
*Conserving butterflies will improve our whole environment for wildlife and enrich the lives of people now and in the future.*

*--- Butterfly Conservation, UK*

# BUTTERFLIES IN TSIRANG DISTRICT, BHUTAN AND THE NEED FOR CONSERVATION


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# AIM & OBJECTIVES

./ The present study was initiated by Department of Science, Mendrelgang Middle Secondary School in the year 2011.

./ Review of literatures reveals that study on lepidoptera fauna of Tsirang is not yet done so far. It is a need of time to carry out such kind of research work for this area.

./ The primary objectives of the study was;

- To inventories lepidoptera diversity of Mendrelgang (Tsirang) by extensive investigation.
- To prepare a checklist of lepidoptera fauna of Mendrelgang (Tsirang) to established a foundation for research on lepidoptera.
- To evaluate the threatened and endangered species of conservation importance.

./ The secondary objective of the study was;

- To educate the youths about the rich biodiversity in Bhutan.
- To instill values and importance of lepidoptera in our ecosystem to our youths.
- To instigation the foundation of research to youths.

# INTRODUCTION (LEPIDOPTERA)

- Lepidoptera is the second largest order and most fascinating group among the insects.
- The total no. of known species of lepidoptera makes up about 10% of animal kingdom. (*Srivastava, 2002*)
- Butterflies along with moths belong to the order Lepidoptera (lepido = scale; ptera = wings).
- 1,60,000 described species of lepidoptera (*Kriestensen & Skalski, 1999*)





# MAIN CHARACTERS OF ORDER

- **The scientific name of the order, Lepidoptera, is derived from one of their main characteristics, namely their having *wings* covered in tiny scales (from the Greek lepidos = scale and pteron = wing). Indeed, it is these coloured scales which give them their patterns. These scales are specially modified flattened hairs.**
- **The Lepidoptera undergo *complete metamorphosis*, i.e. *ova (egg)*, from which emerge *larvae (caterpillars)*, which become the quiescent *pupae (chrysalis)* from which emerge the *imago (winged adult)*. This lifecycle can take anywhere between a few weeks to more than a year, depending upon the species.**
- **Lepidoptera are 'typical' insects, in that they have 2 pair of wings, 3 pair of legs, 1 pair of antennae and a body divided into 3 sections - a head, thorax and abdomen. The leg and wings are attached to the thorax.**
- **In a few species of moths, the females have evolved to become wingless.**
- **Most butterflies and moths feed through a specialised tube formed by some of the *mouthparts*, known as a *proboscis*. Nectar is the usual food for adults.**

Source: http://www.amentsoc.org/insects/fact-files/orders/lepidoptera.html

## CONTINUED……

- **Sense organs on the feet can taste certain food substances with a greater sensitivity than the human tongue.**
- **The wings consist of an upper and lower membrane supported by a system of hollow *veins*.**
- **Most Lepidoptera larvae feed exclusively on plant matter, but a few are *carnivorous* for at least part of their life. Some species feed on a wide variety of plants, whilst others are willing to accept only one or two.**
- **The larvae moult several times, usually 4, 5 or 6 depending upon the species.**
- **The final moult reveals the pupa, which can be attached to part of the food plant or other nearby item, unattached amongst debris such as leaf litter, or in a silk lined chamber underground.**
- **Survival strategies of butterflies and their earlier stages include camouflage, toxic defence such as being distasteful/harmful or mimicking species that are distasteful/harmful.**

Source: http://www.amentsoc.org/insects/fact-files/orders/lepidoptera.html

# DIFFERENCES BETWEEN BUTTERFLY & MOTHS

## BUTTERFLY (RHOPALOCERA)

./ Active during the day (diurnal)

./ Bright colors

./ Wings rest together and upright

./ Straight and clubbed antennae

./ Thin body

## MOTH (HETEROCERA)

./ Active at night (nocturnal)

./ Dull colors

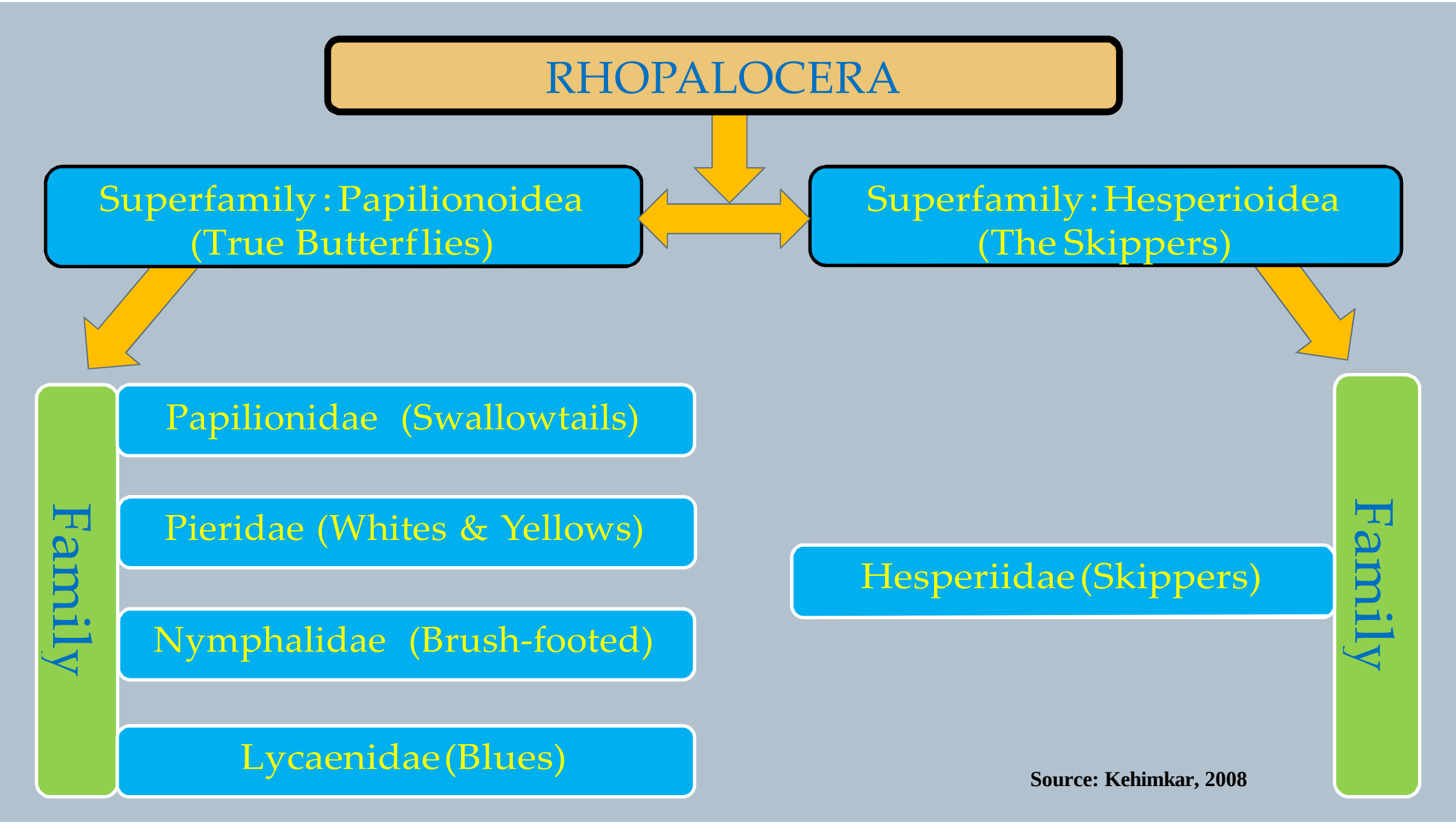
./ Wings rest at their sides

./ Feathered or pointed antennae

./ Thick body

# BUTTERFLY SYSTEMATICS

| Scientific classification | |
|---|---|
| Kingdom: | Animalia |
| Phylum: | Arthropoda |
| Class: | Insecta |
| Order: | Lepidoptera |
| Sub Order: | Rhopalocera |




**Source: Kehimkar, 2008**

# BUTTERFLY INTRODUCTION

- Among insects, butterflies are best known group to humans.
- Butterflies are beautiful flying insects with striking colours and patterns on their wings.
- Most of the butterflies are diurnal in nature.
- Distributed throughout the world except in the polar regions.
- Butterflies as adult are short-lived insects, few weeks (Blues), 2 to 4 weeks (whites & yellows) and up to 8 months (Brush-footed butterflies & Swallowtails).
- Most of the butterflies are found in both Dry and Wet season forms.
- Butterflies are used by conservational biologist as indicator species to identify habitats that are critical and need to be protected.
- Butterflies are also monitored to indicate climate change and environmental degradation.

# SIGNIFICANCE OF BUTTERFLY

- Most important pollinator and plays a very important role in ecosystem restoration.
- Provides food for predators and plays an important part of food web, particularly as larvae for birds, reptiles , spiders and predatory insects.
- Good indicators of anthropogenic disturbance, habitat loss, climate & environmental changes and the ecological quality of a habitat.
- Used as a model insect group in the conservation of tropical forests.
- It can help in development of rural economy through eco-tourism.

# STATUS OF BUTTERFLY IN BHUTAN

./ Bhutan is regarded as 10th richest biological hotspot, but we have very less knowledge on butterfly diversity.

./ Bhutan do not have a comprehensive data on butterfly fauna so far.

./ There are about 18,000 species of butterflies in the world. *(Kehimkar 2008)*

./ Old publications on Bhutan's fauna are found in Bingham (1905), Talbot (1939, 1947), Evans (1927, 1932), Yazaki & Kanmuri (1985), Harada (1987); recent publications on Bhutan's fauna Poel & Wangchuk (2007), Poel (2010), UWICE (2010), Harada et al. (2012), Singh (2012), Wangdi et al. (2012, 2013), Singh & Chib (2014) were conducted at different locations of Bhutan and data are not comprehensive.

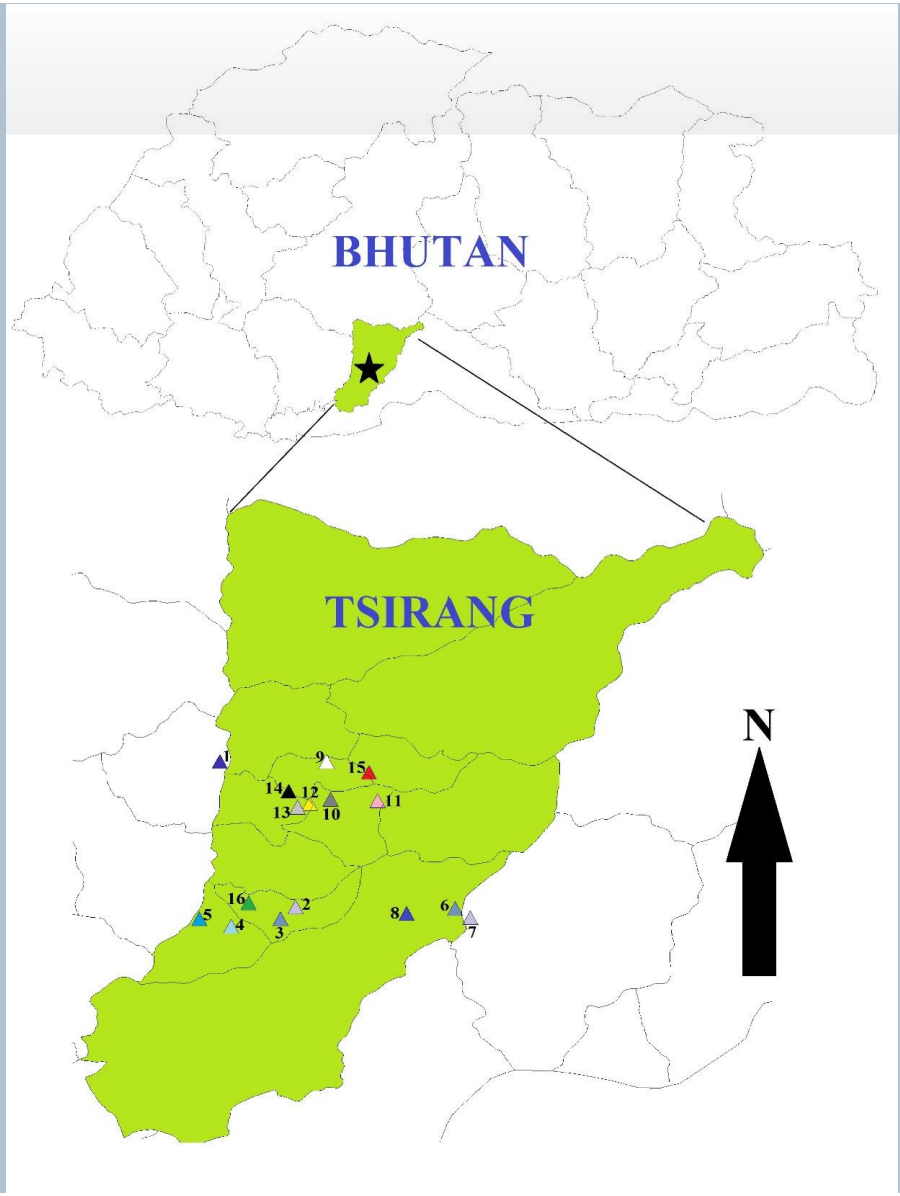
./ Bhutan is expected to have around 700 to 800 species of Butterflies. *(Poel & Wangchuk 2007).*

./ Bhutan has reported 670 species of butterflies *(Singh & Chib 2015)*, comprising of,

- ./ Papilionidae (55 species),
- ./ Pieridae (51 species),
- ./ Nymphalidae (265 species),
- ./ Lycaenidae (160 species), and
- ./ Hesperiidae (139 species).

# STUDY AREA (TSIRANG DISTRICT)

- Tsirang district situated at southern foothills of the Bhutan Himalaya.
- Tsirang covers an area of 638.3 $km^2$ and altitude ranges from 400 m to 2000 m towards north.
- 58% of the area is covered by broadleaf and chir-pine forest.
- It is the only district in Bhutan without a protected area.
- The district is surrounded by Wangdue at north; Sarpang at south and east; and Dagana at west.
- Tsirang shows subtropical vegetation at lower altitudes and temperate forest towards the north.
- Vegetation mainly includes broadleaf forest species and chirpine species.



# SAMPLING SITES IN STUDY AREA

**Burichu (#S1)** – (27° 1' 56.291" N & 90° 4' 30.712" E, altitude 341 m a.s.l.);
**Barsong (#S4)** – (26° 56' 21.03" N & 90° 4' 51.909" E, altitude 788 m a.s.l.);
**Beteni (#S8)** – (26° 56' 47.944" N & 90° 10' 16.172" E, altitude 1670 m a.s.l);
**Damphu (#S12)** –(27° 0' 30.672" N & 90° 7' 16.654" E, altitude 1549 m a.s.l.);
**Darachu (#S7) –** (26° 56' 39.455" N & 90° 12' 14.014" E, altitude 1980 m a.s.l.);
**DNCF (#S16)** – (26° 57' 9.371" N & 90° 5' 24.082" E, altitude 1024 m a.s.l.);
**Kikhorthang (#S13)** –(27° 0' 23.706" N & 90° 6' 54.619" E, 1627 m a.s.l.);
**Manidara (#S3)** – (26° 56' 36.658" N & 90° 6' 23.007" E, 1304 m a.s.l.);
**Sankosh (#S5) -** (26° 56' 37.18" N & 90° 3' 52.678" E, 506 m a.s.l.);
**Salami (#S10)** – (27° 0' 39.035" N & 90° 7' 55.261" E, 1377 m a.s.l.);
**Semjong (#S15) –** (27° 1' 33.859" N & 90° 9' 6.375" E, 861 m a.s.l.);
**Tashipang (#S2) –** (26° 57' 0.504" N & 90° 6' 50.795" E, 1233m a.s.l.);
**Thangray (#S6)** – (26° 56' 58.135" N & 90° 11' 46.107" E, 1922m a.s.l.);
**Tsholingkhar (#S14)** –(27° 0' 55.544" N & 90° 6' 37.933" E, 1239 m a.s.l.);
**Tsirangtoe (#S9)** - (27° 1' 56.377" N & 90° 7' 48.298" E, 1099 m a.s.l.);
**Upper Salami (#S11)** - (27° 0' 36.162" N & 90° 9' 22.683" E, 1342 m a.s.l.).

# BUTTERFLIES RECORDED FROM TSIRANG

Y Tsirang district – Total 241 species of butterflies in 5 families.

./Papilionidae – 20 species.

./Pieridae – 32 species.

./Nymphalidae – 104 species.

./Lycaenidae – 49 species.

./Hesperiidae – 36 species.

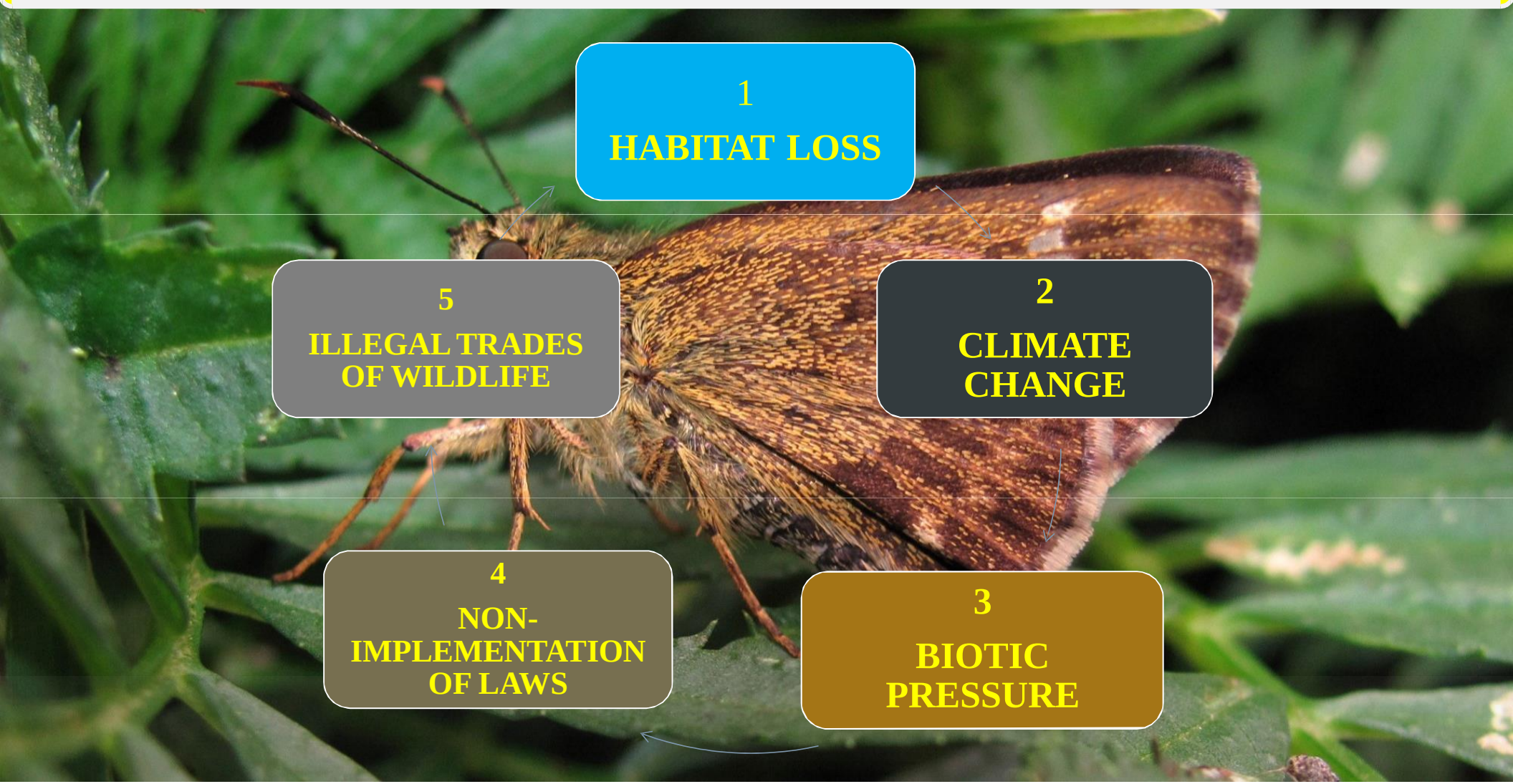
Y Of which, Total 33 sp. (Pieridae 4 sp., Nymphalidae 18 sp., Lycaenidae 8 sp. and Hesperiidae 3 sp.) are protected under different schedules of *Indian Wildlife (Protection) Act (IWPA) 1972 (amended in 2002).*

Y But none of these butterfly species are protected under *Forest and Nature Conservation Act of Bhutan 2006.* (RGoB, MoA 2006)

# OVERVIEW OF PROTECTED SPECIES OF BUTTERFLIES FROM TSIRANG

| Sl. no. | Family | Total No. of sp. | Protected sp. under IWPA 1972 | | | Total protected sp. |
|---|---|---|---|---|---|---|
| | | | Sch. I | Sch. II | Sch. IV | |
| 1 | Papilionidae | 19 | 0 | 0 | 0 | 0 |
| 2 | Pieridae | 31 | 0 | 3 | 1 | 4 |
| 3 | Nymphalidae | 106 | 3 | 13 | 2 | 18 |
| 4 | Lycaenidae | 49 | 3 | 5 | 0 | 8 |
| 5 | Hesperiidae | 36 | 0 | 1 | 2 | 3 |
| | | 241 | 6 | 22 | 5 | 33 |

# THREATS TO BUTTERFLIES



# THREATS TO BUTTERFLIES

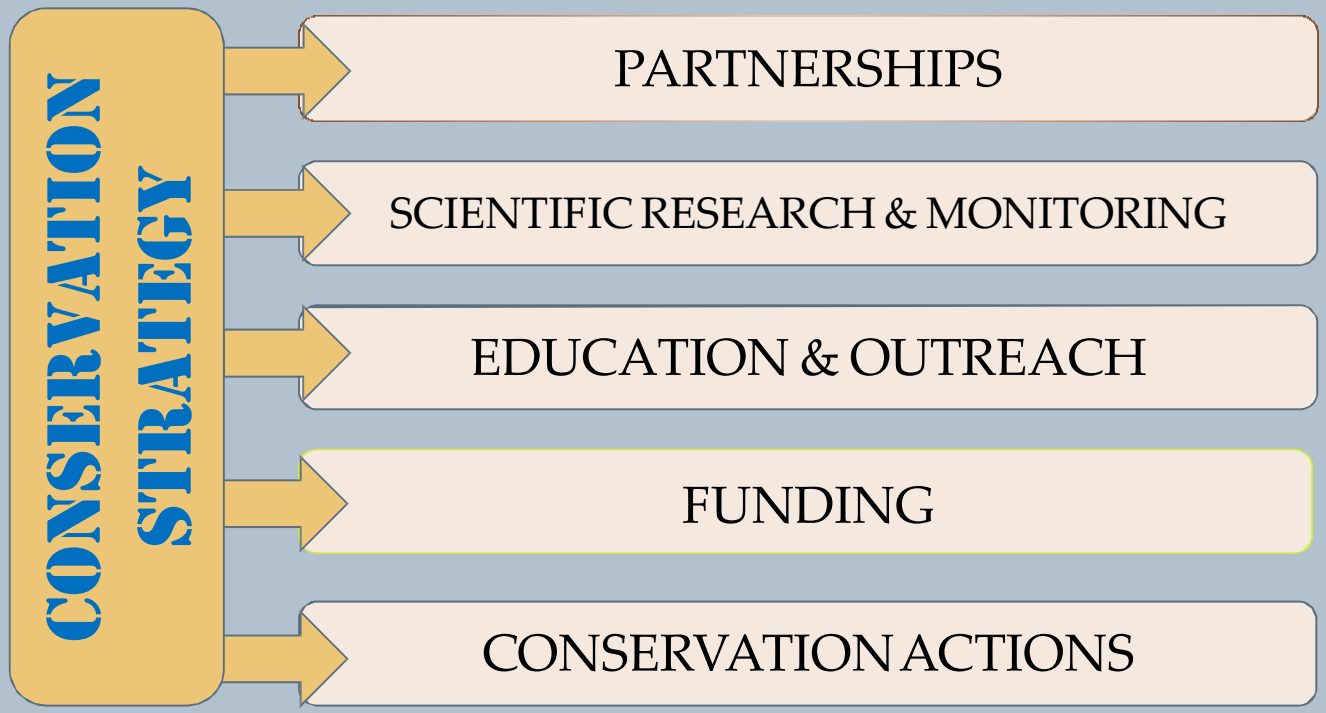
- **Fragmentation and deterioration of habitat due to human exploitation of forestry, Agricultural practices, and other resources.**
- **Climate change affects range, distribution and abundance of butterfly. It also affects in their survival, fecundity, developmental rates, and condition of larval and adults food plant.**
- **Agricultural practices, pastureland development, urbanization also affects in butterfly population.**
- **Non- forest activities - mining , road laying, industrial activities , clearing large forest areas for construction of dams .**
- **Ditching and draining of wet forests, Swamps and bogs in the forest landscape.**
- **Forest plantation practices such as cutting of broad leaved forests and plantations of exotic plant species.**
- **Illegal collection and trades could also leads to reducing the population of butterflies and even extinction of endangered species.**
- **Especially when rare or protected butterflies are collected from wild, can have influence on species sustainability.**

# CONSERVATION

*Conservation is defined as management of human use of biosphere so that it may yield sustainable benefit to the present generation while maintaining its potential to meet the needs and aspirations of posterity.*

# CONSERVATION STRATEGY

**An integrative approach to the maintenance of biodiversity that uses appropriate principles and experiences from basic biological fields such as genetics and ecology; from natural resource management fields such as wildlife management; and from social sciences such as anthropology, sociology, philosophy, and economics.**
**(Meffe et al., 1997)**



# CONSERVATION STRATEGY

## ./ Partnerships

Formulate the Conservation Plan, Entities compiled information, developed conservation measures, and recommended actions, in collaboration with national and international organizations.

## ./ Scientific Research and Monitoring

1. Enhance understanding of Butterfly biology.
2. Conduct research to fill information gaps and inform management.
3. Assess how land management practices affect the butterfly's abundance and distribution.

## ./ Education & Outreach

1. Environmental education programs that lead to a greater understanding, appreciation, and support of the challenge.
2. Engaging communities in conservation by providing training as eco-tour guides and in reforestation activities.
3. Eco-tourism workshops combine indoor presentations and hands-on activities with outdoor field work to raise awareness about the importance of conserving the butterflies.

# CONSERVATION STRATEGY

./Funding

Necessary for surveys, research, monitoring, habitat enhancement, public outreach, and further implementation of the Plans.

./Conservation Actions

1. Protect and manage occupied and unoccupied butterfly habitat on public lands.
2. Manage habitat and promote conservation, through education and public media.
3. Explore potential areas and promote butterfly ecotourism.
4. Provide adequate regulatory protection.

# BUTTERFLY PHOTOGRAPHS

*Capturing butterfly images can be a fascinating experience and is certainly the second best way to appreciate beauty of these winged jewels.*

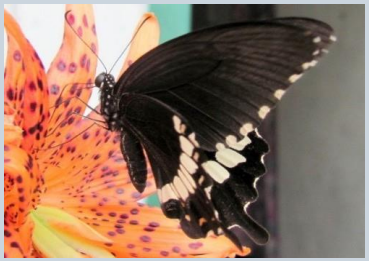
**Capture the butterflies with camera not with net...**

# PAPILIONIDAE (SWALLOWTAILS)

"A pinned butterfly holds no delight. A pinned butterfly is nothing like a butterfly at all."
— Patrick Rothfuss

*Troides helena*

*Papilio demoleus*



*Papilio polytes*

*Pachlopta aristolochiae*

*Graphium antiphates*

*Papilio memnon*

*Papilio paris*

*Papilio helenus*

*Papilio nephelus*

*Papilio alcmenor*

*Papilio protenor*

*Papilio bianor*

# PIERIDAE (WHITES & YELLOWS)

*Pontia daplidice*

*Appias paulina*

*Ceporanadina*

*Pieris cannidia*

*Cepora nerissa*

*Appias lyncida*

*Pieris brassicae*

*Hebomoia glaucippe*

*Delias acalis*

*Appias lalage*

*Delias descombesi*

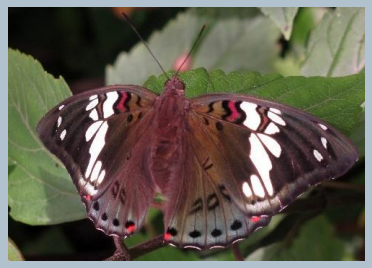
*Eurema laeta*

*Eurema blanda*

*Ixias pyrene*

*Colias fieldi*

# NYMPHALIDAE (BRUSH-FOOTED)



*Euthalia lubentina*

*Euthalia sahadeva*

*Euthalia durga*

*Apatura ambica*

*Herona marathus*

*Apatura sordida*

*Argyrius hyperbius*

*Parasarpa zyla*

*Sumalia zulema*

*Junonia orithya*

*Lethe kansa*

*Lethe sinorix*

*Stibochiona nicea*

*Polyura athamas*

*Athyma cama*

# LYCAENIDAE (BLUES)

*Remalana jangala*

*Rapala nissa*

*Pseudozizeeria maha*

*Acytolepis puspa*

*Zemeros flegyas*

*Prosotas nora*

*Castilius rosimon*

*Catapacilma major*

*Abisara fylla*

*Abisara chela*

*Arhopala eumolphus*

*Celastrina argiolus*

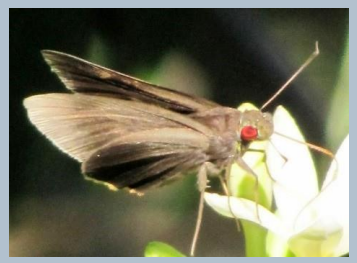
*Taraka hamada*

*Heliophorus epicles*

*Leptotes plinius*

# HESPERIIDAE (SKIPPERS)

*Pelopidas subochracea*



*Matapa sasiarna*

*Iambrix salsala*

*Halpe homolea*

*Notocrypta curvifascia*

*Pelopidas subochracea*

*Pseudocoladenia dan*

*Udaspes folus*

*Oriens goloides*

*Coladenia indrani*

*Pelopidas assamensis*

*Tagiades litigiosa*

*Potanthus nesta ?*

*Oriens gola*

*Pelopidas sp.*

# CONCLUSION

./ Many significant butterfly species were reported from the study area which have conservation importance.

./ Necessary to study on species specific details covering biology, host plant preferences, ecological requirements *etc*.

./ To focus on conservation of rare and endangered species and promoting ecotourism in Bhutan.

./ Detailed studies on the bio-ecology of various species found in this region are necessary for adopting appropriate conservation strategies.

# THE TEAM

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# THANK YOU