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# Journal of Threatened Taxa

Building evidence for conservation globally

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ISSN 0974-7907 (Online) | ISSN 0974-7893 (Print)

## SHORT COMMUNICATION

### STATUS, ABUNDANCE, AND SEASONALITY OF BUTTERFLY FAUNA AT KUVEMPU UNIVERSITY CAMPUS, KARNATAKA, INDIA

M.N. Harisha & B.B. Hosetti

26 April 2021 | Vol. 13 | No. 5 | Pages: 18355–18363

DOI: [10.11609/jott.4488.13.5.18355-18363](https://doi.org/10.11609/jott.4488.13.5.18355-18363)



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## Status, abundance, and seasonality of butterfly fauna at Kuvempu University Campus, Karnataka, India

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**Abstract:** A survey was conducted to record the diversity, status, and occurrence of butterfly species in the Kuvempu University Campus, Jnana Sahyadri, Shivamogga District, Karnataka during February 2010 to January 2011. A total of 115 species of butterflies in 77 genera, belonging to five families were recorded. Nymphalidae comprised the highest number of species, followed by Lycaenidae, Pieridae, Papilionidae, and Hesperiidae. The study area hosts 14 species of butterflies protected under various schedules of the Indian Wildlife Protection Act, 1972. Nine species recorded are endemic to the Western Ghats of peninsular India and Sri Lanka. Hence there is an urgent need to protect this habitat by adapting long-term monitoring programs to manage and conserve the butterfly diversity.

**Keywords:** Diversity, Jnana Sahyadri, Lepidoptera, Seasonality, Shivamogga District, Western Ghats.

northern Western Ghats (Gaonkar 1996).

The diversity of butterflies in a given area reflects the overall plant diversity and the presence of suitable habitats (Kakati 2006), making them good indicators of health of the ecosystems (Padhye et al. 2006) that can be used to assess the impact of various threats (Gaonkar 1996; Kunte 2000, 2008; Kehimkar 2008) and formulating conservation priorities for management of biodiversity. Thus, there is a need for studies of butterfly community structure and dynamic group structure in different regions to assess the impact of changing natural habitats on the diversity and distribution of butterflies.

### MATERIAL AND METHODS

#### Study Area

Kuvempu University Campus is located between 13.7359° N and 75.6324° E at an elevation of 680–720m. The campus is situated 24km south-east of Shivamogga City and 4km north of Bhadra Reservoir amidst dry deciduous forest, and is located on the edge of Bhadra Tiger Reserve and Bhadra Wildlife Sanctuary. The campus covers an area of 326 acres, with 56% of the land being under forest (undisturbed area) and the remaining 44% occupied by buildings and associated landscaping

Butterflies are good indicators of habitat quality, climatic conditions, seasonal, and ecological changes; butterfly studies can be used to formulate conservation strategies (Beccaloni & Gaston 1995). India has 1,800 species and subspecies of butterflies (Kunte et al. 2018), and peninsular India hosts 350 species including many endemics, most found in the Western Ghats (Kunte 2008). Three-hundred-and-seventeen species have been recorded from the southern Western Ghats, 316 from the central Western Ghats and 200 from the

**Editor:** Ashish D. Tiple, Vidyabharati College, Seloo, Wardha, India.

**Date of publication:** 26 April 2021 (online & print)

**Citation:** Harisha, M.N. & B.B. Hosetti (2021). Status, abundance, and seasonality of butterfly fauna at Kuvempu University Campus, Karnataka, India. *Journal of Threatened Taxa* 13(5): 18355–18363. <https://doi.org/10.11609/jott.4488.13.5.18355-18363>

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**Funding:** Kuvempu University.

**Competing interests:** The authors declare no competing interests.

**Acknowledgements:** We take this opportunity to thank: the authorities of Kuvempu University for their support and facilities; all faculty members of Department of Wildlife and Management for their continuous support; Mrs. Yashaswini M.P who helped in making the map of the study area with ArcGIS software; and Mr. Harish Prakash for proving some field photographs.



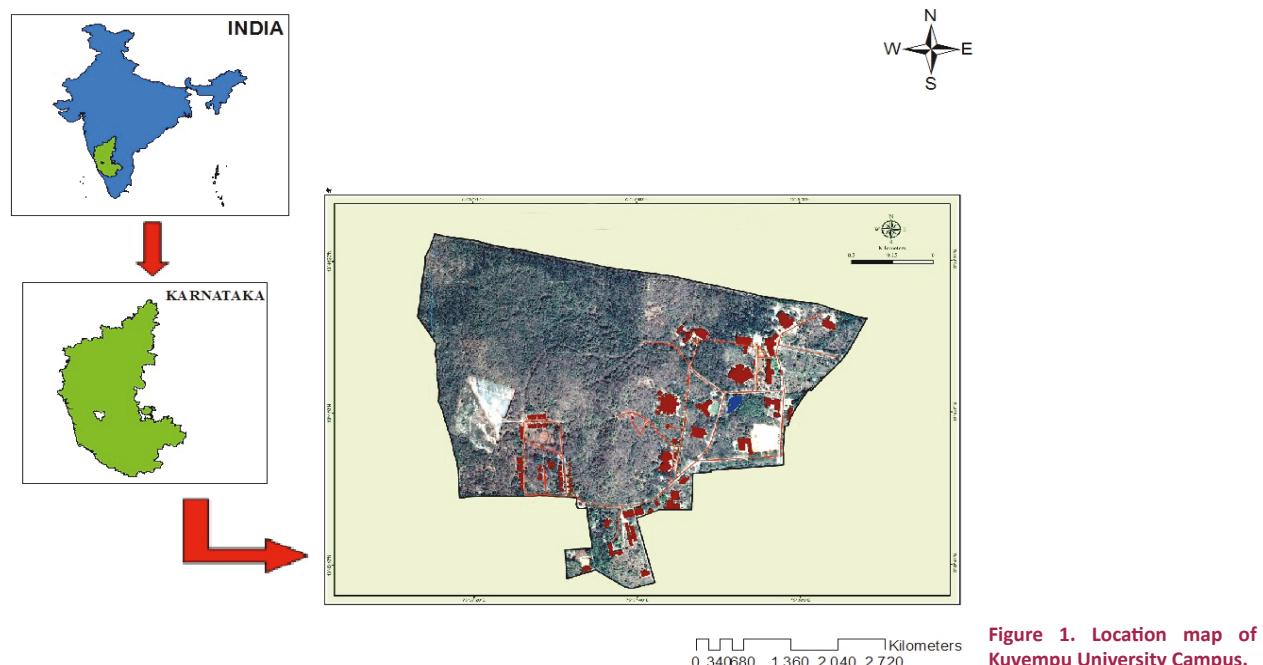


Figure 1. Location map of Kuvempu University Campus.

(Fig. 1). The predominant vegetation is typically dry deciduous forest having considerable similarity with the wildlife sanctuary.

#### Sampling method

The line transect method developed by the Institution of Terrestrial Ecology (Pollard 1979) was followed to monitor the diversity. Three line transects were set up, which were approximately 500m long and 10m wide, passing through different landscape element types. The transect lines were walked at a constant pace for approximately half an hour. Transects were walked from 07.30 to 11.00 h when butterflies are most active. Transects were walked every month for a period of one year from February 2010 to January 2011. Butterflies were identified with the help of field guide (Kunte 2000). Specimen collection was strictly avoided. The taxonomic status of butterflies is adopted from Kunte (2000). The status was scored using presence-absence scoring method and then percentage of abundance was calculated to determine the status. On the basis of abundance, butterflies were categorized under different score classes such as 80–100% as very common (VC), 60–80% as common (C), 40–60% as occasional (O), 20–40% as rare (R), and below 20% as very rare (VR) (Aneesh et al. 2013).

The seasonality of butterflies in the campus was then compared with trends available in other studies of Western Ghats, from Peringome Vayakkara Panchayath,

Kerala (Sneha 2018) to see the variation in this forest type.

#### RESULTS AND DISCUSSION

During the study a total of 115 species of butterflies in 77 genera, belonging to five families were recorded (Table 1, Images 1–16). The family Nymphalidae dominated with 38 species (33% of total species) recorded, followed by Lycaenidae with 28 species (24%), Pieridae with 23 species (20%), Papilionidae with 15 species (13%), and Hesperiidae with 11 species (10%) (see Tables 1,2). The status of butterflies based on frequency of occurrence revealed that 52 species were common (45% of total), 23 rare (20%), 22 very common (19%), 11 very rare (10%), and 7 occasional (6%) (Tables 1,2).

Butterflies are seasonal in their occurrence. They are common for only a few months and rare or absent in other parts of the year (Kunte 2000). During the study, the seasonality in the occurrence of different butterfly species was also recorded (Table 1). Figure 2 represents seasonal wise variations in the abundance and distribution of butterfly species. The number of species encountered was highest during winter at 102 species, and decreased to 85 in summer and 64 during the monsoon; 39 species were sighted throughout the year.

Butterflies are sensitive to changes in habitat and climate, which influence their distribution and

**Table 1. Checklist of butterflies of Kuvempu University Campus along with legal status, status, and seasonality.**

	Common name	Scientific name	Legal status (IWPA 1972)	Status	Seasonality
	<b>Papilionidae</b>				
1	Crimson Rose	<i>Pachliopta hector</i> (Linnaeus, 1758)	Sch. I	VC	M
2	Common Rose	<i>Pachliopta aristolochiae</i> (Fabricius, 1775)		R	S, M
3	Malabar Rose*	<i>Pachliopta pandiyana</i> (Moore, 1881)		VR	W
4	Common Mime	<i>Papilio clytia</i> (Linnaeus, 1758)	Sch. I	R	W, S, M
5	Common Mormon	<i>Papilio polytes</i> (Linnaeus, 1758)		C	W, S, M
6	Blue Mormon**	<i>Papilio polymnestor</i> (Cramer, 1775)		R	W, S, M
7	Lime Swallowtail	<i>Papilio demoleus</i> (Linnaeus, 1758)		VC	W, S
8	Common-banded Peacock	<i>Papilio crino</i> (Fabricius, 1793)		VR	W, S
9	Malabar Raven*	<i>Papilio dravidarum</i> (Wood-Mason, 1880)		R	W, S
10	Red Helen	<i>Papilio helenus</i> (Linnaeus, 1758)		O	W, M
11	Common Bluebottle	<i>Graphium sarpedon</i> (Linnaeus, 1758)		R	W, M
12	Tailed Jay	<i>Graphium agamemnon</i> (Linnaeus, 1758)		VC	W, S, M
13	Common Jay	<i>Graphium doson</i> (C. & R. Felder, 1864)		C	W
14	Spot Swordtail	<i>Graphium nomius</i> (Esper, 1799)		C	S
15	Sahyadri Birdwing*	<i>Troides minos</i> (Cramer, 1779)		R	W, S, M
	<b>Lycaenidae</b>				
16	Common Silverline	<i>Spindasis vulcanus</i> (Fabricius, 1775)		C	W, S
17	Common Pierrot	<i>Castalius rosimon</i> (Fabricius, 1775)	Sch. I	VC	W, S, M
18	Red Pierrot	<i>Talicada nyseus</i> (Guerin-Meneville, 1843)		C	W, S
19	Dark Pierrot	<i>Tarucus ananda</i> (de Nicéville, 1884)	Sch. IV	C	W, S
20	Angled Pierrot	<i>Caleta decidia</i> (Hewitson, 1876)		C	W, S, M
21	Banded Blue Pierrot	<i>Discolampa ethion</i> (Westwood, 1851)		C	W, S, M
22	Common Cerulean	<i>Jamides celeno</i> (Cramer, 1775)		VC	W, S, M
23	Dark Cerulean	<i>Jamides bochus</i> (Stoll, 1782)		C	W, S, M
24	Gram Blue	<i>Euchrysops cneius</i> (Fabricius, 1798)	Sch. II	C	W, S
25	Zebra Blue	<i>Leptotes plinius</i> (Fabricius, 1793)		C	W
26	Pea Blue	<i>Lampides boeticus</i> (Linnaeus, 1767)	Sch. II	C	S, M
27	Lime Blue	<i>Chilades lajus</i> (Stoll, 1780)		C	S, M
28	Dark Grass Blue	<i>Zizeeria karsandra</i> (Moore, 1865)		VC	W, S, M
29	Lesser Grass Blue	<i>Zizina otis</i> (Fabricius, 1787)		C	W, S
30	Tiny Grass Blue	<i>Zizula hylax</i> (Fabricius, 1775)		VR	S, M
31	Common Lineblue	<i>Prosotas nora</i> (C. Felder, 1860)	Sch. II	VC	W, S, M
32	Common Hedge Blue	<i>Acytolepis puspa</i> (Horsfield, 1828)		C	W, M
33	Plain Hedge Blue	<i>Celastrina lavendularis</i> (Moore, 1877)		C	M
34	Orange-spotted Grass Jewel	<i>Freyeria trochylus</i> (Freyer, 1845)		VC	W
35	Forget-me-not	<i>Catochrysops strabo</i> (Fabricius, 1793)		C	M
36	Large Oakblue	<i>Arhopala amantes</i> (Hewitson, 1862)		O	W, M
37	Indian Oakblue	<i>Arhopala atrax</i> (Hewitson, 1862)		O	S
38	Monkey Puzzle	<i>Rathinda amor</i> (Fabricius, 1775)		C	W, S
39	Apefly	<i>Spalgis epius</i> (Westwood, 1851)		R	W, S
40	Yamfly	<i>Loxura atymnus</i> (Stoll, 1780)		O	S, M
41	Plum Judy	<i>Abisara echerius</i> (Stoll, 1790)		C	W, S, M
42	Plains Cupid	<i>Chilades pandava</i> (Horsfield, 1829)		C	W, S, M

	Common name	Scientific name	Legal status (IWPA 1972)	Status	Seasonality
43	Indigo Flash	<i>Rapala varuna</i> (Horsfield, 1829)	Sch. II	R	W, M
	<b>Nymphalidae</b>				
44	Common Castor	<i>Ariadne merione</i> (Cramer, 1777)		C	W, S
45	Tawny Coster	<i>Acraea terpsicore</i> (Linnaeus, 1758)		VC	W, S
46	Blue Tiger	<i>Tirumala limniace</i> (Cramer, 1775)		VC	W, S
47	Dark Blue Tiger	<i>Tirumala septentrionis</i> (Butler, 1874)		C	W, S
48	Glossy Tiger	<i>Parantica aglea</i> (Stoll, 1782)		VR	W, S
49	Plain Tiger	<i>Danaus chrysippus</i> (Linnaeus, 1758)		R	W, S
50	Striped Tiger	<i>Danaus genutia</i> (Cramer, 1779)		C	W, S
51	Common Leopard	<i>Phalanta phalantha</i> (Drury, 1773)		VC	W, S
52	Grey Count	<i>Tanaecia lepidea</i> (Butler, 1868)	Sch. II	R	W, S, M
53	Indian Common Crow	<i>Euploea core</i> (Cramer, 1780)		VC	W, S, M
54	Danaid Eggfly	<i>Hypolimnas misippus</i> (Linnaeus, 1764)	Sch. I	C	W, S, M
55	Great Eggfly	<i>Hypolimnas bolina</i> (Linnaeus, 1758)		C	W, S, M
56	Lemon Pansy	<i>Junonia lemonias</i> (Linnaeus, 1758)		VC	W, S
57	Peacock Pansy	<i>Junonia almana</i> (Linnaeus, 1758)		C	W, S
58	Yellow Pansy	<i>Junonia hirta</i> (Fabricius, 1798)		C	W, S
59	Chocolate Pansy	<i>Junonia iphita</i> (Cramer, 1779)		C	W, S, M
60	Grey Pansy	<i>Junonia atlites</i> (Linnaeus, 1763)		R	W, S
61	Blue Pansy	<i>Junonia orithya</i> (Linnaeus, 1758)		VC	W
62	Common Evening Brown	<i>Melanitis leda</i> (Linnaeus, 1758)		VC	W, S, M
63	Dark Evening Brown	<i>Melanitis phedima</i> (Cramer, 1780)		C	W, M
64	Common Bushbrown	<i>Mycalesis perseus</i> (Fabricius, 1775)		C	W, S, M
65	Dark-branded Bushbrown	<i>Mycalesis mineus</i> (Linnaeus, 1758)		C	W
66	Malabar Glad-eye Bushbrown***	<i>Mycalesis junonia</i> (Butler, 1868)		C	W
67	Bamboo Treebrown	<i>Lethe europa</i> (Fabricius, 1775)		C	W, S, M
68	Common Five-ring	<i>Ypthima baldus</i> (Fabricius, 1775)		VC	W, S, M
69	Common Four-ring	<i>Ypthima huebneri</i> (Kirby, 1871)		VC	W, S, M
70	Common Baron	<i>Euthalia aconthea</i> (Cramer, 1777)		C	W, S, M
71	Common Lascar	<i>Pantoporia hordonia</i> (Stoll, 1790)		R	W, S, M
72	Indian Nawab	<i>Charaxes bharata</i> (C. & R. Felder, 1867)		R	W, S
73	Tamil Yeoman***	<i>Cirrochroa thais</i> (Fabricius, 1787)		VR	W, S
74	Common Palmfly	<i>Elymnias hypermnestra</i> (Linnaeus, 1763)		C	W, S, M
75	Indian Red Admiral	<i>Vanessa indica</i> (Herbst, 1794)		VR	W, S
76	Painted Lady	<i>Vanessa cardui</i> (Linnaeus, 1758)		R	W, S
77	Rustic	<i>Cupha erymanthis</i> (Drury, 1773)		C	W, S
78	Baronet	<i>Symphaedra nais</i> (Forster, 1771)		R	W, S
79	Commander	<i>Moduza procris</i> (Cramer, 1777)		R	W, S
80	Common Sailer	<i>Neptis hylas</i> (Linnaeus, 1758)		VC	W, S, M
81	Nigger or Medus Brown	<i>Orsotriaena medus</i> (Fabricius, 1775)		VR	W, M
	<b>Pieridae</b>				
82	Common or Lemon Emigrant	<i>Catopsilia pomona</i> (Fabricius, 1775)		VC	W, S
83	Mottled Emigrant	<i>Catopsilia pyranthe</i> (Linnaeus, 1758)		C	W, S
84	Sahyadri Cabbage White	<i>Pieris canidia</i> (Linnaeus, 1768)		C	W, S
85	Common Albatross	<i>Appias albina</i> (Boisduval, 1836)	Sch. II	R	W, M

	Common name	Scientific name	Legal status (IWPA 1972)	Status	Seasonality
86	Indian Wanderer	<i>Pareronia hippia</i> (Fabricius, 1787)		C	W
87	Indian Jezebel	<i>Delias eucharis</i> (Drury, 1773)		C	W, S
88	Painted Sawtooth**	<i>Prioneris sita</i> (C. & R. Felder, 1865)	Sch. IV	VR	W
89	Common Grass Yellow	<i>Eurema hecabe</i> (Linnaeus, 1758)		VC	W, S, M
90	Small Grass Yellow	<i>Eurema brigitta</i> (Stoll, 1780)		C	W, S, M
91	One-spot Grass Yellow	<i>Eurema andersoni</i> (Moore, 1886)		C	W, M
92	Three-spot Grass Yellow	<i>Eurema blanda</i> (Boisduval, 1836)		C	W, M
93	Common Gull	<i>Cepora nerissa</i> (Fabricius, 1775)	Sch. II	O	W
94	Lesser Gull	<i>Cepora nadina</i> (Lucas, 1852)	Sch. II	VR	W, M
95	Crimson-tip	<i>Colotis danae</i> (Fabricius, 1775)		C	S
96	Little Orange-tip	<i>Colotis etrida</i> (Boisduval, 1836)		C	W, S
97	Plain Orange-tip	<i>Colotis aurora</i> (Cramer, 1780)		C	W, S
98	Small Salmon Arab	<i>Colotis amata</i> (Fabricius, 1775)		R	W, S, M
99	Large Salmon Arab	<i>Colotis fausta</i> (Olivier, 1804)		R	W, S, M
100	Yellow Orange-tip	<i>Ixias pyrene</i> (Linnaeus, 1764)		R	W, S
101	White Orange-tip	<i>Ixias marianne</i> (Cramer, 1779)		R	S
102	Great Orange-tip	<i>Hebomoia glaucippe</i> (Linnaeus, 1758)		VR	W, M
103	Pioneer	<i>Belenois aurota</i> (Fabricius, 1793)		VC	S
104	Psyche	<i>Leptosia nina</i> (Fabricius, 1793)		O	W, S, M
<b>Hesperiidae</b>					
105	Indian Grizzled Skipper	<i>Spialia galba</i> (Fabricius, 1793)		R	W, S, M
106	Grass Demon	<i>Udaspes folus</i> (Cramer, 1775)		C	W, S, M
107	Dark Palm-Dart	<i>Telicota bambusae</i> (Moore, 1878)		C	W, S, M
108	Oriental or Common Grass Dart	<i>Taractrocera maevius</i> (Fabricius, 1793)		R	W, S, M
109	Tawny-spotted or Tamil Grass Dart	<i>Taractrocera ceramas ceramas</i> (Hewitson, 1868)		VR	W, M
110	Rice Swift	<i>Borbo cinnara</i> (Wallace, 1866)		C	W, S, M
111	Chestnut Bob	<i>Iambrix salsala</i> (Moore, 1866)		VC	W, S, M
112	Common Banded Awl	<i>Hasora chromus</i> (Cramer, 1780)		C	W, M
113	White-banded Awl	<i>Hasora taminatus</i> (Hübner, 1818)		O	W, M
114	Common Snow Flat	<i>Tagiades japetus</i> (Stoll, 1781)		C	W, M
115	Sahyadri Banded Ace	<i>Halpe hindu</i> (Evans, 1937)		C	W, M

\*—Endemic to Western Ghats | \*\*—Endemic to peninsular India & Sri Lanka | \*\*\*—Endemic to Western Ghats & Sri Lanka | VC—Very common | C—Common | O—Occasional | R—Rare | W—Winter | S—Summer | M—Monsoon.

**Table 2. Community structure, composition, and frequency of butterflies in Jnana Sahyadri Campus, Kuvempu University.**

	Family	Relative abundance					
		No. of species	VC	C	O	R	VR
1	Papilionidae	15 (13%)	3	3	1	6	2
2	Lycaenidae	28 (24%)	5	17	3	2	1
3	Nymphalidae	38 (33%)	10	16	0	8	4
4	Pieridae	23 (20%)	3	10	2	5	3
5	Hesperiidae	11 (10%)	1	6	1	2	1
		<b>115 (100%)</b>	<b>22 (19%)</b>	<b>52 (45%)</b>	<b>7 (6%)</b>	<b>23 (20%)</b>	<b>11(10%)</b>

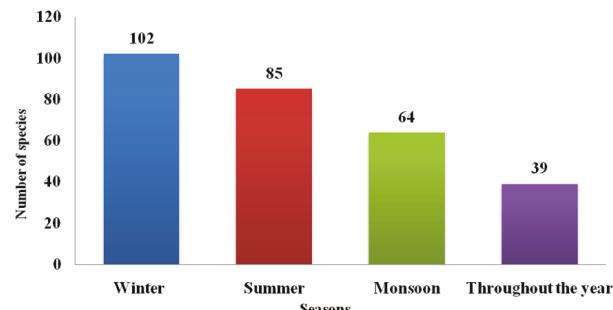


Figure 2. Seasonal wise variations in the abundance of butterfly species at Kuvempu University Campus.

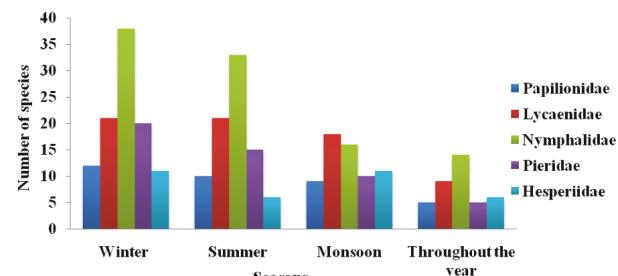


Figure 3. Family wise, seasonal distribution and occurrence of butterfly species at Kuvempu University Campus.

abundance (Wynter-Blyth 1957). Variations in the abundance and distribution of butterfly species (Fig. 3) were found to be consistently highest among the Nymphalidae in winter and summer and throughout the year. Among the Lycaenidae variation was equal in winter and summer, high in the monsoon and lower throughout the year. Among the Pieridae and Papilionidae it was persistently decreasing from winter, summer and monsoon throughout the year and among the Hesperiidae variation was inconsistent across seasons, being high in winter and monsoon, and low in summer and throughout the year.

The level of endemism varies within India depending upon the accessibility of larval as well as adult food resources, which determine the occurrence and migration of butterflies (Gilbert & Singer 1975). Forty-five species are endemic to southern India (Thomas 1966), of which seven were recorded from the study area: Malabar Rose *Pachliopta pandiyana* Moore, 1881, Malabar Raven *Papilio dravidarum* Wood-Mason, 1880 & Southern Birdwing *Triodes minos* Cramer, 1779, endemic to the Western Ghats (Kunte 2008), Glad-eye Bushbrown *Mycalesis patnia* Butler, 1868 & Tamil Yeoman *Cirrochroa thais* Fabricius, 1787 endemic to the Western Ghats & Sri Lanka (Kunte 2008; Kasambe 2018), and the Blue Mormon *Papilio polymnester* Cramer, 1775 & Painted Sawtooth *Prioneris sita* C. & R. Felder, 1865 endemic to peninsular India & Sri Lanka (Kunte 2008).

Conservation activities such as monitoring and mapping biodiversity have played a key role in determining diversity status (Margules & Pressey 2000). When compared to other habitats of the Western Ghats, overall species diversity in the study area was very low. The diversity and abundance of butterfly species is greatly associated with the availability of food plants in the surrounding habitat (Kunte et al. 1999). From this study, it was found that there was frequent clearing in the study area of weeds, which provided nectar as well

as larval host plants, resulting in low floral diversity that supported low butterfly diversity (Image 17).

The study also revealed the impacts of factors such as habitat alterations and improper drainage system (Image 18). The study area is a dry deciduous forest type with hilly terrains, which during the monsoon receives sufficient rainfall, but the drainage system carries water out of the area by flowing down towards the low lying areas, instead of allowing it to percolate into the forest soil. Consequently, there is low water retention for the plants to grow leaving the campus dry at the end of winter and during summer, providing poor habitat for butterflies. Also, the elimination of grasses, shrubs and trees during landscaping has resulted in loss of habitats for plants and butterflies, leading to local extinctions of species (Balmer & Erhardt 2000) (Images 19, 20).

Our results emphasize the importance of campus estates as habitats for butterflies. If landscaping is carefully planned and campus gardens are properly maintained, the diversity of butterfly fauna may increase on the campus, providing a rich ground for butterfly conservation as well as for research. Occurrence of scheduled and endemic species in the study area indicates an urgent need to protect this habitat by adapting long-term monitoring programs to manage and conserve the butterfly diversity of Kuvempu University Campus, Shivamogga District.

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Image 1. Southern Birdwing, *Troides minos*  
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Image 2. Blue Mormon, *Papilio polymnoster*  
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Image 3. Glad-eye Boshbrown, *Mycalesis patnia* ©HP

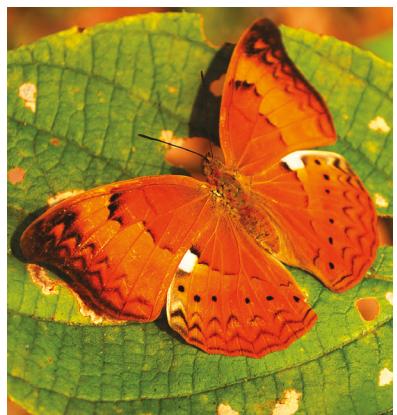


Image 4. Tamil Yeoman, *Cirrochroa thais*  
©HP



Image 5. Common Baron, *Euthalia aconthea*  
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Image 6. Common Crow, *Euploea core*  
©MNH



Image 7. Crimson Rose, *Pachliopta hector*  
©MNH



Image 8. Danaid Eggfly, *Hypolimnas misippus* ©MNH



Image 9. Great Eggfly, *Hypolimnas bolina*  
©MNH



Image 10. Grey Count *Tanaecia lepidea*  
©MNH



Image 11. Common Hedge Blue, *Acytolepis puspa* ©MNH

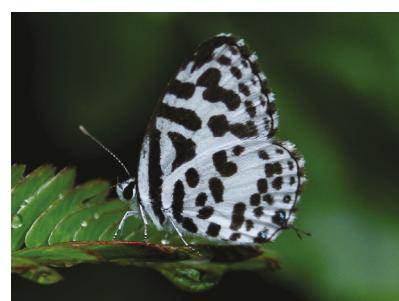


Image 12. Common Pierrot, *Castalius rosimon* ©MNH

Image 13. Dark Pierrot, *Tarucus ananda* ©MNHImage 14. Gram Blue, *Euchrysops cneus* ©MNHImage 15. Indigo Flash, *Rapala varuna* ©MNHImage 16. Pea Blue, *Lampides boeticus* ©MNH

Image 17. Forest patch with weeds cleared or uprooted ©MNH



Image 18. Drainage trench in the forest patch of KU Campus ©MNH

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**Image 19. Anthropogenic activities in the forest area of campus**  
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**Image 20. Anthropogenic activities in the forest area of campus**  
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