
- Khetti (26°57'39.7 N & 95°30'39.0E; 1204m; Sub-Himalayan Light Alluvial Semi-Evergreen Forests).
- Thinsa (26°56'27.0 N & 95°31'00.05E; 1515m; Eastern Alluvial Secondary Semi-Evergreen Forests).
- Sanlium (26°55'43.5 N & 95°32'26.61E; 1684m; Eastern Alluvial Secondary Semi-Evergreen Forests).
- Lazu Rd (Last point) (26°55'21.7N & 95°32'29.2E; 1650m; Sub-Himalayan Light Alluvial Semi-Evergreen Forests / Terminalia -Duabanga)
- Margerita (Assam)-Changlang district border (27°16'55.38N & 95°50'06.6E; 479m; Sub-Himalayan Light Alluvial Semi-Evergreen Forests).

Appendix 2. List of butterflies sampled across four major broadleaved forest sub-types in Arunachal Pradesh, India (December 2011–December 2014; 3–4 June 2015).

	Scientific Name	Common name	2B/C1(a) Assam Alluvial Plains Semi- Evergreen Forests (A)	2B/1S1 Sub- Himalayan Light Alluvial Semi- Evergreen Forests (B)	2B/2S2 Eastern Alluvial Secondary Semi- Evergreen Forests (C)	3/1S2(b) Terminalia- Duabanga (D)	Total Individuals recorded (A+B+C+D)	# Relative Abundance Status
A.1	Family Hesperidae							
i.	Subfamily Coeliadinae							
1	<i>Badamia exclamationis</i> (Fabricius, 1775)	Brown Awl	1				1	Uncommon
2	<i>Burara amara</i> (Moore, 1865)	Small Green Awlet		2	2		4	Fairly Common
3	<i>Burara gomata gomata</i> (Moore, 1865)	Pale Green Awlet		1			1	Uncommon
4	<i>Burara vasutana</i> Moore, 1865	Green Awlet			1		1	Uncommon
5	<i>Choaesper furcata</i> Evans, 1932	Hooked Awlking		1			1	Uncommon
6	<i>Choaesper benjamani japonica</i> (Murray, 1875)	Indian Awlking		1			1	Uncommon
7	<i>Hasora chromus chromus</i> Cramer, 1780	Common Banded Awl		1			1	Uncommon
8	<i>Hasora vitta indica</i> Evans, 1932	Plain Banded Awl(IWPA Sch II Part II)*	1				1	Uncommon
9	<i>Hasora anura china</i> Evans, 1949	Slate Awl (1)		2			2	Common
10	<i>Hasora anura anura</i> de Nicéville, 1889	Slate Awl (2)		1			1	Uncommon
ii.	Subfamily Pyrginae							
11	<i>Sarangesa dasahara dasahara</i> Moore, 1865	Common Small Flat		1			1	Uncommon
12	<i>Celaenorrhinus leucocera</i> (Kollar, 1844)	Common Spotted Flat	8	9	3		20	Very Common
13	<i>Celaenorrhinus aurivittata aurivittata</i> (Moore, 1878)	Dark Yellow Banded Flat		1			1	Uncommon
14	<i>Celaenorrhinus dhanada</i> Moore, 1865	Himalayan Yellow Banded Flat			3		3	Fairly Common
15	<i>Celaenorrhinus putra</i> (Moore, 1865)	Restricted Spotted Flat				2	2	Common
16	<i>Celaenorrhinus ratna tytleri</i> Evans, 1926	Tytlers Multi-spotted Flat			1		1	Uncommon
17	<i>Gerosis phisara phisara</i> (Moore, 1884)	Dusky yellow breasted flat	1	2			3	Fairly Common
18	<i>Pseudocoladenia dan fabia</i> Evans, 1949	Fulvous Pied Flat	5	3	5		13	Common
19	<i>Odontoptilium angulata angulata</i> (Felder, 1862)	Chestnut Angle		2	1		3	Fairly Common
20	<i>Ctenoptilium vasava vasava</i> Moore, 1865	Tawny Angle		1			1	Uncommon
21	<i>Lobocla liliana liliana</i> Atkinson, 1871	Marbled Flat		1			1	Uncommon
22	<i>Tagiades parra gala</i> Evans, 1949	Multi-spotted Snow Flat	1				1	Uncommon
23	<i>Tagiades menaka menaka</i> Moore, 1865	Spotted Snow Flat			1		1	Uncommon
24	<i>Tagiades gana athos</i> Plötz, 1884	Suffused Snow Flat	1				1	Uncommon
25	<i>Tagiades litigiosa litigiosa</i> Möschler, 1878	Water Snow Flat		2	2		4	Fairly Common
26	<i>Tagiades japetus ravi</i> (Moore, 1865)	Common Snow Flat	4				4	Fairly Common
27	<i>Mooreana trichoneura pralaya</i> Moore, 1865	Yellow-veined Flat		1			1	Uncommon

	Scientific Name	Common name	2B/C1(a) Assam Plains Semi- Evergreen Forests (A)	2B/1S1 Sub- Himalayan Light Alluvial Semi- Evergreen Forests (B)	2B/2S2 Eastern Alluvial Secondary Semi- Evergreen Forests (C)	3/1S2(b) Terminalia- Duabanga (D)	Total Individuals recorded (A+B+C+D)	# Relative Abundance Status
28	<i>Psolos fuligo subfasciatus</i> (Moore, 1878)	Coon/Dusky Partwing		1	1		2	Common
iii.	Subfamily Hesperinae							
29	<i>Aeromachus stigmata stigmata</i> Moore, 1878	Veined Scrub Hopper				2	2	Common
30	<i>Astictopterus jama olivascens</i> Moore, 1878	Forest Hopper			1		1	Uncommon
31	<i>Ochus subvittatus subradiatus</i> (Moore, 1878)	Tiger Hopper		2			2	Common
32	<i>Halpe zola</i> Evans, 1937	Long Banded Ace		1			1	Uncommon
33	<i>Halpe porus</i> (Mabille, 1877)	Moores' Ace				1	1	Uncommon
34	<i>Halpe homolea aucma</i> Swinhoe, 1923	Indian Ace (IWPA Sch II Part II)		1			1	Uncommon
35	<i>Pithauria stramineipennis</i> Wood-Mason & de Nicéville, 1886	Light Straw Ace		1	2		3	Fairly Common
36	<i>Sebastonyma dolopia</i> (Hewitson, 1868)	Tufted Ace		4	1		5	Common
37	<i>Sovia lucasii magna</i> Evan's, 1932	Luca's Ace	1		1		2	Common
38	<i>Thoressa cetata</i> Hewitson, 1876	Northern Spotted Ace		1			1	Uncommon
39	<i>Thoressa hyrie</i> (de Nicéville, 1891)	Variable Ace			1	2	3	Fairly Common
40	<i>Cupitha purreea</i> (Moore, 1877)	Wax Dart	1				1	Uncommon
41	<i>Oriens gola pseudolus</i> Mabille, 1883	Common Dartlet	2		3		5	Common
42	<i>Oriens goloides</i> (Moore, 1881)	Smaller Dartlet	6	2			8	Common
43	<i>Potanthus pseudomaesa</i> Moore, 1881	Indian Dart		2	1		3	Fairly Common
44	<i>Telicota bambusae bambusae</i> (Moore, 1878)	Dark Palm Dart	3	1	1		5	Common
45	<i>Telicota</i> sp.	Dart		1	1	1	3	Fairly Common
46	<i>Telicota ancilla horisha</i> (Evans, 1934)	Greenish Palm Dart		1			1	Uncommon
47	<i>Telicota colon colon</i> (Fabricius, 1775)	Plain Palm Dart	2	3			5	Common
48	<i>Notocrypta curvifascia curvifascia</i> (Felder & Felder, 1862)	Restricted Demon		6	5		11	Common
49	<i>Notocrypta feisthamelii alysos</i> (Moore, 1865)	Spotted Demon			1		1	Uncommon
50	<i>Notocrypta paralyos asawa</i> Fruhstorfer, 1911	Common Banded Demon		4			4	Fairly Common
51	<i>Ancistroides nigrita diocles</i> (Moore, 1865)	Chocolate Demon	1	3	5	1	10	Common
52	<i>Udaspes folus</i> (Cramer, 1775)	Grass Demon	3				3	Fairly Common
53	<i>Pedesta pandita</i> de Nicéville, 1885	Brown Bush Bob	1				1	Uncommon
54	<i>Iambrix salsala salsala</i> (Moore, 1865)	Chestnut Bob		10			10	Common
55	<i>Arnetta atkinsoni</i> Moore, 1878	Atkinson's Bob		8			8	Common
56	<i>Scobura cephalo</i> Hewitson, 1876	Extra Forest Bob		1			1	Uncommon
57	<i>Scobura isota</i> (Swinhoe, 1893)	Forest Bob		1		1	2	Common
58	<i>Matapa aria</i> Moore, 1865	Common Redeye	4		1		5	Common

	Scientific Name	Common name	2B/C1(a) Assam Alluvial Plains Semi- Evergreen Forests (A)	2B/1S1 Sub- Himalayan Light Alluvial Semi- Evergreen Forests (B)	2B/2S2 Eastern Alluvial Secondary Semi- Evergreen Forests (C)	3/1S2(b) Terminalia- Duabanga (D)	Total Individuals recorded (A+B+C+D)	# Relative Abundance Status
59	<i>Erionota torus</i> Evans, 1941	Rounded Palm- re- deye		1			1	Uncommon
60	<i>Pudicitia pholus</i> (de Nicéville, 1889)	Spotted Redeye		1			1	Uncommon
61	<i>Baoris farri</i> (Moore, 1878)	Paint brush Swift	1	1			2	Common
62	<i>Caltoris tulusi tulusi</i> (de Nicéville, 1883)	Purple Swift	1				1	Uncommon
63	<i>Caltoris aurociliata</i> (Elwes & Edwards, 1897)	Yellow fringed Swift	1				1	Uncommon
64	<i>Parnara bada bada</i> (Moore, 1878)	Ceylon's Swift		1			1	Uncommon
65	<i>Parnara guttata</i> (Bremer & Grey, 1852)	Straight Swift	6		1	1	8	Common
66	<i>Pelopidas mathias mathias</i> (Fabricius, 1798)	Small branded Swift	2		1		3	Fairly Common
67	<i>Pelopidas conjuncta conjuncta</i> (Herrich-Schäffer, 1869)	Conjoined Swift	1				1	Uncommon
68	<i>Pelopidas subochracea subochracea</i> (Moore, 1878)	Large Branded Swift			1		1	Uncommon
69	<i>Pelopidas sinensis</i> (Mabille, 1877)	Little banded Swift (IWPA Sch IV)		1			1	Uncommon
70	<i>Pelopidas assamensis</i> (de Nicéville, 1882)	Great Swift(IWPA Sch IV)		1	1		2	Common
71	<i>Polytremis lubricans lubricans</i> (Herrich-Schäffer, 1869)	Contiguous Swift				1	1	Uncommon
72	<i>Polytremis discreta discreta</i> Elwes & Edwards, 1897	Himalayan Swift		1			1	Uncommon
73	<i>Polytremis eltola eltola</i> (Hewitson, 1869)	Yellow Spot Swift	2		1		3	Fairly Common
74	<i>Borbo bevani</i> Moore, 1878	Bevan's Swift		1			1	Uncommon
B.1	Family Papilionidae							
i.	Subfamily Parnassiinae							
75	<i>Bhutanitis ludlowi</i> Gabriel, 1942	Ludlow's Bhutan Swallowtail		2			2	Common
ii.	Subfamily Papilioninae							
76	<i>Graphium agamemnon agamemnon</i> (Linnaeus, 1758)	Tailed Jay	4	5	3	1	13	Common
77	<i>Graphium chironides chironides</i> (Honrath, 1884)	Veined Jay		29	2	2	33	Very Common
78	<i>Graphium doson axionides</i> (Page & Treadaway,2014)	Common Jay		5			5	Common
79	<i>Graphium eurypylus acheron</i> (Moore,1885)	Great Jay	7				7	Common
80	<i>Graphium antiphates pompilius</i> (Fabricius, 1787)	Five-bar Swordtail		16	4	1	21	Very Common
81	<i>Graphium macareus indicus</i> (Rothschild, 1895)	Lesser Zebra	1	1			2	Common
82	<i>Graphium xenocles phrontis</i> (de Nicéville, 1897)	Great Zebra			4		4	Fairly Common
83	<i>Graphium sarpedon sarpedon</i> (Linnaeus, 1758)	Common Bluebottle	2	32	1	4	39	Very Common
84	<i>Graphium cloanthus cloanthus</i> Westwood, 1841	Glassy Bluebottle	2	9	5	3	19	Very Common
85	<i>Lamproptera curius curius</i> (Fabricius, 1787)	White Dragontail	4	29	16		49	Very Common

	Scientific Name	Common name	2B/C1(a) Assam Alluvial Plains Semi- Evergreen Forests (A)	2B/1S1 Sub- Himalayan Light Alluvial Semi- Evergreen Forests (B)	2B/2S2 Eastern Alluvial Secondary Semi- Evergreen Forests (C)	3/1S2(b) Terminalia- Duabanga (D)	Total Individuals recorded (A+B+C+D)	# Relative Abundance Status
86	<i>Lamproptera meges indistincta</i> (Tytler, 1912)	Green Dragontail		15	69	2	86	Very Common
87	<i>Papilio agestor agestor</i> Gray, 1831	Tawny Mime		3			3	Fairly Common
88	<i>Papilio paradoxa telearchus</i> (Hewitson, 1852)	Great Blue Mime (IWPA Sch I Part IV)		30			30	Very Common
89	<i>Papilio memnon agenor</i> Linnaeus, 1758	Great Mormon		15	5	9	29	Very Common
90	<i>Papilio polytes romulus</i> Cramer, 1775	Common Mormon		9	3	1	13	Common
91	<i>Papilio helenus helenus</i> Linnaeus, 1758	Red Helen	5	55	17	8	85	Very Common
92	<i>Papilio nephelus chaon</i> Westwood, 1845	Yellow Helen (IWPA Sch II Part II)	3	11	5		19	Very Common
93	<i>Papilio alcmenor alcmenor</i> Felder & Felder, 1864	Common Redbreast		1	1	1	3	Fairly Common
94	<i>Papilio bootes janaka</i> Moore, 1857	Tailed Redbreast (IWPA Sch II Part II)		1			1	Uncommon
95	<i>Papilio protenor euprotenor</i> Fruhstorfer, 1908	Spangle		12	4	7	23	Very Common
96	<i>Papilio arcturus arcturus</i> Westwood, 1842	Blue Peacock	2	10	12	23	47	Very Common
97	<i>Papilio bianor ganesa</i> Doubleday, 1842	Common Peacock	4	4	23	1	32	Very Common
98	<i>Papilio paris paris</i> Linnaeus, 1758	Paris Peacock	1	20	6		27	Very Common
99	<i>Papilio castor castor</i> Westwood, 1842	Common Raven		8	13	1	22	Very Common
100	<i>Papilio demoleus demoleus</i> Linnaeus, 1758	Lime butterfly	1	1	3		5	Common
101	<i>Papilio machaon</i> Linnaeus, 1758	Common Yellow Swallowtail		1			1	Uncommon
102	<i>Losaria coon cacharensis</i> Butler, 1885	Common Clubtail	1				1	Uncommon
103	<i>Meandrusa payeni evan</i> Doubleday, 1845	Yellow Gorgon	1	1			2	Common
104	<i>Meandrusa lachinus lachinus</i> (Fruhstorfer, 1902)	Brown Gorgon (IWPA Sch II Part II)			2		2	Common
105	<i>Atrophaneura aidoneus</i> Doubleday, 1845	Lesser Batwing	1	1	6		8	Common
106	<i>Atrophaneura varuna astorion</i> Westwood, 1842	Common Batwing	1	4	3	2	10	Common
107	<i>Byasa dasarada dasarada</i> (Moore, 1857)	Great Windmill (IWPA Sch II Part II)		4			4	Fairly Common
108	<i>Byasa polyuctes polyuctes</i> (Doubleday, 1842)	Common Windmill		39	13	3	55	Very Common
109	<i>Pachliopta aristolochiae aristolochiae</i> (Fabricius, 1775)	Common Rose		2	3		5	Common
110	<i>Troides helena cerberus</i> (Felder & Felder, 1865)	Common Birdwing	5				5	Common
111	<i>Troides aeacus aeacus</i> (Felder & Felder, 1860)	Golden Birdwing		30	9	7	46	Very Common
C.1	Family Pieridae							
i.	Subfamily Pierinae							
112	<i>Appias albina darada</i> (Felder & Felder, 1865)	Common Albatross (IWPA Sch II Part II)	3	12	2		17	Very Common
113	<i>Appias galba</i> (Wallace, 1867)	Orange Albatross (IWPA Sch IV)	1				1	Uncommon

	Scientific Name	Common name	2B/C1(a) Assam Alluvial Plains Semi- Evergreen Forests (A)	2B/1S1 Sub- Himalayan Light Alluvial Semi- Evergreen Forests (B)	2B/2S2 Eastern Alluvial Secondary Semi- Evergreen Forests (C)	3/1S2(b) Terminalia- Duabanga (D)	Total Individuals recorded (A+B+C+D)	# Relative Abundance Status
114	<i>Appias lycida eleonora</i> (Boisduval, 1836)	Chocolate Albatross	37	50	21	3	111	Very Common
115	<i>Appias olferna</i> (Swinhoe, 1890)	Eastern Striped Albatross	3		1		4	Fairly Common
116	<i>Appias indra indra</i> (Moore, 1857)	Plain Puffin	1	5			6	Common
117	<i>Appias lalage lalage</i> (Doubleday, 1842)	Spot Puffin	4	164	32		200	Very Common
118	<i>Catopsilia pomona pomona</i> (Fabricius, 1775)	Common Emigrant	1	3			4	Fairly Common
119	<i>Catopsilia pyranthe pyranthe</i> (Linnaeus, 1758)	Mottled Emigrant		1			1	Uncommon
120	<i>Cepora nerissa nerissa</i> (Fabricius, 1775)	Common Gull	3	12	1		16	Very Common
121	<i>Cepora nadina nadina</i> (Lucas, 1852)	Lesser Gull	13	11	3		27	Very Common
122	<i>Delias acalis pyramus</i> (Wallace, 1867)	Red breast Jezebel		2			2	Common
123	<i>Delias agostina agostina</i> (Hewitson, 1852)	Yellow Jezebel		2	3	12	17	Very Common
124	<i>Delias belladonna ithiela</i> Butler, 1869	Hill Jezebel	2	1			3	Fairly Common
125	<i>Delias sanaca bhutya</i> Talbot, 1937	Pale Jezebel (IWPA Sch I Part IV)		1			1	Uncommon
126	<i>Delias berinda boyleae</i> Butler, 1885	Dark Jezebel		3		2	5	Common
127	<i>Delias descombesi descombesi</i> (Boisduval, 1836)	Red-spot Jezebel	2	6			8	Common
128	<i>Delias hyparete indica</i> (Wallace, 1867)	Painted Jezebel	1		2		3	Fairly Common
129	<i>Delias pasithoe pasithoe</i> (Linnaeus, 1767)	Red-base Jezebel	2	12	1		15	Very Common
130	<i>Aporia harrietae</i> de Nicéville, 1893	Dark Blackvein		10			10	Common
131	<i>Hebomoia glaucippe glaucippe</i> (Linnaeus, 1758)	Great Orange Tip	9	26	6	1	42	Very Common
132	<i>Ixias marianne</i> Cramer, 1779	White Orange Tip			1		1	Uncommon
133	<i>Ixias pyrene familiaris</i> Butler, 1874	Yellow Orange Tip	44	36	34		114	Very Common
134	<i>Leptosia nina nina</i> (Fabricius, 1793)	Psyche	7	4	5		16	Very Common
135	<i>Pareronia avatar</i> (Moore, 1857)	Pale Wanderer	15	41	24	4	84	Very Common
136	<i>Pieris brassicae nepalensis</i> Gray, 1846	Large Cabbage White		6			6	Common
137	<i>Pieris canidia indica</i> Evans, 1926	Indian Cabbage White	4	89	19		112	Very Common
138	<i>Prioneris philonome clemathe</i> Doubleday, 1846	Red-spot Sawtooth		1			1	Uncommon
139	<i>Prioneris thestylis thestylis</i> (Doubleday, 1842)	Spotted Sawtooth	5	7		1	13	Common
ii.	Subfamily Coliadinae							
140	<i>Colias fieldii fieldii</i> (Ménétriés, 1855)	Dark Clouded Yellow		1			1	Uncommon
141	<i>Derca lycorias lycorias</i> Doubleday, 1842	Plain Sulphur			2		2	Common
142	<i>Dercas verhuelli doubledayi</i> Moore, 1905	Tailed Sulphur		12			12	Common
143	<i>Eurema andersonii jordani</i> Corbet & Pendlebury, 1932	One-spot Grass Yellow	85	21	18	7	131	Very Common

	Scientific Name	Common name	2B/C1(a) Assam Alluvial Plains Semi- Evergreen Forests (A)	2B/151 Sub- Himalayan Light Alluvial Semi- Evergreen Forests (B)	2B/252 Eastern Alluvial Secondary Semi- Evergreen Forests (C)	3/152(b) Terminalia- Duabanga (D)	Total Individuals recorded (A+B+C+D)	# Relative Abundance Status
144	<i>Eurema blanda silhetana</i> (Wallace, 1867)	Three-spot Grass Yellow	40	20	16		76	Very Common
145	<i>Eurema brigitta rubella</i> (Wallace, 1867)	Small Grass Yellow		2			2	Common
146	<i>Eurema hecabe hecabe</i> (Linnaeus, 1758)	Common Grass Yellow	84	33	32	9	158	Very Common
147	<i>Gandaca harina assamica</i> Moore, 1906	Tree Yellow	3	3			6	Common
D.1	Family Riodinidae							
i.	Subfamily Nemeobiinae							
148	<i>Abisara fylla</i> (Westwood, 1851)	Dark judy	2	20	2	4	28	Very Common
149	<i>Abisara neophron neophron</i> (Hewitson, 1861)	Tailed judy			3		3	Fairly Common
150	<i>Dodona adonira adonira</i> Hewitson, 1865	Striped Punch		12	3	1	16	Very Common
151	<i>Dodona dipoea dipoea</i> Hewitson, 1865	Lesser Punch(IWPA Sch II Part II)			3		3	Fairly Common
152	<i>Dodona eugenes venox</i> Fruhstorfer, 1912	Tailed Punch				3	3	Fairly Common
153	<i>Dodona egeon egeon</i> Westwood, 1851	Orange Punch(IWPA Sch II Part II)		1	1	1	3	Fairly Common
154	<i>Zemeros flegyas flegyas</i> Cramer, 1780	Punchinello	78	55	45	23	201	Very Common
E.1	Family Lycaenidae							
i.	Subfamily Poritiinae							
155	<i>Poritia hewitsoni hewitsoni</i> Moore, 1865	Common Gem(IWPA Sch II Part II)	1	4	5		10	Common
ii.	Subfamily Miletinae							
156	<i>Taraka hamada mendesia</i> Fruhstorfer, 1918	Forest Pierrot			1		1	Uncommon
iii.	Subfamily Curetinae							
157	<i>Curetis bulis bulis</i> (Westwood, 1851)	Bright Sunbeam		12	1	1	14	Common
158	<i>Curetis saronis saronis</i> Moore, 1877	Burmese Sunbeam		1			1	Uncommon
iv.	Subfamily Theclinae							
159	<i>Arhopala abseus indicus</i> Riley, 1923	Aberrant Oakblue	2				2	Common
160	<i>Arhopala bazalus teesta</i> (de Nicéville, 1886)	Powdered Oakblue	2				2	Common
161	<i>Arhopala eumolphus eumolphus</i> Cramer, 1780	Green Oakblue	14				14	Common
162	<i>Arhopala centaurus pirithous</i> (Moore, 1883)	Centaur oakblue	2	2		1	5	Common
163	<i>Arhopala silhetensis silhetensis</i> (Hewitson, 1862)	Sylhet Oakblue(IWPA Sch II Part II)		1			1	Uncommon
164	<i>Arhopala paramuta paramuta</i> de Nicéville, 1883	Hooked Oakblue			1		1	Uncommon
165	<i>Arhopala atrax</i> Hewitson, 1862	Indian Oakblue	3				3	Fairly Common
166	<i>Arhopala paralea</i> Evans, 1925	Glazed Oakblue	1				1	Uncommon
167	<i>Flos asoka</i> de Nicéville, 1883	Spangled Plushblue				1	1	Uncommon
168	<i>Cheritra freja evansi</i> Cowan, 1965	Common Imperial	13	54	5		72	Very Common
169	<i>Ticherra acte acte</i> (Moore, 1857)	Blue imperial	8	3			11	Common

	Scientific Name	Common name	2B/C1(a) Assam Alluvial Plains Semi- Evergreen Forests (A)	2B/1S1 Sub- Himalayan Light Alluvial Semi- Evergreen Forests (B)	2B/2S2 Eastern Alluvial Secondary Semi- Evergreen Forests (C)	3/1S2(b) Terminalia- Duabanga (D)	Total Individuals recorded (A+B+C+D)	# Relative Abundance Status
170	<i>Hypolycaena kina kina</i> (Hewitson, 1869)	Blue Tit(IWPA Sch II Part II)	1	2	2	2	7	Common
171	<i>Hypolycaena othona othona</i> Hewitson, 1865	Orchid Tit(IWPA Sch I Part IV)		15			15	Very Common
172	<i>Hypolycaena erylus himavatus</i> Fruhstorfer, 1912	Common Tit	2	14	4		20	Very Common
173	<i>Zeltus amasa amasa</i> (Hewitson, 1865)	Fluffy tit	2	7	4	7	20	Very Common
174	<i>Deudorix epijarbas epijarbas</i> (Moore, 1857)	Cornelian	1	2			3	Fairly Common
175	<i>Rapala iarbus iarbus</i> (Fabricius, 1787)	Common Red Flash	1				1	Uncommon
176	<i>Rapala tara</i> de Nicéville, 1888	Assam Flash	2		9		11	Common
177	<i>Rapala pheretima petosiris</i> (Hewitson, 1863)	Copper Flash	11	1			12	Common
178	<i>Rapala varuna orseis</i> (Hewitson, 1863)	Indigo Flash(IWPA Sch II Part II)	3	1			4	Fairly Common
179	<i>Rapala nissa nissa</i> Kollar, 1844	Common Flash			2		2	Common
180	<i>Rapala sphinx</i> Fabricius, 1775	Brilliant Flash(IWPA Sch II Part II)		1			1	Uncommon
181	<i>Rapala rectivitta</i> Moore, 1879	Shot Flash		1			1	Uncommon
182	<i>Rapala manea schistacea</i> Moore, 1879	Slate Flash	1		1		2	Common
183	<i>Rapala dienece</i> Hewitson, 1878	Scarlet Flash	2				2	Common
184	<i>Ancema ctesia ctesia</i> (Hewitson, 1865)	Bi-spot Royal		1	2		3	Fairly Common
185	<i>Remelana jangala ravata</i> (Moore, 1865)	Chocolate Royal	4	2	1		7	Common
186	<i>Sinthusia virgo</i> (Elwes, 1887)	Pale Spark(IWPA Sch I Part IV)		1			1	Uncommon
187	<i>Surendra quercetorum quercetorum</i> Moore, 1857	Common Acacia Blue	15				15	Very Common
188	<i>Loxura atymnus continentalis</i> Fruhstorfer, 1912	Yamfly		6	1		7	Common
189	<i>Yasoda tripunctata tripunctata</i> (Hewitson, 1863)	Branded Yamfly(IWPA Sch II Part II)	4	3			7	Common
190	<i>Spindasis lohita himalayanus</i> (Moore, 1884)	Long-banded Silverline(IWPA Sch II Part II)	2	7	1	1	11	Common
191	<i>Spindasis syama peguanus</i> (Moore, 1884)	Club Silverline			2		2	Common
192	<i>Spindasis nipalicus</i> Moore, 1884	Silvergry Silverline(IWPA Sch II Part II)			1		1	Uncommon
v.	Subfamily Lycaeninae							
193	<i>Heliophorus brahma brahma</i> (Moore, 1857)	Golden Sapphire		6	3		9	Common
194	<i>Heliophorus epicles latilimbata</i> (Fruhstorfer, 1908)	Purple Sapphire	6	45	37	4	92	Very Common
195	<i>Heliophorus indicus</i> (Fruhstorfer, 1908)	Dark Sapphire	1	4			5	Common
196	<i>Heliophorus tamu tamu</i> (Kollar, 1844)	Powdery Green Sapphire	1		3		4	Fairly Common
197	<i>Heliophorus androcles</i> Westwood, 1851	Green Sapphire		3	5		8	Common
vi.	Subfamily Polyommatae							
198	<i>Anthene emolus emolus</i> (Godart, 1823)	Common Ciliate Blue	1	9			10	Common

	Scientific Name	Common name	2B/C1(a) Assam Alluvial Plains Semi- Evergreen Forests (A)	2B/1S1 Sub- Himalayan Light Alluvial Semi- Evergreen Forests (B)	2B/2S2 Eastern Alluvial Secondary Semi- Evergreen Forests (C)	3/1S2(b) Terminalia- Duabanga (D)	Total Individuals recorded (A+B+C+D)	# Relative Abundance Status
199	<i>Anthene lycaenina lycaenina</i> (Felder, 1868)	Pointed Ciliate Blue(IWPA Sch II Part II)		3	1		4	Fairly Common
200	<i>Catochrysops panormus exiguus</i> (Distant, 1886)	Silver forget me not		1			1	Uncommon
201	<i>Catochrysops strabo strabo</i> (Fabricius, 1793)	Forget me not		2			2	Common
202	<i>Chilades lajus lajus</i> (Stoll, 1780)	Lime Blue		2			2	Common
203	<i>Caleta elna noliteia</i> (Fruhstorfer, 1918)	Elbowed Pierrot	2	14	16		32	Very Common
204	<i>Caleta roxus roxana</i> de Nicéville, 1897	Straight Pierrot		2		1	3	Fairly Common
205	<i>Castalius rosimon rosimon</i> (Fabricius, 1775)	Common Pierrot	3	18	1		22	Very Common
206	<i>Tarucus ananda</i> (de Nicéville, 1883)	Dark Pierrot (IWPA Sch IV)		2			2	Common
207	<i>Tarucus callinara</i> Butler, 1886	Veined Pierrot	3				3	Fairly Common
208	<i>Jamides alecto euryasces</i> (Fruhstorfer, 1915)	Metallic Cerulean(IWPA Sch II Part II)		2	1		3	Fairly Common
209	<i>Jamides bochus bochus</i> (Stoll, 1782)	Dark Cerulean	4	30	5		39	Very Common
210	<i>Jamides celeno celeno</i> (Cramer, 1775)	Common Cerulean	11	11	5	1	28	Very Common
211	<i>Jamides elpis pseudelphis</i> (Butler, 1879)	Glistening Cerulean(IWPA Sch II Part II)			1		1	Uncommon
212	<i>Jamides pura pura</i> (Moore, 1886)	White Cerulean		1			1	Uncommon
213	<i>Lonolyce helicon merguiana</i> (Moore, 1884)	Pointed Line blue		1			1	Uncommon
214	<i>Nacaduba beree gythion</i> Fruhstorfer, 1916	Opaque six line blue		1			1	Uncommon
215	<i>Nacaduba kurava euplea</i> Frushstofer, 1916	Transparent Six-Lineblue		1			1	Uncommon
216	<i>Nacaduba pactolus continentalis</i> Felder, 1860	Large Four-Lineblue(IWPA Sch II Part II)			1	2	3	Fairly Common
217	<i>Petrelaea dana</i> (de Niceville, 1883)	Dingy Lineblue			1		1	Uncommon
218	<i>Prosotas aluta coelestis</i> (Wood-Mason & de Nicéville, 1886)	Banded Lineblue(IWPA Sch II Part II)		2		2	4	Fairly Common
219	<i>Prosotas bhutea</i> (de Nicéville, 1883)	Bhuty Line Blue		11		1	12	Common
220	<i>Prosotas dubiosa indica</i> (Evans, 1925)	Tailless Line blue	4	5	8		17	Very Common
221	<i>Prosotas nora ardates</i> (Moore, 1874)	Common Line blue	4	109	10	11	134	Very Common
222	<i>Lampides boeticus</i> (Linnaeus, 1767)	Pea blue(IWPA Sch II Part II)			3		3	Fairly Common
223	<i>Leptotes plinius plinius</i> (Fabricius, 1793)	Zebra Blue	1	1			2	Common
224	<i>Megisba malaya sikkima</i> Moore, 1884	Malayan		1	1		2	Common
225	<i>Neopithecops zalmora zalmora</i> (Butler, 1870)	Quaker	3	11	3	1	18	Very Common
226	<i>Pithecops fulgens fulgens</i> Doherty, 1889	Blue Quaker			3		3	Fairly Common

	Scientific Name	Common name	2B/C1(a) Assam Alluvial Plains Semi- Evergreen Forests (A)	2B/1S1 Sub- Himalayan Light Alluvial Semi- Evergreen Forests (B)	2B/2S2 Eastern Alluvial Secondary Semi- Evergreen Forests (C)	3/1S2(b) Terminalia- Duabanga (D)	Total Individuals recorded (A+B+C+D)	# Relative Abundance Status
227	<i>Orthomiella pontis pontis</i> (Elwes, 1887)	Straight winged blue(IWPA Sch II Part II)			3		3	Fairly Common
228	<i>Phengaris atroguttata</i> Oberthür, 1876	Great Spotted Blue			5		5	Common
229	<i>Shijimia moorei moorei</i> Leech, 1889	Moore's Cupid(IWPA Sch I Part IV)			1		1	Uncommon
230	<i>Acytolepis puspa gisca</i> (Fruhstorfer, 1910)	Common Hedge Blue(IWPA Sch II Part II)	9	9	23	17	58	Very Common
231	<i>Celastrina lavendularis limbata</i> (Moore, 1879)	Plain Hedge Blue	4				4	Fairly Common
232	<i>Lestranicus transpectus</i> (Moore, 1879)	White-banded Hedge Blue	1		1		2	Common
233	<i>Udara dilecta dilecta</i> (Moore, 1879)	Pale Hedge Blue		24	81		105	Very Common
234	<i>Pseudozizeeria maha maha</i> (Kollar, 1844)	Pale Grass Blue		7	6	1	14	Common
235	<i>Zizeeria karsandra</i> (Moore, 1865)	Dark Grass Blue		1			1	Uncommon
236	<i>Zizula hylax</i> (Fabricius, 1775)	Tiny Grass Blue	1				1	Uncommon
237	<i>Zizina otis otis</i> (Fabricius, 1787)	Lesser Grass Blue	1	1	8		10	Common
238	<i>Freyeria putli</i> (Kollar, 1844)	Eastern Grass Jewel		1			1	Uncommon
239	<i>Luthrodes pandava pandava</i> (Horsefield, 1829)	Plains Cupid	5				5	Common
F.1	Family Nymphalidae							
i.	Subfamily Libytheinae							
240	<i>Libythea lepita lepita</i> Moore, 1857	Common Beak(IWPA Sch II Part II)	2	4	3		9	Common
ii.	Subfamily Danainae							
241	<i>Danaus genutia genutia</i> (Cramer, 1779)	Striped Tiger	3	4	2		9	Common
242	<i>Danaus melanippus</i> Cramer, 1777	White Tiger	1				1	Uncommon
243	<i>Parantica aglea melanooides</i> Moore, 1883	Glassy Tiger	54	44	22	23	143	Very Common
244	<i>Parantica melaneus plataniston</i> (Fruhstorfer, 1910)	Chocolate Tiger	3	15	6	1	25	Very Common
245	<i>Parantica sita sita</i> (Kollar, 1844)	Chestnut Tiger	20	17	7	4	48	Very Common
246	<i>Tirumala limniace exotica</i> (Gmelin, 1790)	Blue Tiger	2	5		5	12	Common
247	<i>Tirumala septentrionis septentrionis</i> (Butler, 1874)	Dark Blue Tiger	14	23	6	1	44	Very Common
248	<i>Euploea algea deione</i> Westwood, 1848	Long Branded Blue Crow		2			2	Common
249	<i>Euploea core core</i> (Cramer, 1780)	Indian Common Crow	1	2			3	Fairly Common
250	<i>Euploea midamus rogenhoferi</i> Felder & Felder, 1865	Blue-spotted Crow(IWPA Sch II Part II)	26	11	2	2	41	Very Common
251	<i>Euploea mulciber mulciber</i> (Cramer, 1777)	Striped Blue Crow(IWPA Sch IV)	66	17	11	8	102	Very Common
252	<i>Euploea sylvester hopei</i> Felder & Felder, 1865	Double-branded Crow	13	14			27	Very Common
253	<i>Euploea radamanthus radamanthus</i> (Fabricius, 1793)	Magpie Crow	12	28	1	2	43	Very Common

	Scientific Name	Common name	2B/C1(a) Assam Alluvial Plains Semi- Evergreen Forests (A)	2B/1S1 Sub- Himalayan Light Alluvial Semi- Evergreen Forests (B)	2B/2S2 Eastern Alluvial Secondary Semi- Evergreen Forests (C)	3/1S2(b) Terminalia- Duabanga (D)	Total Individuals recorded (A+B+C+D)	# Relative Abundance Status
iii.	Subfamily Charaxinae							
254	<i>Charaxes arja arja</i> Felder & Felder, 1866	Pallid Nawab		1			1	Uncommon
255	<i>Charaxes bhārata</i> Felder & Felder, 1867	Indian Nawab	1	5	3	6	15	Very Common
256	<i>Charaxes delphis delphis</i> Doubleday, 1843	Jewelled Nawab (IWPA Sch II Part II)		1			1	Uncommon
257	<i>Charaxes eudamippus eudamippus</i> Doubleday, 1843	Great Nawab		7	5		12	Common
258	<i>Charaxes moori</i> Distant, 1883	Malayan Nawab			1		1	Uncommon
259	<i>Charaxes bernardus hierax</i> (Felder & Felder, 1866)	Tawny Rajah	2	37	2	1	42	Very Common
260	<i>Charaxes marmax marmax</i> Westwood, 1847	Yellow Rajah (IWPA Sch II Part II)		8			8	Common
261	<i>Charaxes kahruha</i> (Moore, 1895)	Variiegated Rajah (IWPA Sch II Part II)	1	7	1		9	Common
iv.	Subfamily Satyrinae							
262	<i>Discophora sondaica zal</i> Westwood, 1851	Common Duffer		1			1	Uncommon
263	<i>Discophora timora timora</i> Westwood, 1850	Great Duffer				1	1	Uncommon
264	<i>Enispe euthymius euthymius</i> Doubleday, 1845	Red Caliph		1			1	Uncommon
265	<i>Stichopthalma camadeva nicevillei</i> Röber, 1900	Northern Jungle Queen		3			3	Fairly Common
266	<i>Stichopthalma lousia tytleri</i> Rothchild, 1918	Manipur jungle Queen		7	1		8	Common
267	<i>Thaumantis diores diores</i> Doubleday, 1845	Jungle Glory		6	1		7	Common
268	<i>Aulocera saraswatti vishnu</i> Gross, 1958	Striated Satyr		2			2	Common
269	<i>Aulocera loha</i> Doherty, 1886	Doherty's Satyr		1			1	Uncommon
270	<i>Callerebia scanda opima</i> Watkins, 1927	Pallid Argus (IWPA Sch II Part II)		1	24		25	Very Common
271	<i>Callerebia dibangensis</i> Roy, 2013	Bright-eyed Argus		86	13		99	Very Common
272	<i>Elymnias hypermnestra undularis</i> (Drury, 1773)	Common Palmfly			1		1	Uncommon
273	<i>Elymnias peali</i> Wood-Mason, 1883	Peal's Palmfly (IWPA Sch I Part IV)		6	1		7	Common
274	<i>Elymnias patna patna</i> (Westwood, 1851)	Blue-striped Palmfly		4	2	3	9	Common
275	<i>Elymnias nesaea timandra</i> Wallace, 1869	Tiger Palmfly	1				1	Uncommon
276	<i>Ethope himachala</i> (Moore, 1857)	Dusky Diadem		1		1	2	Common
277	<i>Lethe isana dinarbas</i> (Hewitson, 1863)	Common Forester			1		1	Uncommon
278	<i>Lethe scanda</i> (Moore, 1857)	Blue Forester (IWPA Sch II Part II)		4			4	Fairly Common
279	<i>Lethe gulnihal gulnihal</i> (de Nicéville, 1887)	Dull Forester		1			1	Uncommon
280	<i>Lethe chandica flonona</i> (Fruhstorfer, 1911)	Angled Red Forester		2	3		5	Common
281	<i>Lethe distans</i> Butler, 1870	Scarce Red Forester (IWPA Sch II Part II)		1			1	Uncommon

	Scientific Name	Common name	2B/C1(a) Assam Alluvial Plains Semi- Evergreen Forests (A)	2B/1S1 Sub- Himalayan Light Alluvial Semi- Evergreen Forests (B)	2B/2S2 Eastern Alluvial Secondary Semi- Evergreen Forests (C)	3/1S2(b) Terminalia- Duabanga (D)	Total Individuals recorded (A+B+C+D)	# Relative Abundance Status
282	<i>Lethe mekara mekara</i> (Moore, 1857)	Common Red Forester			1		1	Uncommon
283	<i>Lethe sinorix sinorix</i> (Hewitson, 1863)	Tailed Red Forester	2	4	5		11	Common
284	<i>Lethe kansa</i> Moore, 1857	Bamboo Forester	1		1		2	Common
285	<i>Lethe satyavati</i> de Niceville, 1881	Pallid Forester	1					Uncommon
286	<i>Lethe maitrya maitrya</i> de Nicéville, 1881	Barred Woodbrown				1	1	Uncommon
287	<i>Lethe sidonis sidonis</i> (Hewitson, 1863)	Common Woodbrown	1	9	1	3	14	Common
288	<i>Lethe nicetas nicetas</i> (Hewitson, 1863)	Yellow Woodbrown	1	1			2	Common
289	<i>Lethe europa niladana</i> Fruhstorfer, 1911	Bamboo Tree brown	1	1		2	4	Fairly Common
290	<i>Lethe confusa confusa</i> Aurivillius, 1898	Banded Treebrown			3	1	4	Fairly Common
291	<i>Lethe verma sintica</i> Fruhstorfer, 1911	Straight banded Treebrown		13	3	1	17	Very Common
292	<i>Lethe rohira rohira</i> (Fabricius, 1787)	Common Treebrown	2	1		1	4	Common
293	<i>Lethe atkinsoni</i> Hewitson, 1876	Small Goldenfork		1			1	Uncommon
294	<i>Lethe sura</i> (Doubleday, 1849)	Lilacfork		10			10	Common
295	<i>Rhaphicera satricus satricus</i> Doubleday, 1849	Large Tawny Wall			1		1	Uncommon
296	<i>Rhaphicera moorei mantra</i> Talbot, 1947	Small Tawny Wall		2	4		6	Common
297	<i>Chonala masoni</i> Elwes, 1882	Chumbi Wall		2			2	Common
298	<i>Melanitis leda leda</i> (Linnaeus, 1758)	Common Evening Brown		6			6	Common
299	<i>Melanitis phedima ganapati</i> Fruhstorfer, 1908	Dark Evening Brown	5				5	Common
300	<i>Cyllogenes janetae loba</i> S.Y.Lang & H.Haung, 2012	Scarce Evening Brown(IWPA Sch II Part II)			2		2	Common
301	<i>Mycalesis anaxias aemate</i> Fruhstorfer, 1911	Whitebar Bushbrown(IWPA Sch II Part II)	8	4	1		13	Common
302	<i>Micalesis adamsoni</i> Watson, 1897	Watson's Bushbrown	1		2		3	Fairly Common
303	<i>Mycalesis gotama charaka</i> Moore, 1874	Chinese Bushbrown(IWPA Sch II Part II)		2			2	Common
304	<i>Mycalesis intermedia</i> (Moore, 1892)	Intermediate Bushbrown		1			1	Uncommon
305	<i>Mycalesis mineus mineus</i> (Linnaeus, 1758)	Dark-brand Bushbrown		1			1	Uncommon
306	<i>Mycalesis perseus blasius</i> (Fabricius, 1798)	Common Bushbrown		29	12		41	Very Common
307	<i>Mycalesis visala visala</i> Moore, 1857	Long branded Bushbrown	16	1		9	26	Very Common
308	<i>Telinga misenus misenus</i> de Nicéville, 1889	Salmon-branded Bushbrown(IWPA Sch II Part II)		2			2	Common
309	<i>Telinga malsarida</i> Butler, 1868	Plain Bushbrown(IWPA Sch II Part II)		1			1	Uncommon
310	<i>Neope bhadra</i> (Moore, 1857)	Tailed Labyrinth		1			1	Uncommon

	Scientific Name	Common name	2B/C1(a) Assam Alluvial Plains Semi- Evergreen Forests (A)	2B/1S1 Sub- Himalayan Light Alluvial Semi- Evergreen Forests (B)	2B/2S2 Eastern Alluvial Secondary Semi- Evergreen Forests (C)	3/1S2(b) Terminalia- Duabanga (D)	Total Individuals recorded (A+B+C+D)	# Relative Abundance Status
311	<i>Neope pulaha pulaha</i> (Moore, 1857)	Veined Labyrinth				2	2	Common
312	<i>Neorina hilda</i> Westwood, 1850	Yellow Owl	1			4	5	Common
313	<i>Orinoma damaris damaris</i> Gray, 1846	Tiger Brown				1	1	Uncommon
314	<i>Orsotriaena medus medus</i> (Fabricius, 1775)	Medus Brown	19	3	6		28	Very Common
315	<i>Penthema lisarda lisarda</i> (Doubleday, 1845)	Yellow Kaiser (IWPA Sch II Part II)		5			5	Common
316	<i>Ragadia crisilda crisilda</i> Hewitson, 1862	Striped Ringlet (IWPA Sch II Part II)		4	4		8	Common
317	<i>Ypthima baldus baldus</i> (Fabricius, 1775)	Common Five-ring	32	37	26	2	97	Very Common
318	<i>Ypthima huebneri</i> Kirby, 1871	Common Four-ring	3		2		5	Common
319	<i>Ypthima sakra sakra</i> Moore, 1857	Himalayan Five-ring	6	66	11	4	87	Very Common
320	<i>Ypthima newara newara</i> Moore, 1874	Newar Three-ring	1		2		3	Fairly Common
321	<i>Zipaetis scylax scylax</i> Hewitson, 1863	Dark Catseye			4		4	Fairly Common
v.	Subfamily Heliconiinae							
322	<i>Acraea issoria issoria</i> (Hübner, 1818)	Yellow Coster		51			51	Very Common
323	<i>Argynnis childreni childreni</i> Gray, 1831	Large Silverstripe	5	6	2	1	14	Common
324	<i>Argynnis hyperbius hyperbius</i> Linnaeus, 1763	Tropical Fritillary	2	5			7	Common
325	<i>Cethosia biblis tisamena</i> Fruhstorfer, 1912	Red Lacewing	2	33	7	4	46	Very Common
326	<i>Cethosia cyane cyane</i> (Drury, 1770)	Leopard Lacewing	14	9	4	1	28	Very Common
327	<i>Cirrochroa aoris aoris</i> Doubleday, 1847	Large Yeoman	51	95	46	46	238	Very Common
328	<i>Cirrochroa tyche mithila</i> Moore, 1872	Common Yeoman	21	2	2	1	26	Very Common
329	<i>Phalanta phalantha phalantha</i> Drury, 1773	Common leopard	1				1	Uncommon
330	<i>Vagrans egista sinha</i> (Kollar, 1844)	Vagrant	6	2			8	Common
331	<i>Vindula erota erota</i> (Fabricius, 1793)	Cruiser	10	118	15	10	153	Very Common
vi.	Subfamily Limenitidinae							
332	<i>Athyma asura asura</i> Moore, 1857	Studded Sergeant (IWPA Sch II Part II)	1				1	Uncommon
333	<i>Athyma cama cama</i> Moore, 1857	Orange Staff Sergeant		4			4	Fairly Common
334	<i>Athyma inara inara</i> Westwood, 1850	Color Sergeant	2		6		8	Common
335	<i>Athyma kanwa phorkys</i> Fruhstorfer, 1912	Dot-dash Sergeant (IWPA Sch II Part II)		11		1	12	Common
336	<i>Athyma perius perius</i> (Linnaeus, 1758)	Common Sergeant	3	5	1		9	Common
337	<i>Athyma pravara acutipennis</i> Fruhstorfer, 1906	Unbroken Sergeant (IWPA Sch II Part II)		17		2	19	Very Common

	Scientific Name	Common name	2B/C1(a) Assam Plains Semi- Evergreen Forests (A)	2B/1S1 Sub- Himalayan Light Alluvial Semi- Evergreen Forests (B)	2B/2S2 Eastern Alluvial Secondary Semi- Evergreen Forests (C)	3/1S2(b) Terminalia- Duabanga (D)	Total Individuals recorded (A+B+C+D)	# Relative Abundance Status
338	<i>Athyma ranga ranga</i> Moore, 1857	Blackvein Sergeant(IWPA Sch II Part II)	10	8		1	19	Very Common
339	<i>Athyma selenophora bahula</i> Moore, 1858	Staff Sergeant	8	24	4	1	37	Very Common
340	<i>Athyma zeroa zeroa</i> Moore, 1872	Small Staff Sergeant	1	1	3	1	6	Common
341	<i>Athyma orientalis</i> Elwes, 1888	Himalayan/Elongated Sergeant	1	23	6	3	33	Very Common
342	<i>Athyma jina jina</i> Moore, 1857	Bhutan Sergeant		1			1	Uncommon
343	<i>Athyma whitei</i> Tytler, 1940	Tytler's Sergeant				1	1	Uncommon
344	<i>Auzakia danava danava</i> Moore, 1857	Commodore	1	3		1	5	Common
345	<i>Bhagadatta austenia austenia</i> Moore, 1872	Grey Commodore(IWPA Sch I Part IV)		9	2	7	18	Very Common
346	<i>Parasarpa zayla zayla</i> (Doubleday, 1848)	Bi-color commodore	1		3	9	13	Common
347	<i>Parasarpa dudu dudu</i> Westwood, 1850	White Commodore		2	1		3	Fairly Common
348	<i>Sumalia daraxa daraxa</i> (Doubleday, 1848)	Green Commodore	3	7	5	3	18	Very Common
349	<i>Euthalia franciae raja</i> Felder & Felder, 1859	French Duke (B) (IWPA Sch II Part II)		3	1		4	Fairly Common
350	<i>Euthalia franciae franciae</i> (Gray, 1846)	French Duke(IWPA Sch II Part II)		2	1		3	Fairly Common
351	<i>Euthalia sahadeva sahadeva</i> Moore, 1859	Green Duke(IWPA Sch II Part II)		2			2	Common
352	<i>Euthalia nara nara</i> (Moore, 1859)	Bronze Duke(IWPA Sch II Part II)	1				1	Uncommon
353	<i>Euthalia patala taoana</i> Moore, 1879	Grand Duchess(IWPA Sch II Part II)			1		1	Uncommon
354	<i>Euthalia anosia anosia</i> Moore, 1857	Grey Baron(IWPA Sch II Part II)		1			1	Uncommon
355	<i>Euthalia lubentina lubentina</i> (Cramer, 1777)	Gaudy Baron(IWPA Sch IV)		4	1		5	Common
356	<i>Euthalia monina kesava</i> (Moore, 1859)	Powdered Baron	1	4	6		11	Common
357	<i>Euthalia aconthea garuda</i> Moore, 1857	Common Baron(IWPA Sch II Part II)	1	5	1		7	Common
358	<i>Euthalia phemius phemius</i> (Doubleday, 1848)	White-edged Blue Baron		3			3	Fairly Common
359	<i>Bassarona durga durga</i> Moore, 1857	Blue Duke(IWPA Sch II Part II)		11	1	1	13	Common
360	<i>Lexias dirtea khasiana</i> (Swinhoe, 1893)	Dark Archduke(IWPA Sch II Part II)		8	3	2	13	Common
361	<i>Lexias cyanipardus cyanipardus</i> Butler, 1868	Great Archduke		12	8		20	Very Common
362	<i>Lebadea martha martha</i> (Fabricius, 1787)	Knight	1	1	1		3	Fairly Common
363	<i>Moduza procris procris</i> (Cramer, 1777)	Commander	8	3	6		17	Very Common
364	<i>Neptis nata adipala</i> Moore, 1872	Clear Sailer		8	6	7	21	Very Common
365	<i>Neptis clinia susruta</i> Moore, 1872	Sullied Sailer	3	3	1	1	8	Common
366	<i>Neptis harita harita</i> Moore, 1874	Dingiest Sailer		20	2	1	23	Very Common
367	<i>Neptis pseudovikasi</i> (Moore, 1899)	False Dingy Sailer		5	5		10	Common

	Scientific Name	Common name	2B/C1(a) Assam Alluvial Plains Semi- Evergreen Forests (A)	2B/1S1 Sub- Himalayan Light Alluvial Semi- Evergreen Forests (B)	2B/2S2 Eastern Alluvial Secondary Semi- Evergreen Forests (C)	3/1S2(b) Terminalia- Duabanga (D)	Total Individuals recorded (A+B+C+D)	# Relative Abundance Status
368	<i>Neptis hylas varmona</i> Moore, 1872	Common Sailer	41	50	29	11	131	Very Common
369	<i>Neptis magadha khasiana</i> Moore, 1872	Spotted Sailer						
370	<i>Neptis miah miah</i> Moore, 1857	Small Yellow Sailer	1	5	4	3	13	Common
371	<i>Neptis ananta ochracea</i> Evans, 1924	Yellow Sailer		3	1		4	Fairly Common
372	<i>Neptis radha radha</i> Moore, 1857	Great Yellow Sailer (IWPA Sch II Part II)	2		1		3	Fairly Common
373	<i>Neptis sankara amba</i> Moore, 1858	Broad-banded Sailer		1	3		4	Fairly Common
374	<i>Neptis sappho astola</i> Moore, 1872	Pallas's Sailer	2				2	Common
375	<i>Phaedyma aspasia aspasia</i> Leech, 1890	Great Hockey Stick Sailer (IWPA Sch I Part IV)			2		2	Common
376	<i>Phaedyma columella ophiana</i> (Moore, 1872)	Short-banded Sailer		1			1	Uncommon
377	<i>Pantoporia hordonia hordonia</i> (Stoll, 1790)	Common Lascar	20	5	7	1	33	Very Common
378	<i>Pantoporia paraka paraka</i> (Butler, 1877)	Perak Lascar		1			1	Uncommon
379	<i>Neurosigma siva siva</i> Westwood, 1850	Panther				1	1	Uncommon
380	<i>Tanaecia jahnu jahnu</i> (Moore, 1857)	Plain Earl	1	2	1		4	Fairly Common
381	<i>Tanaecia julii appiades</i> (Menetries, 1857)	Common Earl	15	5	9	1	30	Very Common
382	<i>Tanaecia lepidea sthavara</i> (Fruhstorfer, 1913)	Grey Count (IWPA Sch II Part II)	11	12	6	2	31	Very Common
vii.	Subfamily Cyrestinae							
383	<i>Cyrestis thyodamas thyodamas</i> Doyère, 1840	Common Map	5	21	10	1	37	Very Common
384	<i>Chersonesia risa risa</i> (Doubleday, 1848)	Common Maplet		9	5		14	Common
385	<i>Dichorragia nesimachus nesimachus</i> (Doyère, 1840)	Constable			4		4	Fairly Common
386	<i>Pseudergolis wedah wedah</i> (Kollar, 1844)	Tabby		13	11	1	25	Very Common
387	<i>Stibochiona nicea nicea</i> (Gray, 1846)	Popinjay		19	30	3	52	Very Common
viii.	Subfamily Bibiliinae							
388	<i>Ariadne ariadne</i> (Linnaeus, 1763)	Angled Castor	1				1	Uncommon
389	<i>Ariadne merione tapestrina</i> (Moore, 1884)	Common Castor	94	5	5		104	Very Common
ix.	Subfamily Apaturinae							
390	<i>Mimathyma ambica ambica</i> Kollar, 1844	Indian Purple Emperor	1	5	7	5	18	Very Common
391	<i>Euripus nyctelius nyctelius</i> (Doubleday, 1845)	Courtesan		4	3		7	Common
392	<i>Hestinalis nama nama</i> (Doubleday, 1844)	Circe		10	16	9	35	Very Common
393	<i>Sasakia funebris funebris</i> Leech, 1891	Empress (IWPA Sch I Part IV)		1			1	Uncommon
394	<i>Rohana parisatis parisatis</i> (Westwood, 1850)	Black Prince	5	28	4	5	42	Very Common

	Scientific Name	Common name	2B/C1(a) Assam Plains Semi- Evergreen Forests (A)	2B/1S1 Sub- Himalayan Light Alluvial Semi- Evergreen Forests (B)	2B/2S2 Eastern Alluvial Secondary Semi- Evergreen Forests (C)	3/1S2(b) Terminalia- Duabanga (D)	Total Individuals recorded (A+B+C+D)	# Relative Abundance Status
395	<i>Rohana parvata parvata</i> (Moore, 1857)	Brown Prince		1			1	Uncommon
396	<i>Chitoria sordida sordida</i> Moore, 1865	Sordid Emperor(IWPA Sch II Part II)				1	1	Uncommon
397	<i>Sephisa chandra chandra</i> (Moore, 1857)	Eastern Courtier(IWPA Sch I Part IV)			4		4	Fairly Common
x.	Subfamily Nymphalinae							
398	<i>Aglais caschmirensis aesis</i> (Fruhstorfer, 1912)	Indian Tortoiseshell	2				2	Common
399	<i>Junonia almana almana</i> (Linnaeus, 1758)	Peacock Pansy	2				2	Common
400	<i>Junonia atlites atlites</i> (Linnaeus, 1763)	Grey Pansy	10	11	7		28	Very Common
401	<i>Junonia hierta hierta</i> (Fabricius, 1798)	Yellow Pansy	1				1	Uncommon
402	<i>Junonia iphita iphita</i> (Cramer, 1779)	Chocolate Pansy	17	16	11	5	49	Very Common
403	<i>Junonia lemonias</i> (Linnaeus, 1758)	Lemon Pansy	21		1		22	Very Common
404	<i>Junonia orithya</i> Linnaeus, 1758	Blue Pansy	1	4	1		6	Common
405	<i>Kaniska canace canace</i> (Linnaeus, 1763)	Blue Admiral	1			1	2	Common
406	<i>Vanessa cardui</i> (Linnaeus, 1758)	Painted Lady		1	1		2	Common
407	<i>Vanessa indica indica</i> (Herbst, 1794)	Indian Red Admiral	4	15	8		27	Very Common
408	<i>Symbrenthia lilaea khasiana</i> Moore, 1874	Common Jester	17	47	35	19	118	Very Common
409	<i>Symbrenthia niphanda niphanda</i> Moore, 1872	Blue-tail Jester		1	1	1	3	Fairly Common
410	<i>Symbrenthia hypselis cotanda</i> Moore, 1874	Himalayan Spotted Jester	1	2	1		4	Fairly Common
411	<i>Hypolimnas bolina jacintha</i> (Drury, 1773)	Great Eggfly		12	1		13	Common
412	<i>Doleschallia bisaltide indica</i> Moore, 1899	Autumn Leaf	2	1			3	Fairly Common
413	<i>Kallima inachus inachus</i> (Doyère, 1840)	Orange Oakleaf	1	14	7	7	29	Very Common
414	<i>Kallima knyvettii</i> de Nicéville, 1886	Scarce Blue Oakleaf(IWPA Sch II Part II)			1		1	Uncommon
415	<i>Rhinopalpa polynice birmana</i> Fruhstorfer, 1897	Wizard(IWPA Sch II Part II)		37	5		42	Very Common
Species identified later and not included in analysis								
416	<i>Limenitis rileyi</i> Tytler, 1940	Tiger-mimic Admiral		1			1	Uncommon

*IWPA= Indian Wildlife (Protection) Act, 1972 for species protected by Law; #Relative Abundance Status: Based on the quartile divisions of their relative abundances, 415 taxa were ranked as Uncommon = Q1= 1 (minimum abundance); Fairly Common = Q2 = 2-4; Common = Q3= 5-14 and Very Common = Q4 = 15- 238 (maximum abundance) with median value = 4.



**OPEN ACCESS**

The Journal of Threatened Taxa is dedicated to building evidence for conservation globally by publishing peer-reviewed articles online every month at a reasonably rapid rate at www.threatenedtaxa.org. All articles published in JoTT are registered under [Creative Commons Attribution 4.0 International License](https://creativecommons.org/licenses/by/4.0/) unless otherwise mentioned. JoTT allows unrestricted use of articles in any medium, reproduction, and distribution by providing adequate credit to the authors and the source of publication.

ISSN 0974-7907 (Online); ISSN 0974-7893 (Print)

April 2017 | Vol. 9 | No. 4 | Pages: 10021–10140

Date of Publication: 26 April 2017 (Online & Print)

DOI: 10.11609/jott.2017.9.4.10021-10140

www.threatenedtaxa.org

Articles

Distribution and population status assessment of the endemic grass-like palm *Butia marmorii* (Arecaceae) in Paraguay

-- Irene Gauto, Fernando Palacios, Pamela Marchi, Nelson Silva & Gloria Céspedes, Pp. 10021–10034

Conservation of the Southern River Terrapin *Batagur affinis* (Reptilia: Testudines: Geoemydidae) in Malaysia: a case study involving local community participation

-- Pelf Nyok Chen, Pp. 10035–10046

Butterflies associated with major forest types in Arunachal Pradesh (eastern Himalaya), India: implications for ecotourism and conservation planning

-- Arun P. Singh, Pp. 10047–10075

Communication

Traditional home garden agroforestry systems: habitat for conservation of Baya Weaver *Ploceus philippinus* (Passeriformes: Ploceidae) in Assam, India

-- Yashmita-Ulman, Awadhesh Kumar & Madhubala Sharma, Pp. 10076–10083

Peer Commentary

Livestock and wild herbivores in the western Himalaya: competition or co-existence?

-- Zarreen Syed & Mohd Shahnawaz Khan, Pp. 10084–10088

Short Communications

Conservation status assessment and new population record of the threatened Golden Himalayan Spike

***Phlomooides superba* (Royle ex Benth.) Kamelin & Makhm. from Jammu & Kashmir, India**

-- Amber Srivastava, Yash Pal Sharma, O.P. Sharma Vidyarthi & Sunil Kumar Srivastava, Pp. 10089–10095

Host specificity of some wood-decaying fungi in moist deciduous forests of Kerala, India

-- A. Muhammed Iqbal, Kattany Vidyasagaran & Narayan Ganesh, Pp. 10096–10101

New records of social wasps (Hymenoptera: Vespinae: *Vespa* and *Provespa*) from Bhutan

-- Phurpa Dorji, Thinley Gyeltshen, Wim Klein & Tshering Nidup, Pp. 10102–10108

Butterfly diversity (Lepidoptera: Rhopalocera) associated with nectar feeding on *Ziziphus mauritiana* Lamarck (Rosales: Rhamnaceae) flowers in Chuadanga, Bangladesh

-- Tahsinur Rahman Shihan, Pp. 10109–10114

First record of a Wrinkle-lipped Free-tailed Bat

***Chaerephon plicatus* Buchannan, 1800 (Mammalia: Chiroptera: Molossidae) colony in Sri Lanka, with notes on echolocation calls and taxonomy**

-- Tharaka Kusuminda & Wipula B. Yapa, Pp. 10115–10120

Density and obligatory feeding habits of an isolated Golden Jackal *Canis aureus* L. (Mammalia: Carnivora: Canidae) population in Pirotan Island, Gulf of Kachchh, India

-- Kamaraj Ramkumaran, Rethnaraj Chandran, Chowdula Satyanarayana, Kailash Chandra & Tikadar Shyamal, Pp. 10121–10124

Notes

The seasonal occurrence of the Whale Shark *Rhincodon typus* (Smith, 1828) (Orectolobiformes: Rhincodontidae) along the Odisha coast, India

-- Shesdev Patro, Biraja Kumar Sahu, Chandanlal Parida, Madhusmita Dash & K.C. Sahu, Pp. 10125–10129

A new record of Gunther's Waspfish *Snyderina guentheri* (Boulenger, 1889) (Scorpaeniformes: Tetrarogidae) from Visakhapatnam, India

-- Muddula Krishna Naranji & Sujatha Kandula, Pp. 10130–10132

First record of *Neojurtina typica* from India (Hemiptera: Heteroptera: Pentatomidae)

-- S. Salini, Pp. 10133–10137

***Xenomerus orientalis* Walker (Hymenoptera: Platygasteridae): a new distribution record for India**

-- Kalmesh Managanvi, A.K. Karnatak & M.A. Khan, Pp. 10138–10140