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A checklist of butterflies at Chincholi wildlife sanctuary, Kalaburagi district, Karnataka, India

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Abstract
The Chincholi Wildlife Sanctuary, which is the only dry land sanctuary in the Kalyana Karnataka region, is well known for its abundant biodiversity and especially for its thriving butterfly population. This is the first scientific attempt to study the butterflies at the Sanctuary. This study provides important insights into the intricate butterfly community thriving inside the sanctuary's distinctive ecology through a combination of field surveys, data gathering, and analysis. During the research period, 51 different kinds of butterfly species belonging to 5 families were found. Nymphalidae and Pieridae, two of the five families, topped the list with 20 and 15 species, respectively, and were followed by Lycaenidae (11 species), Papilionidae (4 species), and Hesperidae (1).

Keywords: Kalyana Karnataka region, biodiversity, dry land sanctuary

Introduction

Butterflies are among the most intriguing, colorful, and vibrant members of the class Insecta, specifically the order Lepidoptera. Lepidopterons also include moths. Butterflies majorly come under 5 families -Papilionidae, Lycanidae, Hesperidae, Pieridae, and Nymphalidae. There are approximately 28,000 species of butterflies in the whole world. India is home to about 1502 species of butterflies among which the Western Ghats have 334 species and Peninsular India 351 (Palei and Rath, 2014) [15]. They serve as indicators of Ecosystem Health and Biodiversity. Butterfly populations can be used to assess the impacts on climate change and habitat loss (Thomas *et al*., 1998) [19]. After honey bees, butterflies are considered to be the second most important pollinators of a variety of plants. (Borges *et al*., 2003) [4].

Wildlife Sanctuaries (WLS) and National Parks (NP's) form the important *in-situ* conservation areas for wildlife. These areas mainly focus on controlling the menace created by an increase in the population of humans and abrupt uncontrollable advances in technology which have several negative impacts on various wildlife habitats (Kantamaht *et al*., 2000) [11]. Karnataka state of India has a recorded forest area of 43,382 sq. km which is 22% of the total geographical area of the state. Altogether there are a total of 37 wildlife sanctuaries (including Bird Sanctuaries). A perusal of the literature about butterflies in wildlife sanctuaries in Karnataka suggests that from Bhadra WLS, a total of 54 species of butterflies were identified. (Raghavendra *et al*., 2011) [17]. 52 species of butterflies were recorded by Jeevan *et al*., 2013 [10] at Mandagadde Bird Sanctuary, Shivamogga. Dayananada conducted a scientific study at Gudavi Bird Sanctuary, Shivamogga, and recorded 115 species in 2014. Krishna identified 48 species of butterflies from Pushpagiri WLS, Kodagu in 2017. Basavarajappa and Santosh documented 138 species of butterflies from Nagarhole National Park in 2018. Harisha *et al*., 2019 [9] recorded 151 species in Shettihalli WLS, Shivamogga. Mohandas and Remadevi reported 149 species of Butterflies from Kudremukh National Park in 2019.

The above data clearly shows that most of the Butterfly studies have been restricted to the Western Ghats area of Karnataka. Only a handful of researchers have done notable works regarding Butterfly diversity in North Karnataka, especially in the Kalyana Karnataka region. In 2013, Harisha and Hosetti conducted a survey at the Daroji Sloth Bear Sanctuary in Hospet, Bellary, to assess the diversity of butterflies and they found 41 different species. 29 different kinds of butterflies were identified by Ankalga and Jadesh in an agricultural region close to Ankalga village in Kalaburagi. Saraf and Jadesh in 2016 [18] documented around 52 species of butterflies from Uplaon Nature Camp, Kalaburagi, Karnataka. As per the literature survey no comprehensive research on the diversity of butterflies has been undertaken in this region. In the current study, authors aim to provide scientific data related to studies conducted on butterfly diversity in one of the lush-green forest lands of the Kalyana Karnataka region which has remained as an untouched and hidden treasure of Wildlife i.e., Chincholi Wildlife Sanctuary.

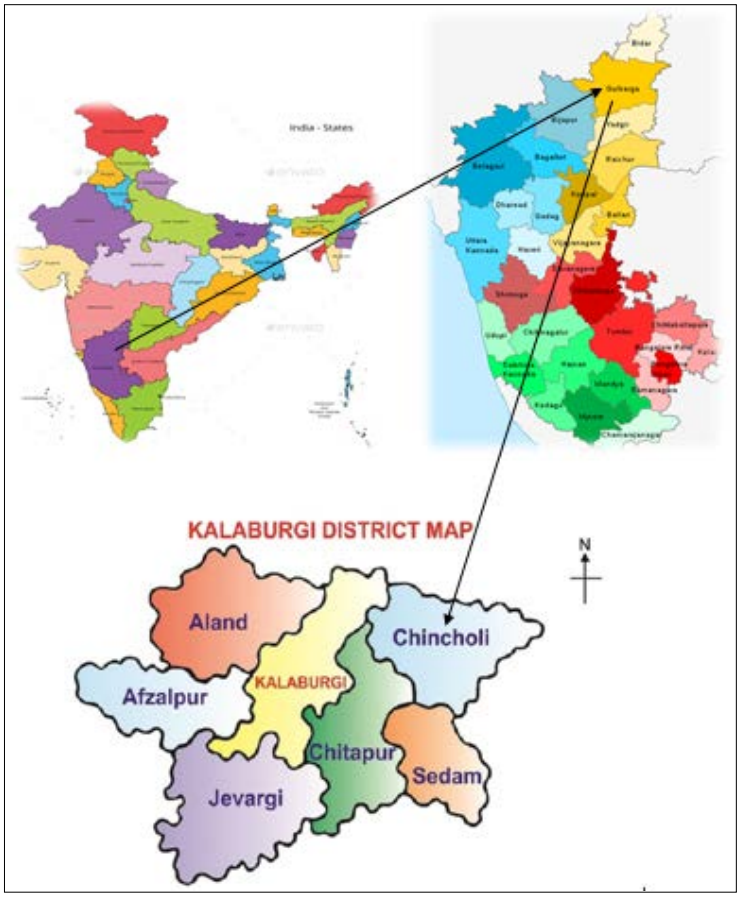
Materials and Methods

1. Study Area

Chincholi Wildlife Sanctuary is located in Chincholi taluq of Kalaburagi district of Karnataka. It also shares a border with Telangana state. It is 75 km away from the Kalaburgi district. The 134.88 square kilometers-long Chincholi Wildlife Sanctuary was declared as a sanctuary in 2011 by the Government of Karnataka. It is South India's first dry land wildlife sanctuary. In the Hyderabad Karnataka Region, this is the only place with a diverse range of floral species. The biodiversity in the woodland is abundant. In addition to therapeutic plants and trees, species like as red Sanders and sandalwood are also abundantly found. The sanctuary's interior is primarily made up of decent moist and dry deciduous forest, with acacia and teak plantations surrounding it. The forest is home to a variety of animals, such as the black buck, fruit bat, common fox, Indian wolf, and hyena. This sanctuary is home to around 35 different

bird species, including the Grey partridge, blue pigeon, black-headed oriole, blossom-headed parakeet, black drongo, and black-winged kite. The presence of diverse nectar plants and host plants provides an ideal place for several different species of butterflies to thrive in the sanctuary and hence the woodland provides a wonderful opportunity to examine the biodiversity of butterflies. The chincholi forest range is mainly divided into 3 sections- Chandrampalli section, Konchavarm section, and Shadipur section. There is a large dam named Chandrampalli dam along with 4 other small dams located inside the sanctuary.

Fig 1: Study Area



2. Methodology

A field survey was conducted for one year, from June 2022 to June 2023. To understand the diversity of butterflies at Chincholi Wildlife Sanctuary, Research was done on a regular basis for every 15 days and the hours of observation were from 7:00 am to 11:00 am in the morning and from 3:00 pm to 6:00 pm in the evening. Six different transects were drawn for the studies. Both direct eye observation and photographic documentation were used to identify the butterflies. No specimens were collected during the survey except for some small butterflies which were hard to identify. The small butterflies belonging to the family Lycanidae and Hesperidae were caught using a butterfly net and moved to a clear glass jar, examined closely and photographed, and then finally released safely. Nevertheless, sufficient safety measures were implemented to ensure that the target specimen was not harmed in any way during the process (Dayananda, 2014) [5]. To track the diversity, the institution of terrestrial ecology's created line transect method was used. (Pollard, 1979) [16]. The different transects were selected at potential sites in the study area-

1. Peripheral area of Chandrampalli Dam
2. Right and left canals (Naala) of Chandrampalli Dam
3. Horticulture Training Camp
4. Gottamgotta Nature Camp
5. Lal Talab (Lake)
6. Mango Orchard in the buffer zone of Sanctuary.

The butterflies photographed in the sanctuary were identified to the species level using various field guides. (Evans, 1932; Kehimkar, 2006; Gunanthilagaraj *et al*., 2015; Milind and Hemant, 2018) [6]. The identification of species was cross checked and authenticated by NCBS, Banglore.

Results

During the study period, 51 different kinds of butterfly species that belonged to 36 genera and 5 major families were identified. Nymphalidae and Pieridae, two of the five families, topped the list with 20 species and 15 species respectively followed by Lycaenidae (11 species), Papilionidae (4 species), and Hesperidae (1 species). (Table 1)

Table 1: Showing Checklist of butterflies recorded at Chincholi Wildlife Sanctuary, Kalaburagi, Karnataka

Serial number	Scientific name	Common name
	I) Family – Hesperidae	
1	*Pelopida mathias* (Fabricius, 1798)	Small Branded Swift
	ii) Family -Lycaenidae	
2	*Leptotes plinius* (Fabricius, 1793)	Zebra Blue
3	*Castalius rosimon* (Fabricius, 1775)	Common Pierrot
4	*Catochrysops Strabo* (Fabricius, 1793)	Forget Me Not
5	*Lampides boeticus* (Linnaeus, 1767)	Pea Blue
6	*Zizina otis* (Fabricius, 1787)	Lesser Grassblue
7	*Zizzeria karsandra* (Moore, 1865)	Dark Grassblue
8	*Zizula hylax* (Fabricius, 1775)	Tiny Grass blue
9	*Pseudozizeeria maha* (Kollar, 1844)	Pale Grass blue
10	*Freyeria putli* (Kollar, 1844)	Oriental Grass Jewel
11	*Azanus ubaldus* (Stoll, 1782)	Bright Babulblue
12	*Everes lacturnus* (Godart, 1824)	Indian Cupid
	iii) Family Nymphalidae	
13	*Danaus genutia* (Cramer,1779)	Striped Tiger
14	*Danaus chrysippus* (Linnaeus, 1758)	Plain Tiger
15	*Tirumala limniace* (Cramer, 1775)	Blue Tiger
16	*Euploea core* (Cramer, 1780)	Common Crow
17	*Melantis leda* (Linnaeus, 1758)	Common Evening Brown
18	*Melantis phedima* (Cramer, 1780)	Dark Evening Brown
19	*Ypthima asterope* (Klug, 1832)	Common Three Ring
20	*Acraea terpsicore* (Linnaeus, 1758)	Tawny Coster
21	*Phalanta phalanta* (Drury, 1773)	Common Leopord
22	*Ariadne ariadne* (Linnaeus, 1763)	Angled Castor
23	*Byblia ilithyia* (Drury, 1773)	Joker
24	*Junonia orithya* (Linnaeus, 1758)	Blue Pansy
25	*Junonia iphita* (Cramer, 1779)	Chocolate Pansy
26	*Junonia atlites* (Linnaeus, 1763)	Grey Pansy
27	*Junonia lemonias* (Linnaeus 1758)	Lemon Pansy
28	*Junonia almanac* (Linnaeus, 1758)	Peacock Pansy
29	*Junonia hierta* (Fabricus, 1798)	Yellow Pansy
30	*Hypolimnas misippus* (Linnaeus, 1764)	Danaid Eggfly
31	*Hypolimnas bolina* (Linnaeus, 1758)	Great Eggfly
32	*Vanessa cardui* (Linnaeus, 1758)	Painted Lady
	iv) Family Pieridae	
33	*Eurema hecabe* (Linnaeus, 1758)	Common Grass Yellow
34	*Eurema brigitta* (Stoll, 1780)	Small Grass Yellow
35	*Eurema blanda* (Boisduval, 1836)	Three Spot Grass Yellow
36	*Eurema laeta* (Boisduval, 1836)	Spotless Grass Yellow
37	*Catopsilia pyranthe* (Linnaeus, 1758)	Mottled Emigrant
38	*Catopsilia pomona* (Fabricius, 1775)	Common Emigrant
39	*Colotes danae* (Fabricius, 1775)	Crimson Tip
40	*Colotes aurora* (Cramer, 1780)	Plain Orange Tip
41	*Ixias Marianne* (Cramer, 1779)	White Orange Tip
42	*Ixias pyrene* (Linnaeus, 1764)	Yellow Orange Tip
43	*Leptosia nina* (Fabricius, 1793)	Psyche
44	*Pereronia hippie* (Fabricius, 1787)	Common Wanderer
45	*Cepora nerissa* (Fabricius, 1775)	Common Gull
46	*Benois aurota* (Fabricius, 1793)	Pioneer
47	*Delia eucharis* (Drury, 1773)	Common Jezebel
	v) Family Papilionidae	
48	*Graphium agamemnon* (Linnaeus, 1758)	Tailed Jay
49	*Papilio demoleus* (Linnaeuus, 1758)	Lime Butterfly
50	*Pachliopta aristolochiae* (Fabricius, 1775)	Common Rose
51	*Pachliopta hector* (Linnaeus, 1758)	Crimson Rose

Discussion

During a one-year study at Chincholi Wildlife Sanctuary, a survey was conducted along 6 different transects.

The Nymphalidae family was the most dominant in terms of species composition. They are also the most dominant butterflies in the tropical regions as they are polyphagous which helps them to thrive in harshest habitats. The capacity of strong flight also helps them to fly long distances in search of food (Joydeb *et al*., 2012). The dominance of Nymphalidae members also indicates the high richness of host plants in the Chincholi Wildlife Sanctuary as our study reported 20 different species of this family in the study area.

Two of the 51 species of butterflies that have been identified are protected under the recently modified Indian Wildlife

Protection Act 1972. As per the 2022 amendment of the Wildlife (Protection) Act-1972, the Danaid Eggfly and Crimson Rose fell under the Act's Schedule 2.

Table 2: Showing the total number of species with their respective families recorded at the study area

	Name of the Family	Total number of species recorded from each family
1	Family- Hesperidae	1
2	Family- Lycaenidae	11
3	Family- Nymphalidae	20
4	Family- Pieridae	15
5	Family- Papilionidae	4
	Total -	51 species

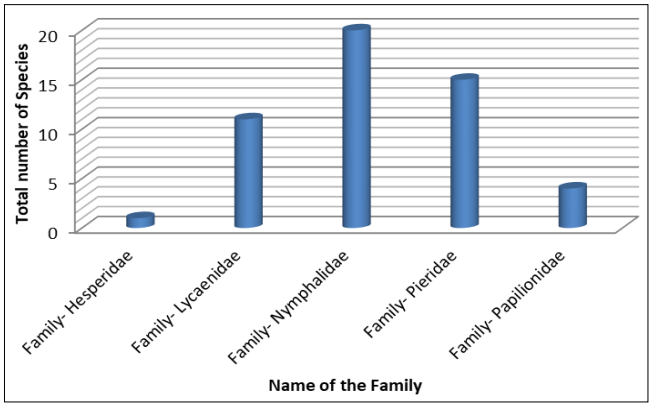
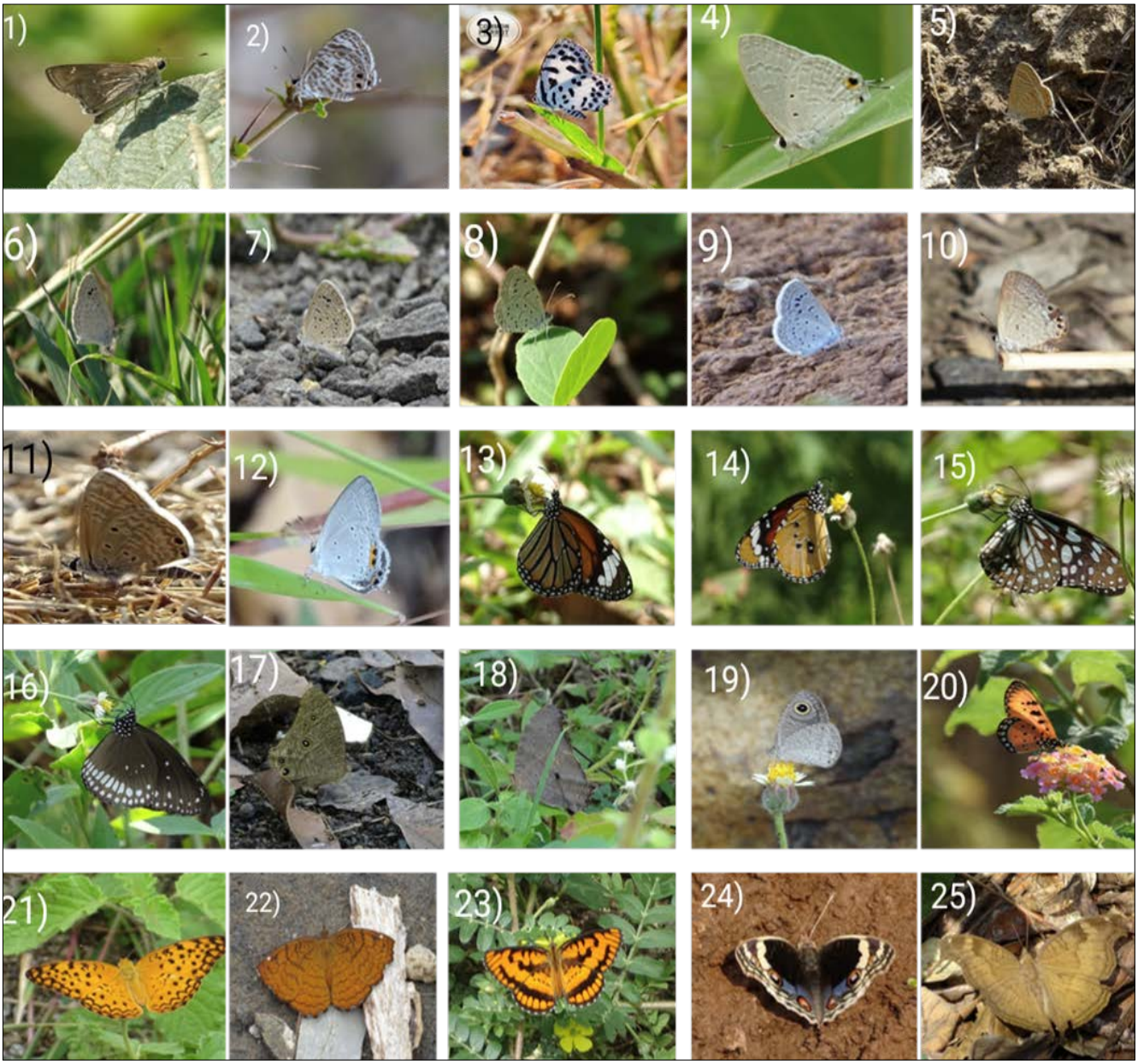


Fig 2: Bar graph showing species composition of different families



Images 1-25: *1-Pelopida mathias; 2-Leptotes plinius; 3-Castalius rosimon; 4- Catochrysops Strabo; 5- Lampides boeticus;6- Zizina otis; 7-Zizzeria karsandra; 8- Zizula hylax; 9- Pseudozizeeria maha; 10- Freyeria putli; 11- Azanus ubaldus;12- Everes lacturnus; 13- Danaus genutia; 14- Danaus chrysippus; 15- Tirumala limniace; 16- Euploea core; 17- Melantis leda; 18- Melantis phedima; 19- Ypthima asterope; 20-Ypthima asterope; 21- Phalanta phalanta; 22- Ariadne ariadne; 23- Byblia ilithyia; 24- Junonia orithya; 25- Junonia iphita.*

Images 25-51: *26- Junonia atlites; 27- Junonia lemonias;28- Junonia almanac; 29- Junonia hierta; 30 Hypolimnas misippus; 31- Hypolimnas bolina; 32- Vanessa cardui; 33- Eurema hecabe; 34- Eurema brigitta; 35- Eurema blanda; 36- Eurema laeta; 37- Catopsilia pyranthe; 38- Catopsilia Pomona; 39- Colotes danae; 40- Colotes aurora; 41- Ixias Marianne; 42- Ixias pyrene; 43- Leptosia nina; 44- Pereronia hippie; 45- Cepora nerissa; 46- Benois aurota; 47- Delia eucharis; 48- Graphium Agamemnon; 49- Papilio demoleus; 50- Pachliopta aristolochiae; 51- Pachliopta hector.*

Conclusion

The checklist showing 51 species of butterflies and the listing of 2 species under The Wildlife (Protection) Act 1972 shows that the diversity of butterflies in the studied region is quite high. This survey to assess the butterfly diversity has been the first scientific attempt to know the richness of wildlife at Chincholi Wildlife Sanctuary and it has offered us an invaluable opportunity to better understand the intricate web of life and the interdependencies that sustain ecosystems. Most of the research regarding Butterflies has been restricted only to the regions of Western Ghats in Karnataka. Despite the unique landscape and richness of wildlife, the Kalyana Karnataka region has been neglected in the studies relating to butterflies, so the core idea of carrying out our research was to fill this gap in the research arena. The Chincholi Wildlife Sanctuary offers a great opportunity for people of all age groups to love and appreciate the diversity of Flora and Fauna. In this regard, the study suggests that the Karnataka Forest Department can start setting up a Butterfly park at the Sanctuary which can draw the attention of the society towards the conservation efforts and the ecological importance of the butterflies. The authors also hope that more and more biodiversity works are taken up by the Karnataka Government and various other Research Institutes in the Chincholi Wildlife Sanctuary which will help in knowing our Wildlife in a better way.

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