Article

Butterfly diversity in Kumakh Rural Municipality, northern part of Salyan District, Karnali Province, Nepal

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Received 4 March 2021; *Accepted 1 April 2021*; *Published 1 June 2021*

Abstract

Butterflies are well studied insects in the world. However, very limited studies are conducted in Karnali Province of Western Nepal and most of them are limited within the protected areas. And the Salyan district is one of areas where no any documented information on butterflies is available. So, this study is conducted in the Kumakh Rural Municipality; northern part of Salyan district, Karnali Province to document checklist of butterflies species present there. As this research conducted during the global pandemic and nationwide lockdown periods due to COVID-19, home point survey methods was adopted. Altogether 45 species of butterflies recorded belong to five families were recorded from the study area. Family Nymphalidae (69%) was dominant in the study area followed by families Lycaenidae (11%), Pieridae (9%), Hesperlidae (7%), and Papilionidae (4%) respectively. Further systematic research including diversity monitoring is recommended to prepare the checklist of butterflies along the altitudinal gradient in Kumakh Rural Municipality.

Keywords checklist; butterflies; COVID-19; Salyan.

Arthropods
ISSN 2224-4255
URL: http://www.iaees.org/publications/journals/arthropods/online-version.asp
RSS: http://www.iaees.org/publications/journals/arthropods/rss.xml
E-mail: arthropods@iaees.org
Editor-in-Chief: WenJun Zhang
Publisher: International Academy of Ecology and Environmental Sciences

1 Introduction

Nepal is the mountainous country located between India and China; at the junction of Indo-malayan and Palearctic biogeographic realms. It occupies about one third of Hindu Kush Himalayan region (Paudel et al., 2012), have wide range of climatic variability (i.e. microclimate) and topographic variation (Subedi et al., 2020), that provides habitats for unique biodiversity (Paudel et al., 2012) as well as 693 species of butterflies including 29 subspecies (Sapkota et al., 2020) within a very small geographic area.

Butterflies are belongs to a single superfamily Papilionidae; morphologically and behaviorally uniform compare to other insect groups (Ehrlich and Raven, 1964). There are more than 28,000 species of butterflies worldwide which has a key role in the ecosystem acts as a pollinator, prey and biological pest control

(Ghazanfar et al., 2016). They are considered as the indicator species of the healthy ecosystem and their well-beings (Braak et al., 2018). Also, their community assemblage are affected and influenced by various climatic event (Gupta et al., 2019), topography and land use change. Although being an ecosystem indicator, they are facing a multiple threats due to the anthropogenic activities like pollution, vehicle collision (Gaudel et al., 2020; Shrestha et al., 2018), climate change, habitat loss (Choudhary and Chishty, 2020), and excessive use of pesticides (Braak et al., 2018).

Due to its wide ecological role as well as economic importance (Kasambe, 2018), butterflies are the most studied insect in the world (Dahal, 2017). However, very few studies on butterflies had been conducted in Western part of Nepal (Khanal, 1999; Khanal, 2009; Paudel, 2019; Shrestha et al., 1999; Smith, 1977; Smith, 1980; Suwal et al., 2019a; Suwal et al., 2019b); and the scenarios are similar to the Karnali Province (Khanal, 2009; Smith, 1980; Suwal et al., 2019a; Suwal et al., 2019b). Most of the studies conducted in the Karnali Province were confined within the protected areas (Acharya and Paudel, 2020). Surkhet, Mugu, Jumla and Dolpa were the only districts of Karnali Province where previous study of butterflies were documented. There are no actual records of total species of butterflies present in Salyan district. So, this checklist has been willing to provide the baseline information on butterflies species present in Kumakh Rural Municipality (KRM) from a northern part of the Salyan district.

2 Materials and Methods

2.1 Study area

Study area (28°34'17.51"N, 82°11'40.31"E) is located in the ward number three (Beltakura), nearly 260 m air distance from the Milan chwok and Nearly 1 km air distance from the office of Kumakh Rural Municipality at an elevation of 790 msl. Dominant land cover in the study area was agriculture and forest. Western side of study point there was a small patches of *Shorea robusta* forest, in the North and East side, area was covered by crops including Finger millet (*Eleusine coracana*), Turmeric (*Curcuma longa*) and Horsegram (*Macrotyloma uniflorum*). The floral species present in the study location were Sal (*Shorea robusta*), Bhimal (*Grewia optiva*), Belauti (*Psidium guajava*), Aaap (*Magnifera indica*), Pipal (*Ficus religiosa*), Simal (*Bombax ceiba*), Ruino (*Mallotus philippensis*), Tiju (*Diospyros melanoxylon*), Timilo (*Ficus auriculata)* etc. Golden Jackel (*Canis aureus*), 11 bird species, six species of moth, two species of insect, one species of spider, two species of amphibians and two species of reptiles were observed during survey periods from the study area.

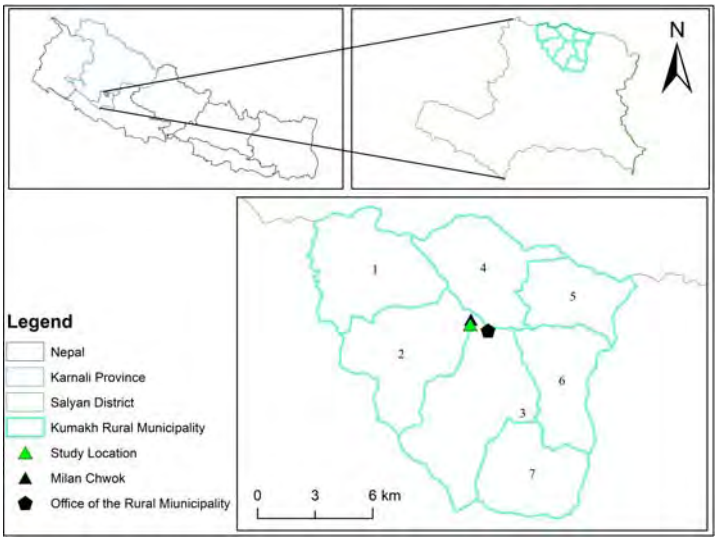

Fig. 1 Map of study area.

2.2 Methods

The standard method of surveying butterflies is pollard line survey (Pollard, 1977), however other methods like random survey were also used in the past (Singh and Chib, 2014). As this research was conducted during the COVID-19 pandemic time, home point survey method was followed. Similar kind of methodology was used by (Chaudhary, 2020) for wildlife survey. Study was carried out during the month of October and November, 2020. Photographs were taken every day in all sites using Canon EOS 80D (35-135 mm) camera and not a single butterflies were harmed during the survey period. And for identification, website named Butterflies of India (https://www.ifoundbutterflies.org/) was visited and for confirmation, Godavari Butterflies (Conniff and Limbu, 2014), Butterflies of Begnas and Rupa Watershed area (Smith et al., 2016), and Butterflies of Western Ghats (Kasambe, 2018) were reviewed. All the data from field was recorded in Excel spread sheet 2013 and analysis was done using R (v. 4.0.3) software.

3 Results

Total 45 species of butterflies belongings to the 5 different families were observed and identified from the study area as mentioned below (Table 1).

Among five families, highest number of species were reported from family Nymphalidae (31 species), followed by family Lycaenidae (5 species), Pieridae (4 species), Hesperiidae (3 species), and Papilionidae (2 species) respectively (Fig. 2). Also individual numbers of the butterflies were dominated by family Nymphalidae, i.e. 69%, with lowest by family Papilionidae, i.e. 4%.

Table 1 Checklist of butterflies from study area with their common, scientific and family name.

S.N.	Common Name	Scientific Name	Family
1	Bevan swift	*Borbo bevani (Moore, 1878)*	Hesperiidae
2	Blue pansy	*Junonia orithya (Linnaeus, 1758)*	Nymphalidae
3	Chocolate pansy	*Junonia iphita (Cramer, 1779)*	Nymphalidae
4	Club peak	*Libythea myrrha (Godart, 1819)*	Nymphalidae
5	Common Barron	*Euthalia aconthea (Cramer, 1777)*	Nymphalidae
6	Common Bushbrown	*Mycalesis perseus (Fabricius, 1775)*	Nymphalidae
7	Common Evening Brown	*Melanitis leda (Linnaeus, 1758)*	Nymphalidae
8	Common fivering	*Ypthima baldus (Fabricius, 1775)*	Nymphalidae
9	Common gem	*Poritia hewitsoni (Moore, 1866)*	Lycaenidae
10	Common Grass Yellow	*Eurema hecabe (Linnaeus, 1758)*	Pieridae
11	Common Indian Crow	*Euploea core (Craner, 1780)*	Nymphalidae
12	Common Lascar	*Pantoporia hordonia (Stoll, 1790)*	Nymphalidae
13	Common leopard	*Phalanta phalantha (Drury, 1773)*	Nymphalidae
14	Common Map	*Cyrestis thyodamas (Doyere,1840)*	Nymphalidae
15	Common Mormon	*Papilio polytes (Linnaeus, 1758)*	Papilionidae
16	Common Palmfly	*Elymnias hypermnestra (Linnaeus, 1763)*	Nymphalidae
17	Common tiger	*Danaus genuita (Cramer, 1779)*	Nymphalidae
18	Dark Branded Bush Brown	*Mycalesis mineus (Linnaeus, 1758)*	Nymphalidae
19	Dark Evening Brown	*Melanitis phedima (Cramer, 1780)*	Nymphalidae

S.N.	Common Name	Scientific Name	Family
20	Glassy Tiger	*Parantica aglea (Stoll, 1782)*	Nymphalidae
21	Great eggfly	*Hypolimnas bolina (Linnaeus, 1758)*	Nymphalidae
22	Grey pansy	*Junonia atlites (Linnaeus, 1763)*	Nymphalidae
23	Indian Cupid	*Everes lacturnus (Godart, 1824)*	Lycaenidae
24	Indian Dart	*Potanthus pseudomaesa (Moore, 1881)*	Hesperiidae
25	Indian oakblue	*Arhopala atrax (Hewitson, 1862)*	Lycaenidae
26	Indian Red Admiral	*Vanessa indica (Herbst, 1784)*	Nymphalidae
27	Indian Red Flash	*Rapala iarbus sorya (Koller, 1844)*	Lycaenidae
28	Indian Tortoiseshell	*Aglais caschmirensis (Kollar, 1844)*	Nymphalidae
29	Asian cabbage white	*Pieris canidia (Linnaeus, 1768)*	Pieridae
30	Indigo flash	*Rapala varuna (Horsfield, 1829)*	Lycaenidae
31	Jungle brown	*Orsotriaena medus (Fabricius, 1775)*	Nymphalidae
32	lemon Emigrant	*Catopsilia pomona (Fabricius, 1775)*	Pieridae
33	Lemon pansy	*Junonia lemonias (Linnaeus, 1758)*	Nymphalidae
34	Lilacine bush brown	*Mycalensis francisca (Stoll, 1780)*	Nymphalidae
35	Lime swallotail	*Papilio demoleus (Linnaeus, 1758)*	Papilionidae
36	Orange oakleaf	*Kallima inachus inachus (Doyere, 1840)*	Nymphalidae
37	Pallas sailer	*Neptis sappho (Pallas, 1771)*	Nymphalidae
38	Peacock Pansy	*Junonia almana (Linnaeus, 1758)*	Nymphalidae
39	Plain tiger	*Danaus chrysippus (Linnaeus, 1758)*	Nymphalidae
40	Red base jezebel	*Delias pasithoe (Linnaeus, 1767)*	Pieridae
41	Rustic	*Cupha erymanthis (Drury, 1773)*	Nymphalidae
42	Staff sergeant	*Athyma selenophora (Kollar, 1844)*	Nymphalidae
43	Straight banded tree brown	*Lethe verma (Kollar, 1844)*	Nymphalidae
44	Straight swift	*Parnara guttata mangala (Moore, 1865)*	Hesperiidae
45	Yellow Pansy	*Junonia hierta (Fabricius, 1798)*	Nymphalidae

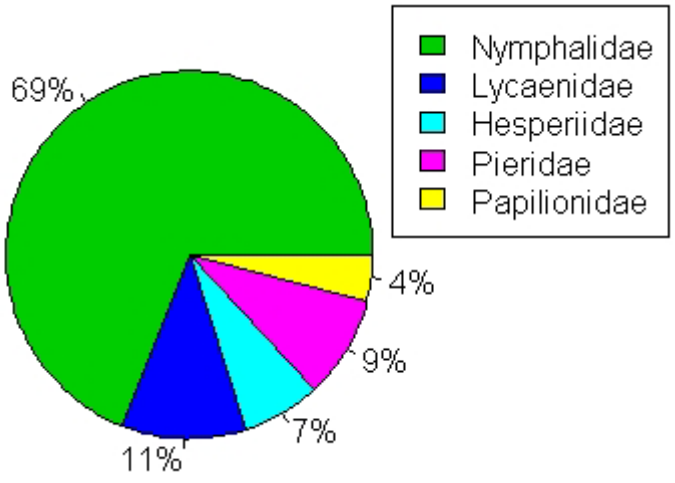

Fig. 2 Family wise composition of the butterflies in study area, dominated by the family Nymphilidae.

4 Discussion

From this assessment of butterflies from Salyan district, altogether 45 species were observed and recorded. Khanal (2009) had also recorded 85 species of butterflies form lowland district of western Nepal, with 52 species only from the Surkhet district of Karnali Province during his study from 1988 to 2003. Similarly, 64 species was reported from Rara National Park (RNP) (Bhandari and Gee, 2007; cited by Suwal et al., 2019b). According to recent study conducted in RNP, 44 species of butterflies were recorded including rare Nepal Comma *Polygoniac-album agnicula* (Moore, 1872) (Suwal, 2018; Suwal et al., 2019b). Similarly, Argus *Paralasa nepalica* (Paulus, 1983) buttefly were reported by (Suwal et al., 2019a) from Humla district. According to Department of National Park and Wildlife Conservation, Shey- Phoksundo National Park, Dolpa harbor about 29 species of butterflies (dnpwc.gov.np).

From Western Lowland of Terai district, Paudel (2020) reported about 27 species of butterflies from Thakurdhwara and Babai valley of Bardiya district. Khanal (1999) conducted a survey in Western Terai in 1985 (Kanchanpur and Kailali District); had reported 71 species of butterflies. Similarly, Shrestha et al. (1999) reported about 124 species from southern floodplain of Karnali (Kailali) area.

According to Acharya and Paudel (2020), Karnali Province may harbor about 144 species (~21.68 % of Nepal butterflies) including two vulnerable and five susceptible species. Based on this data, the present study location provides the habitat for nearly 31.25 % species of Karnali Province and and nearly 6.78% species of whole Nepal (Sapkota et al., 2020). Among the 11 butterfly families present in Nepal (Khanal, 2008), five families had been reported from this study.

Family Nymphalidae (i.e., 31 species) seemed to be the dominant in the study area. Nymphalidae is one of the largest family in terms of species richness and they has widely distributed in nature (Khyade et al., 2018; Pena and Espeland, 2015); which might be the reason behind dominance of Nymphalidae family. This finding supports the other studies, which reported family Nymphalidae contained highest number of species in different parts of Mid-hills Nepal (Bhusal and Khanal, 2009; Nepali et al., 2018; Paudel, 2020; Shrestha et al., 2018; Smith et al., 2016; Subedi et al., 2020); but result was contradictive to Khanal (2009) and Khanal et al. (2012), as they found family Lycaenidae had higher species diversity. While, Prajapati et al. (2000) mention family Nymphalidae and Lycaenidae contribute equal numbers of species in Daman area of Makawanpur district, Nepal.

5 Conclusions

During this study, a total 45 species (6.78 % of Nepal) belonging to five families were reported from the study area. Among them, 69% species were from family Nymphalidae, followed by 11%, 9%, 7% and 4% of species from family Lycaenidae, Pleridae, Hesperlidae, and Papilionidae respectively. This study provides the baseline data for butterflies of Kumakh Rural Municipality. Further systematic research is recommended for preparation of checklist along the altitudinal gradient, and to measure the diversity of butterflies in Kumakh Rural Municipality, Salyan.

Acknowledgements

Authors are grateful to Mr. Bimal Raj Shrestha for identification of species, and Mr. Prakash Bhandari for providing us DSLR camera during the study period.

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