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COMMUNICATION

AN INSIGHT INTO THE BUTTERFLY (LEPIDOPTERA) DIVERSITY OF AN URBAN LANDSCAPE: GUWAHATI, ASSAM, INDIA

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An insight into the butterfly (Lepidoptera) diversity of an urban landscape: Guwahati, Assam, India

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Abstract: The paper deals with the butterfly diversity of Guwahati, Assam, India which was the result of a survey conducted from April 2016 to July 2020. During the study period we recorded 249 species of butterflies belonging to six families namely Papilionidae (24 species), Pieridae (23 species), Lycaenidae (57 species), Riodinidae (two species), Nymphalidae (97 species), and Hesperiidae (46 species). Twenty-eight species were recorded from commercial areas, 74 species from residential areas, and 248 species from forested areas. Nineteen species were found to be very common, 39 species common, 50 species fairly common, 53 species uncommon, 57 species rare, and 31 species very rare. Twenty-four species and nine subspecies including Discophora sondiaca, Athyma selenophora, and Athyma kanwa phorkys are legally protected under different schedules as per the Indian Wildlife Protection Act (1972).

Keywords: Hesperiidae, Lycaenidae, Nymphalidae, Papilionidae, Pieridae, Riodinidae.
INTRODUCTION

Guwahati (26.1859°N & 91.7477°E) is the capital city of the state of Assam having a population of around 9.6 lacs with a population density of 4,370 per sq.km with a total area of 216.79km². Guwahati is the largest metropolis of northeastern India and is also the business capital of the region. The city is ecologically very important as it enjoys being a part of the Indo-Burma global biodiversity hotspot. It has a tropical monsoon climate and receives approximately 1,600mm of rainfall annually, with an average annual temperature of 23°C. Due to rapid urbanisation, there is a continuous loss of forest cover with a rapid loss of 160.34ha/year between 2010 and 2015 (Yadav & Barua 2016) (Figure 1). Most of the forest patches are of moist deciduous type (Purkayastha 2012, 2015). The pattern of habitat mostly present in and around the city includes forest patches, scrublands, grasslands, secondary plantations, wetlands, agricultural lands, and human habitations. The city is surrounded by eighteen hill ranges including eight reserve forests (South Kalapahar RF, Fatasil RF, Jalukbari RF, Gotanagar RF, Hengrabari RF, Sarnai Hill RF, Garbhanga RF, Rani RF) and two wildlife sanctuaries (Deeporbeel WS and Amchang WS). The Deeporbeel WS is also an internationally acclaimed wetland and has been declared as a RAMSAR site in 2002. The mighty Brahmaputra River flows through the heart of the city for about 25km eventually dividing it into northern and southern areas (Devi & Bhattacharyya 2015). Apart from butterflies, 26 species of amphibians, 57 species of reptiles, 214 species of birds, and 36 species of mammals have been recorded from the city (Purkayastha 2018).

Some of the recent work on butterflies of Assam were based on protected areas (Karthikeyan & Venkatesh 2011; Gogoi 2013a, b, 2015; Neog 2015; Singh 2015, 2017; Singh et al. 2015). In this paper we want to extend the available knowledge on the butterflies of the region by presenting, for the first time, a publication on the butterflies of Guwahati city of Assam, India.

MATERIALS AND METHODS

Extensive field surveys were carried out throughout all the seasons from April 2016 to July 2019 in different landscapes in and around Guwahati (Figure 1). The field study was conducted mostly during early mornings from 06.30h till 12.00h and occasionally during late afternoons till dusk from 16.30h till 17.30h. Thus, a total of five man hours was invested per survey during the study period which also includes investigating the residential localities. Pollard walk methodology (Pollard 1982) was done to spot the butterflies by walking on the trails as much as possible (3–10 trails) in the forested regions, the focus was mostly confined to the tracks/trails surrounded by flowering plants, bushes, plantations and trees present in and around the loose soils, mud, rocks and stones very close to streams such that the butterflies could be observed feeding on nectar, basking and mud-puddling respectively. The specimens were observed, photographed and identified using field literature (Evans 1932; Wynter-Blyth 1957; Kehimkar 2008; Kunte et al. 2020). Depending upon the abundance of the individuals spotted throughout the survey, the species were categorised as Very Common: 25 or more individuals recorded, Common: 15–25 individuals recorded, Fairly Common: 11–15 individuals recorded, Uncommon: 6–10 individuals recorded, Rare: 3–5 individuals recorded, Very Rare: less than three individuals recorded (Table no. 1). The following localities were selected for surveying purposes:

Commercial Areas (CA): Panbazar (26.1859°N & 91.7477°E), Fancy Bazar (26.1830°N & 91.7429°E), and Christian Basti (26.1552°N & 91.78°E).

Residential Areas (RA): Lachitnagar (26.1695°N & 91.7563°E), Lokhra (26.1106°N & 91.7465°E), Kala Pahar (26.1519°N & 91.7465°E), Bhangagarh (26.1620°N & 91.7672°E), Maligaon (26.1556°N & 91.6906°E), Hatigaon (26.1278°N & 91.7855°E), Kamakhya (26.1642°N & 91.7076°E), Rehbari (26.1733°N & 91.7471°E), Barshapara (26.1417°N & 91.7380°E), and Silpukhuri (26.1835°N & 91.7605°E).

Forested Areas (FA): Amchang Wildlife Sanctuary (26.1891°N & 91.8464°E), Hengrabari Reserve Forest (26.1618°N & 91.7843°E), Geetanagar (26.1750°N & 91.7952°E), Jalukbari Reserve Forest (26.1441°N & 91.6614°E), Deeporbeel Wildlife Sanctuary (26.13055N & 91.6591E), Rani-Garbhanga Reserve Forest (26.0419°N & 91.7056°E), Narakashur Hills (26.1499°N & 91.7643°E), Birubari Hills (26.1527°N & 91.7619°E), Khanapara Reserve Forest (26.1253°N & 91.8389°E), and Sarania Reserve Forest (26.1769°N & 91.7599°E). The classification of the commercial and residential areas was done as per Guwahati Municipal Corporation (GMC) regulations and forest reserves are considered under forest areas.
RESULTS AND DISCUSSION

During the survey period, a total of 249 species of butterflies were recorded from in and around the city belonging to six different families namely Papilionidae, Pieridae, Lycaenidae, Nymphalidae, Riodinidae, and Hesperiidae (Table 1, Image 1–100).

Account of each family from the study site

Papilionidae: A total of 24 species in this family were recorded. Among these, only one species namely the Papilio castor has legal protection and had been listed as Schedule I of the Indian Wildlife Protection Act, 1972 (IWPA) and the rest were non-scheduled species. Papilio polytes was found to be ‘Very Common’ as it was the most encountered species in a variety of habitats (commercial residential and forested areas. Lamproptera curius and Graphium agetes were found to be ‘Very rare’ as they were spotted only twice in and around the forested regions (Amchang WS and Rani Reserve Forest) throughout the field study.

Pieridae: A total of 23 species in this family were documented during the survey and the subspecies Appias albina darada (Table 1) is legally protected as Schedule I under IWPA. Most of the species of this family were observed in and around forests and residential localities (Table 1).

Lycaenidae: For this family, 57 species have been recorded from which seven species (Anthene lycaenina, Bindahara phoides, Horaga onyx, Lampides boeticus, Poritia hewitsoni, Spindasis lohita, Suasa lisides) and four subspecies (Euchrysops cnejus cnejus, Prosotas aluta coelestis, Arhopala fulla ignara, and Jamides pura pura) (Table 1) are protected under Schedule II of the IWPA (Table 1) while the others are non-scheduled. Most of the species of this family were recorded from in and around the forest patches. During the study period, a mating pair of the Pea blue Lampides boeticus was observed late in the afternoon during April 2018 at Nilachal Hills.

Riodinidae: Only two members of this family have been recorded in the study area, namely Zemeros flegyas which was the most encountered species of this family, Abisara echerius was recorded only once during the survey from the Garbhanga-Rani reserve forest. (Table 1).

Nymphalidae: Nymphalidae comprises the most diverse group of butterflies representing 97 species recorded in and around the city, some of which are legally protected under IWPA, 1972 which includes one species listed in Schedule I, 11 species listed in Schedule II, two species listed in Schedule IV (Table 1), subspecies Euripus nyctelius nycteliu, Euploea midamus rogenhoferi, and Athyma kanwa phorkys (Table 1) are listed in Schedule II of the IWPA while the others are non-scheduled. Some of the members of this family...
### Table 1. Checklist of butterflies of Guwahati, Assam, India.

| Scientific name | Common name | Local status | CA | RA | FA | IWPA |
|-----------------|-------------|--------------|----|----|----|------|
| **Family: Papilionidae** | | | | | | |
| 1 | Atrophaneura varuna White, 1842 | Common Batwing | Uncommon | + | + | |
| 2 | Byasa polyeuctes Doubleday, 1842 | Common Windmill | Uncommon | + | | |
| 3 | Graphium agamemnon Linnaeus, 1758 | Tailed Jay | Common | + | + | + |
| 4 | Graphium agestes Westwood, 1843 | Four-bar Swordtail | Very rare | | | + |
| 5 | Graphium antiphates Cramer, 1775 | Five-bar Swordtail | Rare | | | |
| 6 | Graphium cloanthus Westwood, 1841 | Glassy Bluebottle | Uncommon | + | | |
| 7 | Graphium dason C. & R. Felder, 1864 | Common Jay | Common | + | + | + |
| 8 | Graphium macareus Godart, 1819 | Lesser Zebra | Rare | | | + |
| 9 | Graphium sarpedon Linnaeus, 1758 | Common Bluebottle | Common | + | + | + |
| 10 | Lamp respectful curius Fabricius, 1787 | White Dragontail | Very rare | | | + |
| 11 | Pachliopta aristolochiae Fabricius, 1775 | Common Rose | Fairly common | | | + |
| 12 | Papilio castor Westwood, 1842 | Common Raven | Uncommon | | | + |
| 13 | Papilio clyta Linnaeus, 1758 | Common Mime | Fairly common | + | + | Schedule I |
| 14 | Papilio eurylypus Linnaeus, 1758 | Great Jay | Rare | | | + |
| 15 | Papilio demoleus Linnaeus, 1758 | Lime Butterfly | Common | + | + | + |
| 16 | Papilio helena Linnaeus, 1758 | Red Helen | Common | | | + |
| 17 | Papilio memnon Linnaeus, 1758 | Great Mormon | Fairly common | + | | |
| 18 | Papilio nepheus Boisduval, 1836 | Yellow Helen | Fairly common | | | + |
| 19 | Papilio paris Linnaeus, 1758 | Paris Peacock | Rare | | | + |
| 20 | Papilio polytes Linnaeus, 1758 | Common Mormon | Very common | + | + | + |
| 21 | Papilio proteror Cramer, 1775 | Spangle | Rare | | | + |
| 22 | Troides aeacus C. & R. Felder, 1860 | Golden Birdwing | Fairly common | | | + |
| 23 | Troides helena Linnaeus, 1758 | Common Birdwing | Rare | | | + |
| 24 | Byasa dasarada Moore, 1858 | Great Windmill | Very Rare | | | + |
| **Family: Pieridae** | | | | | | |
| 25 | Appias albinia Boisduval, 1836 | Common Albatross | Fairly common | + | | Schedule II |
| 26 | Appias indra Moore, 1858 | Plain Puffin | Rare | | | + |
| 27 | Appias lalage Doubleday, 1842 | Spot Puffin | Rare | | | + |
| 28 | Appias lyncida Cramer, 1777 | Chocolate Albatross | Uncommon | | | + |
| 29 | Appias olferna Swinhoe, 1890 | Striped Albatross | Fairly common | + | | + |
| 30 | Catopsilia pomona Fabricius, 1775 | Common Emigrant | Common | + | + | + |
| 31 | Catopsilia pyranthe (Linnaeus, 1758) | Mottled Emigrant | Fairly common | | | + |
| 32 | Cepora nadina Lucas, 1852 | Lesser Gull | Uncommon | | | + |
| 33 | Cepora nerissa Fabricius, 1775 | Common Gull | Uncommon | | | + |
| 34 | Delias descombesi Boisduval, 1836 | Red spot Jezebel | Fairly common | + | + | + |
| 35 | Delias pasthio Linnaeus, 1767 | Red base Jezebel | Uncommon | + | + | + |
| 36 | Dersas verhueli Hoeven, 1839 | Tailed Sulpher | Rare | | | + |
| 37 | Eurema anderssoii Moore, 1886 | One-spot Grass Yellow | Fairly common | | | + |
| 38 | Eurema blanda Boisduval, 1836 | Three-spot Grass Yellow | Common | + | + | + |
| 39 | Eurema brigitta Stoll, 1780 | Small Grass Yellow | Common | | | + |
| 40 | Eurema hecabe Linnaeus, 1758 | Common Grass Yellow | Common | + | + | + |
| 41 | Gandaca harina Honfield, 1829 | Tree Yellow | Uncommon | | | + |
| 42 | Hebomoia glaucipppe Linnaeus, 1758 | Great Orange Tip | Rare | | | + |
| Scientific name | Common name | Local status | CA | RA | FA | IWPA |
|-----------------|-------------|--------------|----|----|----|------|
| 43 | Ixias pyrene Linnaeus, 1764 | Yellow Orange Tip | Rare | + | + | |
| 44 | Leptasia nina Fabricius, 1793 | Psyche | Very common | + | + | + |
| 45 | Pareronia hippia Fabricius, 1787 | Common Wanderer | Fairly common | + | |
| 46 | Pieris brassicae Linnaeus, 1758 | Large Cabbage White | Uncommon | + | |
| 47 | Pieris canidia Linnaeus, 1768 | Indian Cabbage White | Very common | + | + | + |
| **Family:** Lycaenidae | | | | | | |
| 48 | Acetolepis puspa Horsfield, 1828 | Common Hedge Blue | Common | + | + | + |
| 49 | Anthene emolus Godart, 1824 | Common Ciliate Blue | Common | + | |
| 50 | Anthene lycaenina Felder, 1868 | Pointed Ciliate Blue | Uncommon | + | |
| 51 | Arhopala atrax Hewitson, 1862 | Indian Oakblue | Rare | + | |
| 52 | Arhopala camdeo Moore, 1858 | Lilac Oakblue | Uncommon | + | |
| 53 | Arhopala centaurus Fabricius, 1775 | Centaur Oakblue | Rare | + | |
| 54 | Arhopala eumolphus Cramer, 1780 | Green Oakblue | Very rare | + | |
| 55 | Arhopala fullo Hewitson, 1862 | Spotless Oakblue | Rare | + | Schedule II |
| 56 | Arhopala perimuta Moore, 1858 | Yellowdisc Tailless Oakblue | Very rare | + | |
| 57 | Bindahara phocides Fabricius, 1793 | Plane | Rare | + | Schedule II |
| 58 | Coleta decidia Hewitson, 1876 | Angled Pierrot | Uncommon | + | |
| 59 | Coleta elna Hewitson, 1876 | Elbowed Pierrot | Rare | + | |
| 60 | Castalius rosimon Fabricius, 1775 | Common Pierrot | Very common | + | + | + |
| 61 | Catopsiplus major Druce, 1895 | Common Tinsel | Rare | + | |
| 62 | Catochrysops panormus C. Felder, 1860 | Silver Forget-me-not | Uncommon | + | |
| 63 | Catochrysops strabo Fabricius, 1793 | Forget-me-not | Fairly common | + | |
| 64 | Chenitra freja Fabricius, 1793 | Common Imperial | Uncommon | + | |
| 65 | Chilades lajus Stoll, 1780 | Lime Blue | Common | + | + | + |
| 66 | Chilades pandava Horsfield, 1829 | Plains Cupid | Fairly common | + | + | |
| 67 | Creon cleobis Godart, 1824 | Broad Tail Royal | Very rare | + | |
| 68 | Curetis acuta Moore, 1877 | Angled Sunbeam | Uncommon | + | |
| 69 | Curetis saronis Moore, 1877 | Saronis Sunbeam | Rare | + | |
| 70 | Deudorix epinarbas Moore, 1858 | Cornelian | Very rare | + | |
| 71 | Discolampa ethion Westwood, 1851 | Banded Blue Pierrot | Rare | + | |
| 72 | Euchrysops cnejus Fabricius, 1798 | Gram Blue | Fairly common | + | + | Schedule II |
| 73 | Heliophorus epicles Godart, 1824 | Purple Sapphire | Fairly common | + | + | |
| 74 | Horaga onyx Moore, 1857 | Common Onyx | Uncommon | + | Schedule II |
| 75 | Hypolycaena erulys Godart, 1824 | Common Tit | Common | + | |
| 76 | Iraota timoleon Stoll, 1790 | Silver Streak Blue | Rare | + | |
| 77 | Jamides alecto C. Felder, 1860 | Metallic Cerulean | Common | + | |
| 78 | Jamides bochus Stoll, 1782 | Dark Cerulean | Common | + | |
| 79 | Jamides celeno Cramer, 1775 | Common Cerulean | Common | + | + | |
| 80 | Jamides elpis Godart, 1824 | Glistening Cerulean | Common | + | + | |
| 81 | Jamides pura Moore, 1886 | White Cerulean | Rare | + | Schedule II |
| 82 | Lampides boeticus Linnaeus, 1767 | Peablu | Common | + | + | Schedule II |
| 83 | Loxura atymnus Stoll, 1780 | Yamfly | Uncommon | + | |
| 84 | Megista malaya Horsfield, 1828 | Malayan | Fairly common | + | |
| 85 | Miletus chinensis C. Felder, 1862 | Common Mottle | Uncommon | + | |
| 86 | Neopithecos zalmore Butler, 1870 | Common Quaker | Common | + | + | |

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| Scientific name | Common name | Local status | CA | RA | FA | IWPA |
|-----------------|-------------|--------------|----|----|----|------|
| 87              | Poritia Hewitsoni Moore, 1866 | Common Gem | Rare | + |    | Schedule II |
| 88              | Prosotas aluta Druce, 1873 | Banded Lineblue | Very rare | + |    | Schedule II |
| 89              | Prosatas dubiosa (Semper, [1879]) | Tailless Lineblue | Fairly common | + |    |    |
| 90              | Prosotas nora (C. Felder, 1860) | Common Lineblue | Fairly common | + |    |    |
| 91              | Pseudozizeeria maha Kollar, 1844 | Pale Grass Blue | Very common | + | + | +   |
| 92              | Rapala iarbés Fabricius, 1787 | Common Red Flash | Uncommon | + |    |    |
| 93              | Rapala mones Hewitson, 1863 | State Flash | Uncommon | + |    |    |
| 94              | Rapala pheretima Hewitson, 1863 | Copper Flash | Fairly common | + |    |    |
| 95              | Remelana jangala (Horsfield, [1829]) | Chocolate Royal | Uncommon | + |    |    |
| 96              | Spalgis epius Westwood, 1851 | Apefly | Fairly common | + | + |    |
| 97              | Spindasis lohita Horsfield, 1829 | Long Banded Silverline | Rare | + |    | Schedule II |
| 98              | Suasa lisides Hewitson, 1863 | Red Imperial | Very rare | + |    | Schedule II |
| 99              | Surentra quercetorum Moore, 1858 | Common Acacia Blue | Fairly common | + | + |    |
| 100             | Leptotes plinius Fabricius, 1793 | Zebra Blue | Common | + | + | +   |
| 101             | Taraka hamada Druce, 1875 | Forest Pierrot | Rare | + |    |    |
| 102             | Virachola isocrates Fabricius, 1793 | Common Guava Blue | Fairly common | + |    |    |
| 103             | Zeltus amass Hewitson, 1865 | Fluffy Tit | Fairly common | + |    |    |
| 104             | Zizeeria karsandra Moore, 1865 | Dark Grass Blue | Common | + | + | +   |
| **Family: Riodinidae** | | | | | | |
| 105             | Abisara echerius Stoll, 1790 | Plum Judy | Uncommon | + |    |    |
| 106             | Zemeros flegyas Cramer, 1780 | Punchinello | Very common | + | + |    |
| **Family: Nymphalidae** | | | | | | |
| 107             | Acraea isasia Hübner, 1818 | Yellow Coster | Uncommon | + | + |    |
| 108             | Acraea terpsicore Linnaeus, 1758 | Tawny Coster | Fairly common | + | + |    |
| 109             | Ariadne ariadne Linnaeus, 1763 | Angled Castor | Common | + |    |    |
| 110             | Ariadne merione Cramer, 1777 | Common Castor | Fairly common | + | + |    |
| 111             | Athyma inara Westwood, 1850 | Colour Sergeant | Fairly common | + | + |    |
| 112             | Athyma kanwa Moore, 1858 | Dot Dash Sergeant | Very rare | + |    | Schedule II |
| 113             | Athyma perius Linnaeus, 1758 | Common Sergeant | Common | + | + |    |
| 114             | Athyma ranga Moore, 1857 | Blackvein Sergeant | Rare | + |    | Schedule II |
| 115             | Athyma selenophora Kollar, 1844 | Staff Sergeant | Rare | + |    |    |
| 116             | Ausokia donava Moore, 1857 | Commodore | Rare | + |    | Schedule II |
| 117             | Cethosia biblis Drury, 1770 | Red Lacewing | Uncommon | + |    |    |
| 118             | Cethosia cyane Drury, 1770 | Leopard Lacewing | Uncommon | + |    |    |
| 119             | Charaxes arja Felder & Felder, 1866 | Pallid Nawab | Very rare | + |    |    |
| 120             | Charaxes bernardes Fabricius, 1793 | Tawny Rajah | Uncommon | + |    |    |
| 121             | Charaxes bharata Felder & Felder, 1867 | Common Nawab | Common | + | + |    |
| 122             | Charaxes dolon Westwood, 1848 | Stately Nawab | Very rare | + |    | Schedule II |
| 123             | Charaxes kahruba Moore, 1895 | Variegated Rajah | Rare | + |    | Schedule II |
| 124             | Charaxes marmax Westwood, 1847 | Yellow Rajah | Uncommon | + |    | Schedule II |
| 125             | Charaxes solon Fabricius, 1793 | Black Rajah | Uncommon | + |    |    |
| 126             | Chersonesia rahnoides Martin, 1895 | Indian Red Maplet | Uncommon | + |    | Schedule II |
| 127             | Chersonesia risa Doubleday, 1848 | Common Maplet | Fairly common | + |    |    |
| 128             | Cirrochroa aoris Doubleday, 1847 | Large Yeoman | Fairly common | + |    |    |
| 129             | Cirrochroa tyche Felder & Felder, 1861 | Common Yeoman | Uncommon | + |    |    |
| Scientific name                          | Common name                  | Local status | CA | RA | FA | IWPA |
|-----------------------------------------|------------------------------|--------------|----|----|----|------|
| Cupha erymanthis                        | Drury, 1773                  | Rustic       | Rare |    |    |      |
| Cyrestis thyodamas                      | Doyère, 1840                 | Common Map   | Rare | +  | +  |      |
| Danaus chrysippus                       | Linnaeus, 1758               | Plain Tiger  | Very common | + | + | + |
| Danaus genutia                          | Cramer, 1779                 | Common Tiger | Common | + | + | + |
| Dichorragia nesimachus                  | Doyère, 1840                 | Constable    | Very rare |    |    | +   |
| Discophora sondiaca                     | Boisduval, 1836              | Common Duffer| Fairly common | + | + | + Schedule I |
| Deleschallia bisadifide                 | Cramer, 1777                 | Autumn Leaf  | Very rare |    |    | +   |
| Elymnias hypermnestra                   | Linnaeus, 1763               | Common Palmfly| Very common | + | + | + |
| Elymnias maeflos                        | Hewitson, 1863               | Spotted Palmfly| Rare |    |    | +   |
| Elymnias patna                          | Westwood, 1851               | Blue striped Palmfly| Rare |    |    | +   |
| Elymnias anopsia                        | Moore, 1858                  | Grey Baron   | Rare | +  | +  | Schedule II |
| Elymnias lubentina                      | Fabricius, 1787              | Powdered Baron| Rare |    |    | +   |
| Elymnias phemius                        | Doubleday, 1848              | White-edged Blue Baron| Very rare |    |    | +   |
| Euploea algea                           | Godart, 1819                 | Long Branded Blue Crow| Uncommon |    |    | +   |
| Euploea core                            | Cramer, 1780                 | Common Crow  | Very common | + | + | + |
| Euploea midamus                         | Linnaeus, 1758               | Blue Spotted Crow| Uncommon | +  |    | Schedule II |
| Euploea mulckiber                       | Cramer, 1777                 | Striped Blue Crow| Uncommon | +  |    | Schedule IV |
| Euploea syvlerster                      | Fabricius, 1793              | Double Branded Crow | Uncommon |    |    | +   |
| Euripus nectarilus                      | Doubleday, 1845              | Courtesan    | Very rare | +  |    | Schedule II |
| Euthalia aconthea                       | Cramer, 1777                 | Common Baron | Common |    | +  | +  |
| Euthalia anopsia                        | Moore, 1858                  | Gaudy Baron  | Rare | +  |    | Schedule IV |
| Euthalia rubentina                      | Cramer, 1777                 | Powdered Baron| Rare |    |    | +   |
| Euthalia phemius                        | Doubleday, 1848              | White-edged Blue Baron| Very rare |    |    | +   |
| Founis canens                           | Hübner, 1826                 | Common Faun  | Uncommon |    |    | +   |
| Herona marathus                         | Doubleday, 1848              | Pasha        | Very rare |    |    | +   |
| Hypolimnas balino                       | Linnaeus, 1758               | Great Eggfly | Fairly common |    |    | +   |
| Junonia almana                          | Linnaeus, 1758               | Peacock Pansy| Very common | + | + | + |
| Junonia atiltes                         | Linnaeus, 1763               | Grey Pansy   | Common | +  | +  | +   |
| Junonia hiroto                         | Fabricius, 1798              | Yellow Pansy | Fairly common |    |    | +   |
| Junonia phita                          | Cramer, 1779                 | Chocolate Pansy| Very common | + | + | + |
| Junonia lemonias                        | Linnaeus, 1758               | Lemon Pansy  | Very common | +  | +  | +   |
| Junonia orthya                          | Linnaeus, 1758               | Blue Pansy   | Fairly common |    |    | +   |
| Kallima inachus                         | Doyère, 1840                 | Orange Oakleaf| Very rare |    |    | +   |
| Kaniska canace                          | Linnaeus, 1763               | Blue Admiral | Uncommon |    |    | +   |
| Lebadea martha                          | Fabricius, 1873              | Knight       | Common |    |    | +   |
| Lethe chandica                          | Moore, 1857                  | Angled Red Forester| Fairly common |    |    | +   |
| Lethe confusa                           | Aurivillius, 1898            | Banded Treebrown| Fairly common |    |    | +   |
| Lethe europa                           | Fabricius, 1775              | Bamboo Treebrown| Common |    |    | +   |
| Lethe mokra                            | Moore, 1857                  | Common Red Forester| Fairly common |    |    | +   |
| Lethe rhoria                           | Fabricius, 1787              | Common Treebrown| Common |    | +  | + |
| Lexias dirtea                           | Fabricius, 1793              | Dark Archduke| Very rare | +  |    | Schedule II |
| Melanitis ledo                          | Linnaeus, 1758               | Common Evening Brown| Very common | + | + | + |
| Melanitis phedima                       | Cramer, 1780                 | Dark Evening Brown| Uncommon |    |    | +   |
| Melanitis zitenius                      | Herbst, 1796                 | Great Evening Brown| Very Rare |    |    | +   |
| Mimathyma ambica                        | Kollar, 1844                 | Purple Emperor| Rare |    |    | +   |
| Modusa procos                          | Cramer, 1777                 | Commander    | Uncommon |    |    | +   |
| Scientific name | Common name | Local status | CA | RA | FA | IWPA |
|-----------------|-------------|--------------|----|----|----|------|
| 175 Mycalesis anaxias Hewitson, 1862 | White-bar Bushbrown | Rare | + | | | Schedule II |
| 176 Mycalesis mineus Linnaeus, 1758 | Dark Brand Bushbrown | Fairly common | + | + | | |
| 177 Mycalesis perseus Fabricius, 1775 | Common Bushbrown | Very common | + | + | | |
| 178 Mycalesis visola Moore, 1857 | Long Brand Bushbrown | Uncommon | + | | | |
| 179 Neptis clinia Moore, 1872 | Sullied Sailor | Fairly common | + | | | |
| 180 Neptis hylas Linnaeus, 1758 | Common Sailor | Very common | + | + | + | |
| 181 Neptis nata Moore, 1857 | Clear Sailor | Uncommon | + | | | |
| 182 Neptis pseudovikasi Moore, 1899 | False Dingy Sailor | Rare | + | | | |
| 183 Orsotrioena medus Fabricius, 1775 | Nigger | Common | + | | | |
| 184 Pantoporia hordonia Stoll, 1790 | Common Lascar | Common | + | + | + | |
| 185 Parantica aglea Stoll, 1782 | Glassy Tiger | Fairly common | | + | | |
| 186 Parantica sita Kollar, 1844 | Chestnut Tiger | Rare | + | | | |
| 187 Parthenos sylvia Cramer, 1775 | Clipper | Rare | + | | Schedule II |
| 188 Phalanta alcippe Stoll, 1782 | Small Leopard | Fairly common | + | | Schedule II |
| 189 Phalanta phalantha Drury, 1773 | Common Leopard | Fairly common | + | | | |
| 190 Pseudergolis wedah Kollar, 1844 | Tabby | Uncommon | + | | | |
| 191 Rohana parisatsi Westwood, 1851 | Black Prince | Very rare | + | | | |
| 192 Stibochiona nicea (Gray, 1846) | Popinjay | Rare | + | | | |
| 193 Stichophthalma camadeva Westwood, 1848 | Northern Jungle Queen | Rare | + | | | |
| 194 Symbrenthia hypselis Godart, 1823 | Spotted Jester | Rare | + | | | |
| 195 Symbrenthia liliae Hewitson, 1864 | Common jester | Fairly common | + | + | | |
| 196 Tanacea julii Lesson, 1837 | Common Earl | Uncommon | + | | | |
| 197 Tanacea lepidea Butler, 1868 | Grey Count | Very common | + | + | Schedule II |
| 198 Thaumantis diore Stoll, 1845 | Jungle Glory | Rare | + | | | |
| 199 Vagrans egista Cramer, 1780 | Vagrant | Uncommon | + | | | |
| 200 Vanessa cardui Linnaeus, 1758 | Painted Lady | Uncommon | + | | | |
| 201 Vanessa indica Herbst, 1794 | Indian Red Admiral | Rare | + | + | | |
| 202 Ypthima baldus Fabricius, 1775 | Common Fivering | Very common | + | | | |
| 203 Ypthima hubenii Kirby, 1871 | Common Fivering | Very common | + | | | |

**Family: Hesperiidae**

| Scientific name | Common name | Local status | CA | RA | FA | IWPA |
|-----------------|-------------|--------------|----|----|----|------|
| 204 Ancistrooides nigrita Lateville, 1824 | Chocolate Demon | Common | + | | | |
| 205 Arnetta atkinsoni Moore, 1878 | Atkinson’s Bob | Rare | + | | | |
| 206 Astictopterus jama Felder & Felder, 1860 | Forest Hopper | Fairly common | + | + | | |
| 207 Baoris chapmani Evans, 1937 | Small Paint-brush Swift | Common | + | | | |
| 208 Baoris unicolor Moore, (1884) | Black Paint-brush Swift | Fairly common | + | | | |
| 209 Burara amara Moore, (1866) | Small Green Awlet | Rare | + | | | |
| 210 Burara arisa Moore, 1865 | Harisa Orange Awlet | Very rare | + | | | |
| 211 Burara edipoeae (Swainson, 1820) | Branded Orange Awlet | Very rare | + | | | |
| 212 Celaenorrhinus leucocera Kollar, 1844 | Common Spotted Flat | Fairly common | + | + | | |
| 213 Cephaelis acalle (Höpfner, 1874) | Plain Palm Dart | Uncommon | + | + | | |
| 214 Choaspes benjamini (Guérin-Méneville, 1843) | Indian Awking | Very rare | + | | | |
| 215 Cupitha purpurea Moore, 1877 | Wax Dart | Rare | + | | | |
| 216 Gerosis bhagava Moore, 1866 | Common Yellow-breast Flat | Rare | + | | | |
| 217 Gerosis phisura Moore, 1884 | Dusky Yellow-breasted Flat | Very Rare | + | + | | |
were found to be ‘Very Rare’ and were recorded only twice within the study period which includes *Melanitis zitenius*, *Charaxes arja*, *Athyma ranga*, *Rohana parisatis*, *Athyma kanwa*, *Stbchionia nivea*, *Kallima inachus*, *Dichorragia nesimachus*, *Thaumantis diorens*, *Lexias dirtea*, and *Herona marathus*.

**Hesperiidae:** During the study, 46 species of this family were recorded (Table 1) out of which only two of them namely *Pelopidas assamensis* and *Hyarotis adrastus* are legally protected (Schedule IV of IWPA) while the others are non-scheduled. Most of the members of this family were found in and around the forest patches including the *Scobura isota* recorded from the Hengrabari Reserve Forest. Other interesting findings include *Zographetus satwa*, *Aretta atkinsoni*, and *Burara jaina* from the Rani Reserve Forest, *Halpe aucma* and *Odontoptilum angulata* from the Amchang WS and a *Pelopidas assamensis* from Geetanagar area. From the Geetanagar area itself a mating pair of *Lambrix salsala* was also observed late in the afternoon during the month of March in 2018.

| Scientific name | Common name | Local status | CA | RA | FA | IWPA |
|-----------------|-------------|--------------|----|----|----|------|
| 218 Gerosis sinica C. & R. Felder, 1862 | White Yellow-breasted Flat | Very Rare | + | | | |
| 219 Halpe homolea aucma Swinhoe, 1893 | Gold-spotted Ace | Rare | | | | |
| 220 Halpe porus Mabille, 1877 | Moore’s Ace | Uncommon | | | + | |
| 221 Halpe zema (Hewitson, 1877) | Banded ace | Rare | | | | |
| 222 Hasora chromus (Cramer, [1780]) | Common Banded Awl | Very rare | + | | | |
| 223 Hyarotis adrastus Stoll, 1780 | Tree Flitter | Rare | + | Schedule IV | |
| 224 Koruthaialos butcheri de Nicéville, 1883 | Dark Velvet Bob | Uncommon | | | + | |
| 225 Lambrix salsala Moore, 1866 | Chestnut Bob | Common | + | | + | |
| 226 Matapa aria Moore, 1866 | Common Redeye | Fairly common | + | | + | |
| 227 Matapa sasivarna Moore, 1865 | Black Veined Redeye | Uncommon | + | | | |
| 228 Notocrypta curvifascia (C. & R. Felder, 1862) | Restricted Demon | Rare | | | | |
| 229 Notocrypta paralysos (Wood-Mason & de Nicéville, 1881) | Common Banded Demon | Common | + | | + | |
| 230 Ochus subvittatus Moore, 1878 | Tiger Hopper | Rare | | | + | |
| 231 Odontoptilum angulata C. Felder, 1862 | Chestnut Angle | Very rare | + | | | |
| 232 Oriens gola Moore, 1877 | Common Dartlet | Common | + | | | |
| 233 Parnara sp. | | Uncommon | + | | | |
| 234 Pelopidas assamensis de Nicéville, 1882 | Great Swift | Rare | + | Schedule IV | |
| 235 Pelopidas mathias (Fabricius, 1798) | Small Branded Swift | Very common | + | | + | |
| 236 Pelopidas subochracea (Moore, 1878) | Large Branded Swift | Uncommon | + | | + | |
| 237 Ponthanus sp. | | Fairly common | + | | | |
| 238 Pseudocoladenia don Fabricius, 1787 | Fulvous Pied Flat | Common | + | | | |
| 239 Sarangesa dasahara Moore, 1866 | Common Small Flat | Common | + | | + | |
| 240 Scobura isota Swinhoe, 1893 | Khasi Hills Bob | Very rare | + | | | |
| 241 Scobura phidotia (Hewitson, [1866]) | Malay Forest Bob | Very rare | + | | | |
| 242 Spialia golba Fabricius, 1793 | Indian Skipper | Fairly common | + | | | |
| 243 Suastus gremius (Fabricius, 1798) | Indian Palm Bob | Uncommon | + | | | |
| 244 Tagiades gana Moore, 1866 | Suffused Snow Flat | Fairly common | + | | + | |
| 245 Tagiades jepetus Stoll, 1781 | Common Snow Flat | Fairly common | + | | + | |
| 246 Tagiades litigiosa Möscher, 1878 | Water Snow Flat | Rare | + | | | |
| 247 Telicota colon (Fabricius, 1775) | Pale Palm Dart | Uncommon | + | | | |
| 248 Uldaspes folus Cramer, 1775 | Grass Demon | Fairly common | + | | + | |
| 249 Zographetus satwa de Nicéville, 1884 | Purple and Gold Flitter | Very rare | + | | | |

CA—Commercial Areas | RA—Residential Areas | FA—Forested Areas | IWPA—Indian Wildlife Protection Act.
Insight into the butterflies of Guwahati
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Image 1–50. Photographic collage of butterflies of Guwahati, Assam, India. Family: Papilionidae: 1—Troides aeacus | 2—Graphium agamemnon | 3—Graphium doson | 4—Papilio clytia | 5—Papilio demoleus | 6—Papilio polytes | 7—Papilio helenus | Family: Pieridae: 8—Appias olferna | 9—Catopsilia Pomona | 10—Delias descombesi | 11—Delias pasithoe | 12—Eurema blanda | 13—Leptosia nina | 14—Pieris canidia | Family: Lycaenidae: 15—Anthene emolus | 16—Caleta decidia | 17—Castalius rosimon | 18—Catochrysois strabo | 19—Cheritra freja | 20—Chilades pandava | 21—Discolampa ethion | 22—Heliophorus epicles | 23—Hypolycena erylus | 24—Iraota tinoleon | 25—Jamides bochus | 26—Jamides celena | 27—Lampides boeticus | 28—Loxura atymnus | 29—Neopithecops zalmora | 30—Prosotas dubiosa | 31—Prosotas noria | 32—Pseudozizeeria maha | 33—Rapala irabus | 34—Spandasis lohito | 35—Surenda quercetorum | 36—Leptotes pilinus | 37—Virachola isocrates | 38—Zeitns amasa | Family: Riodinidae: 39—Zemeros flegyas | Family: Nymphalidae: 40—Acraea terpsicore | 41—Athyma inara | 42—Athyma ranga | 43—Athyma selenophora | 44—Cethosia cyane | 45—Charaxes bernardes | 46—Charaxes bharata | 47—Charaxes solon | 48—Chersonesia rahioides | 49—Cyrestis thyodamas | 50—Danaus chrysippus | © Sanath Chandra Bohra.
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Image 51–100. Photographic collage of butterflies of Guwahati, Assam, India. Family: Nymphalidae: 51—Discophora sondiaca | 52—Elymnias hypermnestra | 53—Ethope himachala | 54—Euploea core | 55—Euploea mulciiber | 56—Euthalia aconthea | 57—Hypolimnas bolina | 58—Junonia almana | 59—Junonia atalanta | 60—Junonia iphita | 61—Junonia lemonias, 62—Lebadea Martha | 63—Lethe mekara | 64—Lexias dirtea | 65—Melanitis leda | 66—Melanitis zitenius | 67—Moduza Procris | 68—Mycalesis anaxias | 69—Neptis clinia | 70—Neptis hylas | 71—Neptis pseudovikasi | 72—Pantoporia hordonia | 73—Parantica aglea | 74—Rohana parisatis | 75—Stibochiona nicea | 76—Symbrenthia lilaee | 77—Tanaecia lepidea | 78—Vanessa indica | Family: Hesperiidae: 79—Arnetta atkinsoni | 80—Astictopterus jama | 81—Baoris unicolor | 82—Cepheus acalle | 83—Halpezena | 84—Karuthaialos butleri | 85—Matapa sasivarna | 86—Notocrypta curvifascia | 87—Notocrypta paralysos | 88—Oriens gola | 89—Pelopidas assamensis | 90—Pelopidas mathis | 91—Pseudocoladenia dan | 92—Sarangesa dasara | 93—Scobura isota | 94—Suastus gremius | 95—Tagiades gana | 96—Tagiades jepetus | 97—Tagiades litigiosa | 98—Telicota colon | 99—Udaspes folus | 100—Zographetus satwa | © Sanath Chandra Bohra.
Insight into the butterflies of Guwahati

Lack of public awareness: Most urban dwellers are totally unaware of the importance of butterflies in their ecosystem. An average urban dweller’s mindset has been calibrated as such that only larger mammals conservation concerns holds importance to him if at all.

Threats

The major threats perceived to the butterfly population in the study are:

- Habitat alteration: Due to development activities the prime habitat and host plants of butterflies are fast vanishing and are replaced by human settlements. Due to scarcity in living space within Guwahati, small kitchen gardens are being lost at a rapid pace which once harboured a sustainable population of butterflies. Again in urban landscape most of the roads are tarred or made of concrete making it hard for butterflies to seek nutrients from the mud (mud-puddling).

- Agriculture: As the city expands, it is eating into its peripheral agricultural land, which in-turn is eating into adjacent forest areas, a prime habitat for butterflies. To suffice need of ever rising population, the agricultural land are using fertilizers and pesticide more than ever before, creating a negative impact on butterfly population.

- Invasive species: Invasive species of both plant and animal are impacting butterfly population in a negative way. Plants like *Mimosa pudica* are competing with native plant species whereas introduced lizard species *Hemidactylus flaviviridis* are eating into butterfly and other insect population. Feral species of cats also hunt butterflies.

- Climate change: Urban areas are the prime generators of climate change and thus the effect of climate change are felt more in urban landscape. The ever increasing heat gradient along with urban heat island effect is presenting challenges to wide range of biodiversity including butterflies.

- Lack of public awareness: Most urban dwellers are totally unaware of the importance of butterflies in their ecosystem. An average urban dweller’s mindset has been calibrated as such that only larger mammals conservation concerns holds importance to him if at all.

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