Checklist of Butterflies (Lepidoptera) in Atpadi Conservation Reserve (Dubhai Kuran)

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***Abstract*—Butterflies are important indicators of habitat quality and biodiversity. This study presents a baseline assessment of butterfly diversity in the Atpadi Conservation Reserve (locally known as Dubhai Conservation Reserve), Atpadi tehsil, Sangli district, Maharashtra. Surveys were carried out using line-transect and time-constrained visual encounter methods across representative habitats (dry scrub, rocky outcrops, agricultural edges, riparian strips) between 2019 to 2021. We recorded species richness, relative abundance and calculated diversity indices and evenness. According to this checklist, the total number of 05 families and 40 species of butterfly were recorded, 18 species are belonging to the family Nymphalidae, 10 species to Pieridae, 03 species to Papilionidae, 07 species to Lycaenidae, and 02 species of Hesperiidae. The highest numbers of butterflies were recorded during the summer in the months of March to June. Species composition, seasonal occurrence, habitat associations and conservation implications are discussed. This baseline will inform future monitoring and community-based conservation actions in the reserve.**

***Index Terms*—Butterflies, Lepidoptera, diversity indices, Atpadi Conservation**

I. INTRODUCTION

Butterflies (Order Lepidoptera: Rhopalocera) are widely used as biological indicators due to their sensitivity to habitat change, short generation times and well-known taxonomy. Surveys of butterfly assemblages supply rapid information on habitat quality, plant–insect interactions and the effectiveness of conservation measures (Kunte 2000; Magurran 2004). There are approximately 255,000 to 265,000 documented species across 126 families of Lepidoptera worldwide, with butterflies accounting for 7.5% of these species (Saini P, 2021). Kunte (2001) Despite increasing interest in the biodiversity of Maharashtra, many local reserves still lack comprehensive lepidopteran inventories. The Atpadi Conservation Reserve (Dubhai Kuran) comprises a mosaic of dryland habitat types and agricultural matrix, forming potentially important refugia for xeric-adapted butterflies as well as generalist species.
This study aims to:

1) Document butterfly species richness and relative abundance across major habitat types within the reserve;
2) Calculate standard diversity indices and compare habitats;
3) Identify species of conservation concern or indicator status; and
4) Provide baseline recommendations for monitoring and habitat management.

II. MATERIALS AND METHODS

Study area

Atpadi Conservation Reserve (local name: Dubhai) lies in Atpadi tehsil, Sangli district, southwestern Maharashtra. The landscape is characterized by semi-arid plains with rocky outcrops, patches of scrub forest, seasonal streams and agricultural fields (sugarcane, sorghum, pulses) in the surrounding matrix. It geographically lies between 27°40' North of Latitude and 74°89' East of Longitude. Its Altitude is about 100 meters above sea level. Climate is tropical semi-arid with hot summers (Mar–May), monsoon rains (Jun–Sep) and cool winters (Nov–Feb). Dominant vegetation includes xerophytic shrubs, acacia and native grasses; riparian strips support riparian trees and herbs that are important nectar and larval host plants. The study area has 36 tree species, 116 herb species, 15 shrub species, 14 vine species, 1 parasitic plant are found in this area.

Methodology

Sampling covered four principal habitat types:

1) Dry scrub/rocky outcrops,
2) Riparian/streamside vegetation,
3) Agricultural edges/field margins, and
4) Degraded/open grassland patches.

Five study sites were randomly selected in different vegetation types. Transects were walked between 09:00–12:00 and 15:00–17:00 under suitable weather (sunny to partly cloudy; wind < 5 m s^{-1}) traversing slowly with a phase of 30 minutes per transect by visual counting within three-meter radius of the observer as per. Field photographed butterflies were identified with the help of field guides as per. Since, capturing of butterflies is strictly prohibited in NNP as per Wildlife Act, (1972), fast flying butterflies were not considered during the present investigation. Statistical Analysis: The collected data was compiled and the checklists of the butterflies were prepared. The density and abundance were calculated as per. Percentage compositions of the different families at different locations of study area were calculated by following standard methods and the data were graphically plotted. For identification of butterflies, we looked for a reference book "Butterflies of Begnas and Rupa Watershed area" (Smith et al., 2016) and some reputed internet websites like Butterflies of India (https://www.ifoundbutterflies.org/) was visited.

Results and Discussion

A total of 40 butterfly species were identified, with the Nymphalidae family being the most prevalent. The prevalence of the Nymphalidae family can be attributed to its status as one of the largest families in terms of species diversity and its wide distribution in nature (Khyade et al., 2018). This dominance is likely a result of their ecological adaptability and strong dispersal capabilities. It was observed that butterfly diversity and distribution decrease as human disturbances, habitat fragmentation, and forest fires increase (Khanal et al., 2013). Since butterflies serve as ecological indicators, a declining population can signal habitat degradation (Bourn & Thomas, 2002). Throughout the study, it became evident that further exploratory work is needed to estimate the population size and abundance of these insects. The region's abundant flora provides an ideal environment and location for biodiversity. A total number of 05 families and 40 species of butterfly are recorded, 18 species are belonging to the family Nymphalidae, 10 species to Pieridine, 03 species to Papilionidae, 07 species to Lycaenidae, and 02 species to Hesperiidae were recorded in the Atpadi Conservation Reserve. The highest number of butterflies is recorded during the summer in the months of March to June. The diagnostic characters, distribution, and ecology of butterflies' species were observed.

III. MANAGEMENT RECOMMENDATIONS

1. Protect and restore riparian strips. Given their high diversity value, maintain native riparian vegetation and limit removal of host plants.
2. Promote butterfly-friendly agricultural practices. Conservation strips with native nectar plants, reduced pesticide use near reserve boundaries.
3. Community engagement & citizen science. Train local volunteers to record butterflies and plant larval host and nectar species around habitation.
4. Long-term monitoring. Establish permanent transects sampled seasonally to detect changes and responses to land-use or climate change.
5. Documentation. Compile a photographic field guide for Atpadi butterflies (local names in Marathi) to support outreach.

Table No.1

List of Butterflies recorded in Atpadi Conservation Reserve

Family	Sub-family	Tribes	ScientificName	CommonName	Relative Abundance%
I). Nymphalidae	Biblidinae	Biblidini	Ariadne merione	Common Castor	3.38
	Danainae	Danaini	Danaus genutia	Striped Tiger	1.88
			Danaus chrysippus	Plain Tiger	3.76

			Euploea core	Indian Common Crow	1.50
	Heliconiinae	Acraeini	Acraea terpsicore	Tawny Coster	1.50
		Vagrantini	Phalanta phalantha	Common Leopard	3.57
	Limenitidinae	Neptini	Neptis hylas	Common Sailer	0.94
	Nymphalinae	Junoniini	Junonia lemonias	Lemon Pansy	2.44
			Junonia almana	Peacock Pansy	3.95
			Junonia atlites atlites	Oriental Grey Pansy	1.12
			Junonia iphita	Chocolate Pansy	0.94
			Hypolimnas anomala	Anomalous Egg fly	0.75
			Vanessa cardui	Painted Lady	0.75
			Hypolimnas misippus	Danaid Egg fly	1.31
			Hypolimnas bolina	Great Egg fly	2.63
			Junonia hierta	Yellow Pansy	0.75
	Satyrinae	Elymniini	Elymnias hypermnestra	Common Palm fly	0.94
		Melanitini	Melanitis leda	Common Evening Brown	2.07
II). Pieridae	Coliadinae		Catopsi liapomona	Lemon Emigrant	2.63
			Eurema hecabe	Common Grass Yellow	6.96
	Pierinae	Nepheroniini	Pareronia hippia	Indian Wanderer	3.20
		Pierini	Cepora nerissa	Common Gull	8.47
			Pieris brassicae	Large Cabbage White	1.31
			Pieris canidia	Asian Cabbage White	8.47
			Delias eucharis	Indian Jezebel	1.88
		Teracolini	Colotis fausta	Large Salmon Arab	0.56
			Colotis vestalis	White Arab	0.75
			Colotis amata	Small Salmon Arab	1.69
III). Papilionidae	Papilioninae	Leptocircini	Graphium doson	Common Jay	2.07
		Papilionini	Papilio polytes	Common Mormon	1.88
			Papilio demoleus	Lime Swallowtail	7.15
IV). Lycaenidae	Polyommatinae	Polyommatini	Acyto lepispuspa	Common Hedge Blue	0.56
			Pseudozizeeria maha	Pale Grass Blue	3.38
			Chilades pandava	Plains Cupid	3.76

			Chilades lajus	Indian Lime Blue	3.38
			Catochrysops panormus	Silver Forget-me-not	0.56
			Leptotes plinius	Zebra Blue	1.88
			Zizeeria karsandra	Dark Grass Blue	3.01
V). Hesperiidae	Hesperiinae	Taractrocerini	Potanthus omaha	Lesser Dart Skipper	0.56
	Pyrginae	Carcharodini	Spialia galba	Asian Grizzled Skipper	1.50

IV. CONCLUSION

The current butterfly checklist is not comprehensive, and ongoing research will keep it up to date. This research aims to promote conservation efforts and raise awareness about the endangered forest habitats threatened by human interference. The density, abundance, and seasonal presence of existing butterfly species differ significantly across conservation area, offering a foundation for more extensive conservation research in the future. This baseline study documents the butterfly assemblage of Atpadi Conservation Reserve and demonstrates the significance of riparian and interface habitats for maintaining lepidopteran diversity in a semi-arid agricultural landscape. Continued, standardized monitoring and habitat-sensitive management will be essential to safeguard these insect communities.

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