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# Threatened butterflies of central Nepal

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In Nepal, the area above 3000m is occupied mostly by palearctic butterflies while the temperate, subtropical and tropical species are sequentially distributed below this altitude. The temperate zone has many micro-habitats to offer to different butterflies.

The central districts, namely, Kathmandu, Bhaktapur, and Lalitpur are dominated by evergreen broad-leaved mixed forests between 1800–2400 m. The evergreen Oak (*Quercus*) forest covers the area above 2000m (DMP 1969). Conifers like *Pinus roxburghii* and *Pinus wallichiana* also occur in these districts. Besides *Schima wallichii, Castanopsis indica* and *Alnus nepalensis* can be observed in wet ravines. Other flora observed here are *Ilex doniana*, *Zizyphus incurva*, *Leucodeptrum canum*, *Myrica esculenta*, *Myrsine semiserrata* and *Rhododendron arboreum*.

The central region of Nepal was once forested (Upreti & Ghimire 1982). These hills and valleys are now cultivated and very little forest is left (Chalise 2010). Some forested areas of this region are incorporated into the protected area network like the Langtang National Park and Nagarjun-Shivapuri National Park. The Langtang National Park lies at 32km north of Kathmandu City while the latter is located close to this city with its northern boundary to the Nuwakot District. *Teinopalpus imperialis*, *Papilio krishna*, *Diagora nicevillei*, *Troides aeacus* etc. are the notable species found in the Kathmandu Valley. The southern part of the valley, extending from Godavari (1360m) to Phulchowki Mountain (2734m) is a species -rich area where more than 150 species of butterflies, mostly forest dwelling species, are found (Smith 1989). The recent loss of trees in these forests has left the hills virtually bare except for a few areas between 2660–2715 m. These changes in the natural habitat have had a negative impact on the butterflies of the region. Therefore, an attempt has been made here to identify the threats imposed on some rare butterfly species of this region.

**Material and Methods:** The present study was carried out in the central part of Nepal which includes three districts—Kathmandu, Bhaktapur, and Lalitpur (Fig. 1). The base-line study consisted of direct observations made during 2004–2009 and comparison is made with the present study conducted during 2010–2011 in the three mentioned districts. A butterfly net was used for capturing insects. Data sheets and field guides as well as an altimeter and a diary were used in the field.

The peak diversity of butterflies was observed during May to August. Talbot (1939, 1947), Smith (1989) and Khanal & Smith (1997) were consulted for identification. Capture and release method was adopted to identify species in the field. Habitat alteration was assessed minutely in relation to perceived threat factors. The species records mentioned in the National Red Data Book of Nepal (NRDB 1995) and the field data resulted from the study made in the central districts in 2004 to 2011, are considered for the current status of the species.

**Results:** The interesting findings of this study are mentioned in Table 1. Four species of butterflies were found at low density and therefore, are considered at high risk. These species are restricted to narrow

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**Figure 1. Study Areas**

distributional ranges in all the three districts. These species are *Teinopalpus imperialis*, *Papilio krishna*, *Meandrusa lachinus,* and *Euripus consimilis*. Other species surveyed in this study are under declining state as shown by the field studies conducted in 2004–2011.

**Discussion and Conclusion:** The human population in the central part of Nepal is rising rapidly (CBS 2003). Tourist inflow is also comparatively high in this region. Some areas of the central districts are included in the protected area network, except the Godavari and Phulchoki forests where a rich diversity of butterflies, with several rare and endemic species and subspecies are found. Study based on field surveys from 2004 to 2011 has indicated that 19 species are now under very low density in their known habitats. Shrinkage of habitats due to construction of roads and establishment of quarry industry are, therefore, imposing severe impacts on the species like *Chrysozephyrus disparatus interpositas*, *Thermozephyrus ataxus*, *Maneca bhotea*, *Pamela dudgeoni dudgeoni Celastrina hersilia vipia*, *Neptis manasa Neptis nycteus*, *Phaedyma aspasia kathmandia*, *Euthalia dudu Diagora nicevillei*, *Lethe latiaris hige*, and *Satarupa zulla*. None of these species have been reported in other parts of the country except the central districts considered for this study.

*Teinopalpus imperialis*, *Meandrusa lachinus*, *Papilio krishna*, and *Maneca bhotea* dwell in forests, being usually found on mountain tops where vegetation like *Quercus semicarpifolia*, *Michelia* sp., *Rhododendron arboreum* and *Daphne bholua* are found. *Meandrusa lachinus* has a very narrow range along the Himalaya from Uttarakhand to Arunachal Pradesh and the mountains of Laos and China.

The probable factors imposing severe impacts on the above mentioned species are:

(1) Forest clearing for governmental activities and tourism, which has a negative impact on populations of these butterflies in Kathmandu Valley.

(2) *Daphne bholua,* a host plant of *Teinopalpus imperialis,* is used in the paper industry and has been extensively harvested in these areas. These factors have caused the butterfly species mentioned above to be included in the "endangered" category (Smith 1989).

*Pamela dudgeoni*, *Neptis manasa*, *N. nycteus*, *Phaedyma aspasia*, *Diagora persimilis*, *D. nicevillii* are restricted to forest habitats close to streams, where vegetation like *Quercus semecarpifolia*, *Alnus nepalensis*, *Celtis tetranda* and *Schima wallichii* are found.

(3) Streams in Godavari forest have now dried up presumably due to the impact of marble quarrying,

**Table 1. Threatened butterfly species and altitudinal distribution across the study area**

| | Scientific name | No of specimens examined | Altitude (m) | Distribution |
|---|---|---|---|---|
| | **Papilionidae** | | | |
| 1. | *Teinopalpus imperialis* Hope | 21 specimens in three localities | 2090–2730 | Nepal to southern Myanmar, China, Thailand |
| 2. | *Papilio krishna* Gray | 8 specimens | 1485–2730 | Nepal to Myanmar, northeastern India, western China |
| 3. | *Meandrusa lachinus* Fanahashi | 2 specimens | 1820 | Uttarakhand to Assam, upper Myanmar, Thailand |
| | **Hesperiidae** | | | |
| | *Satarupa zulla* Tytler | 1 specimen | | Nepal to northern Myanmar |
| | **Lycaenidae** | | | |
| 4. | *Tajuria luculentus* Swinhoe | 1 specimen | 1730–1818 | Assam, Meghalaya, Nepal |
| 5. | *Chrysozephyrus disparatus* Howarth | 2 specimens (two places) | 1848–2060 | Nepal to Assam, Taiwan |
| 6. | *Thermozephyrus ataxus* Doubleday & Hewitson | 5 specimens | 1400 | Northern India, southern China, Afghanistan, Taiwan, Japan |
| 7. | *Maneca bhotea* Moore | 4 specimens | 2484–2730 | Nepal to Assam |
| 8. | *Pamela dudgeoni* de Nicéville | 2 specimens | 1660–1790 | Uttarakhand to Thailand. |
| 9. | *Amblopala avidiena* Hewitson | 1 specimen | 2000–2090 | Nagaland (Naga Hills), Sikkim and Nepal |
| | **Nymphalidae** | | | |
| 10. | *Euripus consimilis* Westwood | 2 specimens | 1365–1520 | Uttarakhand to Assam, southern India, Myanmar, Thailand |
| 11. | *Neptis manasa* Moore | 5 specimens in two localities | 1520–2151 | Central China, Yunnan, northern India, Sikkim, Thailand |
| 12. | *Neptis nycteus* de Nicéville | 2 specimens | 1520–2060 | Nepal, Sikkim, Bhutan. |
| 13. | *Phaedyma aspasia* Leech | 3 specimens | 1485–1850 | Nepal to Nagaland, Myanmar Indo-China, central and western China. |
| 14. | *Euthalia duda* Staudinger | 2 specimens | 1850–1880 | Nepal to Sikkim, Assam, Tibet |
| 15. | *Euthalia franciae* Gray | 3 specimens | 1363–1940 | Nepal to Sikkim, Assam, Myanmar. |
| 16. | *Diagora nicevillei* Moore | 2 specimens (*museum specimen-1) | 1575–2121 | Himachal Pradesh, Nepal to Vietnam and China. |
| 17 | *Diagora persimilis* Westwood | 5 specimens in two localities | 1365–1520 | Himachal Pradesh to Myanmar. |
| | **Satyridae** | | | |
| 18. | *Lethe latiaris* Hewitson | 1 specimen | 1578–1670 | Nepal to western China |

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which has been going on in the area for the last several years.

(4) *Celtis tetranda,* the host plant of *Diagora persimilis* is lopped for fodder.

(5) *Diagora nicevillei*, an endangered nymphalid, is probably one of the rarest butterflies in the world (Smith 1990). Furthermore, the only known Himalayan population is confined to a small pocket in Godavari forest and the area has now been reduced due to stone quarrying and deforestation.

(6) Other threats perceived elsewhere for *D. nicevillei* include grazing, mining, unsustainable uses of biological resources, urbanization, tourism and illegal trade (Khanna & Kumar 2001). This species is given protection under Schedule I (Part - IV) of the Indian Wildlife (Protection) Act, 1972 (Singh & Singh 2002). In the National Red Data Book of Nepal it has been included in the endangered category (NRDB 1995). This species has five subspecies known so far which includes *D.n. nicevillei* Moore from Chamba to western Nepal; *D.n. nigra* Morishita from the Kathmandu Valley; *jermyni* Druce from the Tons Valley, India; *ouvrardi* Watkins from northwestern Yunnan, southeastern Tibet, China and *magna* Omoto & Funahashi from Vietnam.

(7) *Tajuria luculentus*, *Celastrina hersilia* and *Euthalia duda* are found from 1730–1880 m in mixed forest of *Alnus nepalensis* and *Quercus semicarpifolia* (DMP 1969). In Nagarjun, a large forest area has been cleared to build monasteries and roads.

(8) The marble mining at Godavari has destroyed a

large portion of the habitat of many rare and endangered species including *Teinopalpus imperialis*, *Papilio krishna*, *Phaedyma aspasia* and *Euthalia duda*. Chalise (1978) in his study at Godavari found that nine species of nymphalids were becoming increasingly rare.

(10) The habitat of *Amblopala avidiena* in Nagarjun forest is threatened mainly due to the broadening of roads and building of monasteries.

(11) *Lethe latiaris,* which inhabits shady *Quercus-Alnus* forest at 1670m is impacted mostly due to road construction, picnickers and herb collectors. Godavari forest is notorious for these ecological malpractices.

*Euripus consimilis* occurs sparingly at 1370–1400 m; its host plant, *Trema orientalis*, is an uncommon tree at low elevation and it may be commoner in the belt below 1000m elevation. The population of *Satarupa zulla,* which also occurs at the same elevation as *Euripus consimilis* but in *Alnus-Quercus* forest which is also declining due to increasing anthropogenic activities in this part. The status of many species is changing mainly due to habitat degradation. Only two species, *Troides aeacus* and *Troides helena* have been listed in CITES Appendix II (Khanal et al. 2010). Nepal Red Data Book (1995) incorporated 142 species of butterflies under different threat categories.

The continued habitat degradation and pressure on natural resources is adversely affecting butterfly populations outside the protected area network. There is a need for discovering, assessing and taking steps for long term conservation initiatives for endangered butterfly taxa, especially involving the local community and government.

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