



## DIVERSITY OF BUTTERFLIES (LEPIDOPTERA : PAPILIONOIDEA) OF ECO-SENSITIVE ZONE OF SAINJ WILDLIFE SANCTUARY (DISTRICT KULLU, HP)

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### ABSTRACT:

During three-year survey in Eco-sensitive zone of Sainj Wildlife Sanctuary, seventy-one species of butterflies belonging to 53 genera and five families was recorded. The family Nymphalidae was the most dominant with the highest number of species (36 species; 50.70%), followed by Lycaenidae (15 species; 21.12%), Pieridae (12 species; 16.90%), Papilionidae (04 species; 05.64%) and Hesperidae (04 species; 05.64%). The study of butterflies from eco-sensitive zone of Sainj Wildlife Sanctuary is the first checklist from this transition area. One species recorded as extended distribution in North-West Himalaya and one species from Himachal Pradesh. 36 species are new records from Great Himalayan landscape.

**Keywords:** - Diversity, Eco-sensitive zone, Sainj Wildlife Sanctuary.

### INTRODUCTION :

The Sainj Wildlife Sanctuary is located in the Kullu district in Himachal Pradesh and is positioned at latitude 31°49'1.03"N & longitude 77°30'34.35"E (around Shagwar, Shakti and Marore villages) adjoining to the Great Himalayan National Park (GHNP). It has an area of 90 sq km with the length 56.69 kms and was created in 1994. Recently, this sanctuary was added to Great Himalayan National Park in 2010. The sanctuary area is managed by the Park Administration and is referred as Great Himalayan National Park Conservation Area (GHNPCA) that includes National Park, Wildlife Sanctuaries and Eco-zone, in total covering an area of 1171 sq kms and it constituted Himachal Pradesh's largest protected area. The park was established in 1984 and in 1994 Sainj Wildlife Sanctuary was created out of it with area of 90km<sup>2</sup>. GHNPCA is part of the Himalaya biodiversity hotspot and is a World Wild Fund

(WWF) Global 200 Eco-region (IUCN Evaluation, 2014). In June 2014, the National Park has been

added to the UNESCO list of World Heritage Sites. The UNESCO World Heritage Site Committee granted the status to the park under the criteria of "exceptional natural beauty and conservation of biological diversity". The sanctuary has a great altitude variation from 1500 to 5800 m asl with deep valleys. It has good protection in the north, east and south due to the rugged and difficult to access high mountains.

As per the National Wildlife Action Plan (2002-2016), issued by Ministry of Environment, Forest and Climate Change, land within 10 km of the boundaries of national parks and wildlife sanctuaries is to be notified as eco-fragile zones or Eco-Sensitive Zones (ESZ). According to the guidelines issued by the Environment Ministry on February 9, 2011, ESZs are created as "shock absorbers" for the protected areas, to minimize the negative impact on the "fragile

ecosystems” by certain human activities taking place nearby. Furthermore, these areas are meant to act as a transition zone from areas requiring higher protection to those requiring lesser protection. The eco-sensitive zone around the Sainj WLS has a buffer zone along its south-western side (the 26,560 ha Eco-zone) which contains 160 small villages. There are no motorable roads that closely approach the Sanctuary. It requires trekking through the Eco-zone to enter into Sainj Wildlife Sanctuary. From Ropa to Neharni the vehicle road is there in the Eco-zone. Neharni is the last motorable village in the Eco zone area. The footstep with steep, Kaccha, dangerous way all along the Sainj River goes to the sanctuary. After covering an area of 05 km on foot from Neharni to Bah, the sanctuary area starts. Bah is at the end of ecozone area and afterwards the Sainj Wildlife Sanctuary starts.

**Climate:** Climate in the area is warm during the day due to sunlight and becomes cold during the night time. Temperature rises up to 33°C during the day. The temperature ranges from -5 to 30°C in the sanctuary. The sanctuary have moderate to less rainfall during rainy season and humidity is low. Summers extends from March to June, Monsoons from July to August in the sanctuary. Rainfall at middle altitudes varies between 1000-2000 mm. The area is covered with snow from November to February and remains closed.

**Forest:** The forest types found in the area includes the Himalayan Chir Pine forest, Broad leaf forest, Conifer mixed with broad leaf forest, Secondary scrubs and Sub-tropical Riverine Forest. Sub-tropical forest of Chir Pine (*Pinus roxburghii*) is found in the lower reaches. The coniferous tree species, viz. *Cedrus deodara*, *Picea smithiana*, *Pinus wallichiana*, etc. In Dalogi there is small alke with deodar forests all around and whereas in Shagar Shah has a very large grassland surrounded by delodar forests.

**Agriculture:** People depend mainly on their agricultural produce which consists of Wheat, Potatoes, Maize, Pea, Beans and Cabbage. The common fruit trees are Plum, Apple, Walnut, Apricot, Pear, Mulberry etc which were seen during the survey. As people live in very far off places they mostly depend on local produce and also use their goats and sheep as food during harsh winter months when the area is cut off from the rest of the humanity.

Butterflies constitute an integral part of the conservation areas and show distinct patterns of habitat utilization. Being sensitive creatures, they leave the degraded or deteriorating habitats. Protected areas provide suitable habitats and environment for butterflies. The baseline data of protected areas are of great value as it provides meaningful approach for diversity analysis and sustainable conservation approach. During present studies the identification has been done from Bingham (1905, 1907), Evans (1932), Wynter-Blyth (1957), Cantiel (1963) and the nomenclature has been followed from Varshney (2010).

From Indian Himalayan region 1013 species of butterflies has been reported, out of which, the biogeographic zone 1 represents 134 species (1A :111 species; 1B :76 species and 1C : 5 species) (Das *et. al.* 2018) and of which 288 species occur in Himachal Pradesh (Arora *et. al.* 1995, 2005). Butterflies of Great Himalayan National Park as well as Great Himalayan landscape including all protected areas around GHNP in Kullu and Kinnaur district has been documented by Uniyal and Mehta (1996), Uniyal and Mathur (1998, 50 species) and Uniyal (2007, 75 species). During present studies, 71 species has been recorded from Eco-sensitive zone of Sainj Wildlife Sanctuary alone referable to 53 genera and five families.

#### **MATERIALS AND METHODS :**

Survey of butterflies was made at different altitudes in various areas and habitats in Eco-

sensitive zone of Sainj WLS during day times (9 a.m to 2.30 p.m.) for a period of three years (from April, 2016 to March, 2018). Various area (as given in table:1) and habitats (viz. forests, agriculture fields, waste lands, grasslands, around wet lands) were surveyed. After identification, checklist of butterflies was prepared from this eco-sensitive area.

### RESULTS AND DISCUSSION :

Butterflies constitute an integral part of the conservation areas and show distinct patterns of habitat utilization. Being sensitive creatures, they leave the degraded or deteriorating habitats. Protected areas provide suitable habitats and environment for butterflies. The baseline data of protected areas are of great value as it provides meaningful approach for diversity analysis and sustainable conservation approach. During present studies the identification has been done from Bingham (1905, 1907), Evans (1932), Wynter-Blyth (1957), Cantiel (1963) and the nomenclature has been followed from Varshney (2010).

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The species *Coladenia agnioides* (Hesperidae) recorded from Eco-zone of Sainj WLS has been recorded as an extended distribution in North-West Himalaya as it is previously recorded from East Himalayan region of India and the species *Mimathyma ambica* (Nymphalidae) from Himachal Pradesh. 36 species as given with "\*" above in the table-2, are new records from Great Himalayan landscape including Great Himalayan National Park and Protected areas of adjoining Kinnaur and Kullu districts.

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**Table 1 : Localities surveyed in Eco-sensitive zone of Sainj WLS**

S. No.	Name of Locality	Latitude	Longitude	Altitude (in meters)
1	Bah	31.78012	77.42441	1849
2	Dalogi	31.76501	77.3409	2120
3	Kathyogi	31.76214	77.34894	1774
4	Neoli	31.78737	77.3743	2280
5	Niharni	31.78134	77.41188	1776
6	Ropa	31.76596	77.35603	1772
7	Shangarh Shah	31.76113	77.37888	2126
8	Taliyara	31.78494	77.37946	2133
9	Noi	31.75905	77.34932	2042



**Table 2 : Diversity of butterflies in Eco-sensitive zone of Sainj Wildlife Sanctuary (District Kullu (HP))**

Family	Species name	Common Name	Nirahr ni	Shangar Shah	Ropa	Taliy ara	Dalog i	Neol i	Noi	Bah	Kat hyo gi	statu s
Papilionidae	<i>Atrophaneura polyeuctes</i> (Doubleday, 1842)	Common Windmill	+	-	-	-	-	-	-	-	-	R
Papilionidae	<i>Atrophaneura dasarda</i> (Moore, 1857)	Great Windmill	+	-	-	-	-	-	-	+	-	NC*
Papilionidae	<i>Papilio protenor</i> Cramer, [1775]	Spangle	-	+	-	-	-	-	-	-	-	R*
Papilionidae	<i>Papilio polyctor</i> Boisduval, 1836	Common peacock	+	+	+	-	-	-	-	-	-	C
Pieridae	<i>Aporia agathon</i> (Gray, 1831)	Great Blackvein	+	-	-	-	-	-	-	-	-	NC*
Pieridae	<i>Pieris brassicae</i> (Linnaeus, 1758)	Large Cabbage White	-	+	-	+	+	-	-	-	-	NC
Pieridae	<i>Pieris canidia</i> (Linnaeus, 1768)	Indian Cabbage White	+	+	+	+	+	+	+	+	+	C
Pieridae	<i>Pieris melete</i> Ménétriés, 1857	Asian Green-veined White	-	-	+	-	-	-	-	-	-	R*
Pieridae	<i>Pontia daplidice</i> (Linnaeus, 1758)	Large Cabbage White	+	+	-	+	-	-	-	-	-	NC
Pieridae	<i>Belenois aurota</i> (Fabricius, 1793)	Brown Veined White	+	+	-	-	+	-	-	+	+	NC
Pieridae	<i>Delias belladonna</i> (Fabricius, 1793)	Hill Jazebel	+	+	-	-	-	+	-	-	-	NC
Pieridae	<i>Catopsilia pomona</i> (Fabricius, 1775)	Lemon Migrant	+	-	-	-	-	-	-	-	-	NC
Pieridae	<i>Gonepteryx rhamni</i> (Linnaeus, 1758)	Common Brimstone	+	+	-	-	-	-	-	+	-	NC
Pieridae	<i>Colias erate</i> (Esper, [1805])	Pale Clouded Yellow	-	+	-	+	-	-	-	-	-	NC
Pieridae	<i>Colias fieldii</i> Ménétriés, 1855	Dark Clouded Yellow	-	+	-	+	+	-	-	+	-	C
Pieridae	<i>Eurema hecabe</i> (Linnaeus, 1758)	Common Grass Yellow	-	+	+	-	-	-	-	-	-	NC*
Nymphalidae	<i>Danaus chrysippus</i> (Linnaeus, 1758)	Plain Tiger	-	+	-	-	-	-	-	-	-	NC
Nymphalidae	<i>Parantica sita</i> (Kollar, 1844)	Chestnut Tiger	+	-	-	-	-	-	-	-	-	R
Nymphalidae	<i>Lethe verma</i> (Kollar, 1844)	Straight banded Treebrown	-	-	+	-	+	-	+	+	+	NC
Nymphalidae	<i>Lethe insana</i> (Kollar, [1844])	Common Forester	-	-	-	-	-	+	-	+	-	R*
Nymphalidae	<i>Lethe nicetas</i> (Hewitson, 1863)	Yellow Woodbrown	-	-	-	-	-	-	-	+	-	R
Nymphalidae	<i>Lasiommata</i>	Common	-	-	+	+	+	+	+	+	-	C

	<b>schakra</b> (Kollar, [1844])	Wall										
Nymphalidae	<b>Ypthima sakra</b> Moore, 1857	Himalayan Fire Ring	+	-	-	-	+	-	-	+	-	NC*
Nymphalidae	<b>Ypthima inica</b> Hewitson, 1865	Lesser Three Ring	+	-	-	-	-	-	-	-	-	C*
Nymphalidae	<b>Callerebia kalinda</b> (Moore, 1865)	Scarce Mountain Argus	-	-	-	+	+	-	-	+	-	NC*
Nymphalidae	<b>Callerebia scanda</b> (Kollar, 1844)	Pallid Argus	-	-	-	+	-	-	-	-	-	NC*
Nymphalidae	<b>Aulocera saraswati</b> (Kollar, [1844])	Striated Satyr	+	-	-	-	-	-	-	+	-	R
Nymphalidae	<b>Aulocera swaha</b> (Kollar, [1844])	Common Satyr	+	+	-	+	+	-	-	+	-	C
Nymphalidae	<b>Argyreus hyperbius</b> (Linnaeus, 1763)	Indian Fritillary	-	+	-	-	-	-	-	-	-	NC
Nymphalidae	<b>Childrena childreni</b> Gray, 1831	Large Silverstripe	+	+	+	-	-	-	+	+	-	NC*
Nymphalidae	<b>Fabriciana kamala</b> (Moore, 1857)	Common Silverstripe	-	+	-	-	-	-	-	-	-	R*
Nymphalidae	<b>Issoria isaea</b> (Gray, 1846)	Himalayan Queen Fritillary	-	+	-	-	-	+	-	-	-	NC
Nymphalidae	<b>Phalanta phalantha</b> (Drury, [1773])	Common Leopard	+	+	-	+	-	-	-	+	-	NC*
Nymphalidae	<b>Nymphalis xanthomelas</b> (Esper, 1781)	Yellow Legged Tortoiseshell	+	+	-	-	-	-	-	-	-	R*
Nymphalidae	<b>Aglais cashmirensis</b> Kollar, 1844	Indian Tortoiseshell	+	+	+	+	-	-	-	+	-	C
Nymphalidae	<b>Kaniska Canace</b> (Linnaeus, 1763)	Blue Admiral	+	-	+	-	-	+	-	+	-	NC
Nymphalidae	<b>Vanessa indica</b> (Herbst, 1794)	Indian Red Admiral	+	+	-	-	+	+	-	-	-	C
Nymphalidae	<b>Cynthia cardui</b> (Linnaeus, 1758)	Painted Lady	-	+	-	+	+	-	-	+	-	C
Nymphalidae	<b>Junonia orithya</b> (Linnaeus, 1758)	Blue Pansy	-	+	+	-	+	-	-	-	-	NC
Nymphalidae	<b>Junonia lemonias</b> (Linnaeus, 1758)	Lemon Pansy	-	-	-	-	+	-	-	-	-	C
Nymphalidae	<b>Junonia iphita</b> (Cramer, [1779])	Chocolate Pansy	+	-	+	+	+	+	+	+	-	C
Nymphalidae	<b>Cyrestis thyodomas</b> Boisduval, 1846	Common Map	+	-	-	-	-	+	-	-	-	NC*
Nymphalidae	<b>Neptis ananta</b>	Yellow	-	-	-	-	-	-	+	-	-	R*



Nymphalidae	Moore, 1858 <b>Neptis hylas</b> (Linnaeus, 1758)	Sailer Common Sailer	+	+	-	-	+	-	+	+	-	NC
Nymphalidae	<b>Neptis narayana</b> Moore, 1858	Broadstic k Sailer	+	-	-	-	-	-	-	-	-	R*
Nymphalidae	<b>Neptis soma</b> Moore, 1858	Sullied Sailer	+	-	-	-	-	-	-	-	-	R*
Nymphalidae	<b>Neptis sankara</b> (Kollar,[1844])	Broad- banded Sailer	+	-	-	-	+	-	-	-	-	R*
Nymphalidae	<b>Athyma opalina</b> (Kollar, 1844)	Himalaya n Sergeant	+	-	-	-	-	-	+	+	-	NC*
Nymphalidae	<b>Euthalia aconthea</b> (Cramer, [1777])	Common Barron	-	-	-	-	-	-	-	+	-	R*
Nymphalidae	<b>Pseudergolis wedah</b> (Kollar, 1848)	Straight Banded Treebrow n	+	-	-	-	-	-	-	-	-	R*
Nymphalidae	<b>Mimathyma ambica</b> (Kollar, [1844])	Indian Purple Emperor	+	-	-	-	-	-	-	-	-	NC*
Nymphalidae	<b>Libythea lepita</b> (Moore, 1858) Common name:	Himalaya n Common Beak	+	+	-	-	-	-	-	+	-	NC*
Lycaenidae	<b>Dodona durga</b> (Kollar, 1844)	Common Punch	+	-	+	-	-	+	-	-	-	NC
Lycaenidae	<b>Heliophorus sena</b> (Kollar, [1844])	Sorrel Sapphire	-	-	-	-	-	+	+	+	-	NC
Lycaenidae	<b>Heliophorus androcles</b> (Westwood, 1851)	Green Sapphire	+	-	+	-	-	-	+	+	-	NC
Lycaenidae	<b>Lycaena phlaeas</b> (Linnaeus, 1761)	Common Copper	+	+	+	+	+	+	+	+	+	C
Lycaenidae	<b>Everes argiades</b> (Pallas, 1771)	Tailed Cupid	-	+	-	-	-	-	-	-	-	NC*
Lycaenidae	<b>Zizeeria karsandra</b> (Moore, 1865)	Dark Grass Blue	-	+	-	-	-	-	-	-	-	NC
Lycaenidae	<b>Pseudozizeeria maha</b> (Kollar, [1844])	Pale Grass Blue	-	-	-	-	-	-	-	+	-	NC
Lycaenidae	<b>Zizina otis</b> (Fabricius, 1787)	Common Grass Blue	-	+	-	-	-	-	-	-	-	NC*
Lycaenidae	<b>Aricia agestis</b> ([Schiffermüller], 1775)	Brown Argus	-	+	-	-	-	+	-	-	-	NC*
Lycaenidae	<b>Lampides boeticus</b> (Linnaeus, 1767)	Pea Blue	+	-	+	-	+	+	+	+	+	C
Lycaenidae	<b>Oreolyce vardhana</b> (Moore, [1875])	Dusky Hedge Blue	+	-	-	-	-	-	-	-	-	R*
Lycaenidae	<b>Celastrina gigas</b> (Hemming, 1928)	Silvery Hedge Blue	+	+	+	-	+	+	-	+	-	C*
Lycaenidae	<b>Celastrina</b>	Large	-	+	-	+	-	-	-	-	-	NC*



	<b>huegelli (Moore, 1882)</b>	Hedge Blue										
Lycaenidae	<b>Chaetoprocta odata</b> (Hewitson, 1865)	Walnut Blue	-	-	-	+	-	-	-	-	-	C*
Lycaenidae	<b>Arhopala dodonaea</b> Moore, [1858]	Pale Himalayan Oakblue	+	-	-	-	-	-	-	-	-	R*
Hesperiidae	<b>Pseudocoladenia dan</b> (Fabricius, 1787)	Fulvous Pied Flat	-	-	-	-	-	-	+	-	-	NC*
Hesperiidae	<b>Parnara guttatus</b> (Bremer & Gray, [1852])	Straight Swift	-	-	-	-	-	-	+	-	-	NC*
Hesperiidae	<b>Coladenia agnioides</b> Elwes & Edwards, 1897	Brown Tipped Pied Flat	+	-	-	-	-	-	-	-	-	R*
Hesperiidae	<b>Potanthus dara</b> (Kollar, [1844])	Himalayan Dart	-	-	-	-	-	-	-	+	-	R*