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Distribution of different species of Butterflies across various regions in Nizamabad district

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Abstract
In order to understand the species composition and quantity of butterflies in the area, the butterfly diversity in Nizamabad was examined. Three different ecosystems, including a forest region in Indalwai, agricultural fields in Dichpally, and urban areas in Nizamabad, were chosen for the sampling sites. Using a standardized procedure, samples of butterflies were collected, and the diversity of those samples was examined using multiple ecological indices. Nizamabad has a high diversity of butterfly species, with a total of 53 species observed, according to the study. These species belonged to a number of families, including the Nymphalidae, Lycaenidae, Pieridae and Papilionidae. To evaluate the variety and distribution of butterflies, the Shannon-Wiener, Simpson's, and evenness indices were computed. The diversity indexes showed that there was a fair amount of diversity. These diverse environments offer a singular chance to investigate butterfly species distribution in the area, illuminating their ecological importance. In order to provide insights into the local biodiversity and factors impacting butterfly populations, this study intends to map the variety and distribution of butterfly species in the Nizamabad district. The goal of the research is to provide answers regarding the effects of seasonality, habitat type, and environmental variables on the variety and abundance of butterflies. To document the species of butterflies found in the various areas of the Nizamabad district, a mix of field surveys, butterfly netting, and observation methods will be utilized. Over the course of a year, data on the species' behavior and abundance will be gathered over many seasons. Preliminary findings indicate a rich diversity of butterfly species inhabiting various ecosystems within Nizamabad district. The study reveals the presence of both common and rare species, some of which may be indicative of the region's ecological health. Factors such as habitat type and seasonal variation appear to influence butterfly distribution. This information can serve as a valuable baseline for conservation efforts and the preservation of butterfly habitats in the region. Comprehending the butterfly species' distribution in the Nizamabad district is essential for the preservation of biodiversity, ecological studies, and ecotourism. This study adds to our understanding of the complex interactions that occur between butterflies and their surroundings, emphasizing the need for ongoing research and conservation efforts to save these fragile and essential elements of regional ecosystems.

Keywords: Distribution, Butterflies, nizamabad, dichpally, indalwai, One way ANOVA

Introduction

Butterflies are generally regarded as the best taxonomically studied groups of insects due to their great aesthetic value owing to bright colors, interesting behaviors and day time activity periods [1]. Food of butterfly plays an important role in determining their distribution, abundance and movement [2]. Many butterfly species have showed population decline due to hunting, poaching and forest fires [3]. As a result, many butterfly species are facing threat in natural ecosystems including protected areas [4]. For many predators like birds, lizards these butterflies both in larva and adult stages act as their prey species. Diurnal butterflies are preferred indicators of habitat disturbance because of their sensitivity to environmental changes, diversity, and advanced taxonomy, lower economic and temporal costs of collection [5]. Appropriate a biotic and biotic factors such as climate condition, temperature and exposure, availability of host and larval plants, food and vegetation, topographic features, habitat quality are some of the most important parameters to determine butterfly composition in a community [6]. Habitat alteration, increasing human population, climate alteration and the anthropomorphic alterations that accompany these issues are sources of important stress to original biota [7]. Insects are outstanding indicator species for recording alterations in bio-diversity and ecosystems, habitat degradation, as well as the benefits of habitat reinstatement [8]. Butterfly community assembly and the factors which influence it, have long been a topic of interest to ecologists and conservationists. Human dominated landscape from a substantial and ever increasing amount of the earth's land surface. These modified habitats often negatively influence butterfly species and their dynamics [9]. Species community structure was different among habitats, but rather similar in the open scrub and dry deciduous habitat. Many species of butterflies depend on remnant vegetation or secondary forest for survival, especially in urban areas [10, 11]. The butterflies are the agents of pollination and a natural pest control [12]. To a large extent, butterflies (being pollinating agents) contribute to the growth, maintenance and expansion of flora in the tropical regions where these insects show high abundance and species diversity [13].

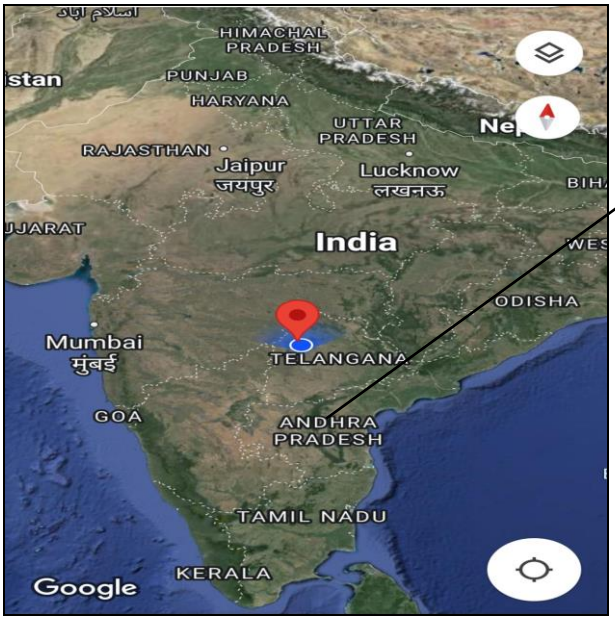
Materials and methods

For the survey of butterflies "point counting" method and "Hand netting method" were employed during the survey

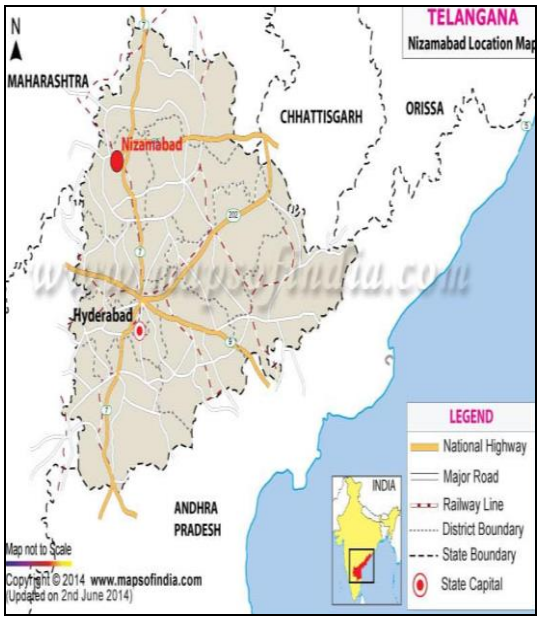
from 7:00 am to 10.30 am and 4.00 pm to 5.00pm. To determine butterfly richness and abundance "Line transect method" was adopted by dividing the study area based on the vegetation and soil type. After the observation and capturing, identification of Butterflies released them at the spot of capture only. A butterfly net is required for this purpose. Collecting live specimens was avoided during the study.

Study area: Nizamabad district was chosen as the study's habitat. The district has a total size of 4,288 square kilometers (1,656 sq mi), and its coordinates are 18°41′ N 78°6′ E [6]. Nizamabad is bordered by the Maharashtra State districts of Kamareddy on the south, Jagtial and Rajanna Sircilla on the east, Nirmal district on the north, and Nanded district on the west. At Kandakurthi, the Godavari River enters Telangana from the Nizamabad district.

Statistical analysis: One-way ANOVA was implemented to know the variation in Butterfly distribution among the various regions in Nizamabad district. The Shannon-Wiener index, Simpson's diversity index, and evenness index were calculated to assess the diversity and distribution pattern of butterflies.



Telangana state in India



Nizamabad district in Telangana state

Nizamabad, Dichpally, Indalwai areas in Nizamabad district in Telangana state

Results and Discussion

53 species of butterflies were documented during the survey, and the occurrence of butterflies is attributed to the emergence of secondary vegetation like *Lantana camera, Nerium, Tridax procumbens, Catharanthaus roseus, Verticillaster, Ixora, Euphorbia milli, Bougainvillea glabra, Hibiscus rosasinensis, Tecoma stans,Guava,Callindra surinamensis,Tagetes patula,Cleome viscose, Calotropis, Caesalpinia, Duranta erecta, Senna obtusifolia, Acacia indica, Butea monosperma, Delonix regia, Senna auriculata, Jatropha gossypifolia, Mesosphaerum suaveolens, Melochia corchorifolia.*

These species belonged to various families such as Nymphalidae, Lycaenidae, Pieridae and Papilionidae.

From Nymphalidae family 21 species were identified.They are *Hypolimnas misippus* (Danaid egg fly), *Junonia almanac (*Peacock pansy), *Acraea terpsicore* (Tawny coster*), Junonia lemonias* (Lemon pansy), *Euploea core* (Common crow butterfly), *Danaus plaxipus* (Monarch butterfly), *Danaus chrysipus* (The plain tiger), *Junonia orithya* (The blue pansy), *Tirumala limniace* (Blue tiger*), Danaus genutia (*The common tiger),*Melanitis leda* (Common evening brown), *Hypolimnas bolina* (Great Eggfly), *Asterocampa clyton* (Tawny emperor), *Bicyclus anynana* (Squinting bush brown*), Junonia atlites* (The grey pansy), *Tirumala septentrionis* (The dark tiger), *Byblia ilithyia* (The spotted joker), *Ariadne ariadne* (Angled castor), *Euthalia nais* (Baronet), *Menelaus blue morpho* (Common blue morpho), *Elymnias hypermnestra* (Common palmfly) .

From Lycaenidae family 14 specie were identified. They are *Castalius rosimoon* (Common pierrot), *Freyeria trochylus* (Grass jewel), *Lampides boeticus* (Pea blue butterfly), *Freyeria putli* (Eastern grass jewel), *Jamides celeno* (Common cerulean), *Euchrysops cnejus* (The gram blue), *Taracus indica* (The Indian pierrot), *Hemiargus ceraunus*(The ceraunus blue), *Luthrodes pandava* (The plains cupid or cycad blue), *Leptotes cassius* (Cassius blue or tropical striped blue), *Taracus balkanicus* (Balkan pierrot or little tiger blue), *Zizeeria karsandra* (Dark grass blue), *Catochrysops panormus* (Silver Forget -me- not), *Talicada nyseus* (The red pierrot).

From Pieridae family 12 species were identified. They are *Catopsilia Pomona* (Lemon emigrant*), Eurema hecabe* (Common grass yellow*), Catopsilia florella* (Common migrant), *Delias eucharis* (Indian Jezebel) *Catopsilia pyranthe* (Mottled emigrant), *Colotis danae* (Crimson tip*), Colotis aurora* (Sulphur orange tip or plain orange tip*), Pieris rapae* (Cabbage white*), Kricogonia lyside* (The lyside sulphur or guayacan sulphur*), Belenois aurota* (Pioneer white), *Cepora nerissa* (The common gull*), Eurema andersonii* (One-spot Grass yellow).

From Papilionidae family 6 species were identified. They are Papilio polytes (Common mormon), *Papilio demoleus* (The lime butterfly), *Papilio polymnastor* (Blue mormon), *Pachliopta hector* (*Crimson rose*), *Pachliopta aristolochiae (Common rose), Papilio demodocus* (Citrus swallowtail*), Graphium nomius* (The spot swordtail).

General, Species and individuals relative abundance of Butterflies in Dichpally

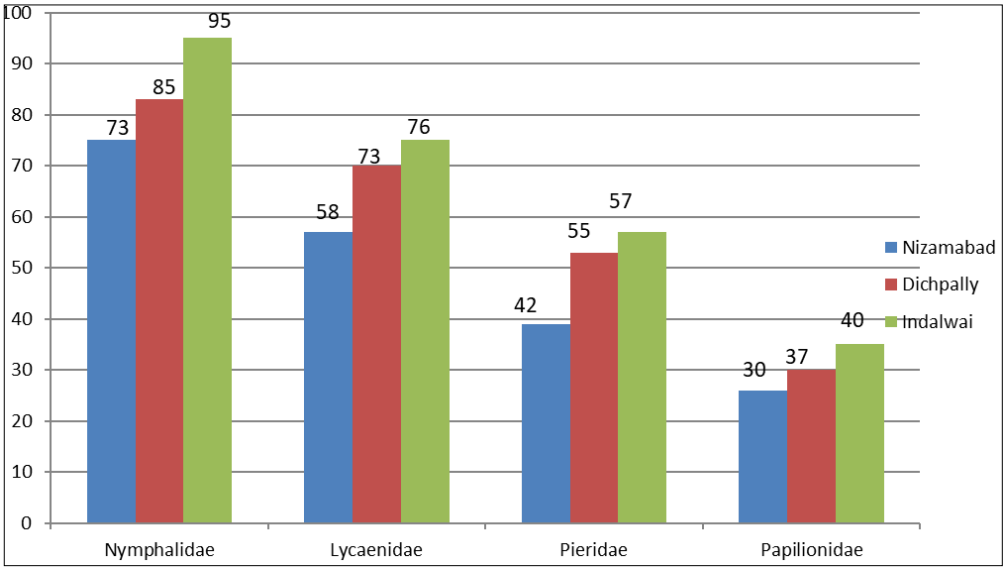
S. No	Family	No. of Genera	No. of Species	No. of Individuals
1	Nymphalidae	14(36.85%)	21(39.62%)	85(34%)
2	Lycaenidae	12(31.57%)	14(26.42%)	73(29.2%)
3	Pieridae	09(23.68%)	12(22.64%)	55(22%)
4	Papilionidae	3(7.90%)	6(11.32%)	37(14.8%)
Total	4 Families	38(100%)	53(100%)	250(100%)

General, Species and individuals relative abundance of butterflies in Indalwai

S. No	Family	No. of Genera	No. of Species	No. of Individuals
1	Nymphalidae	14(36.85%)	21(39.62%)	95(35.45%)
2	Lycaenidae	12(31.57%)	14(26.42%)	76(28.35%)
3	Pieridae	09(23.68%)	12(22.64%)	57(21.27%)
4	Papilionidae	3(7.90%)	6(11.32%)	40(14.93%)
Total	4Families	38(100%)	53(100%)	268(100%)

General, Species and individuals relative abundance of butterflies in Nizamabad

S. No	Family	No. of Genera	No. of Species	No. of Individuals
1	Nymphalidae	14(36.85%)	21(39.62%)	73(35.97%)
2	Lycaenidae	12(31.57%)	14(26.42%)	58(28.57%)
3	Pieridae	09(23.68%)	12(22.64%)	42(20.68%)
4	Papilionidae	3(7.90%)	6(11.32%)	30(14.78%)
Total	4 Families	38(100%)	53(100%)	203(100%)



Distribution of different species of Butterflies across various regions in Nizamabad district

The butterflies were observed perching and feeding on *Lantana camera, Nerium, Tridax procumbens, Catharanthaus roseus, Verticillaster, Ixora, Euphorbia milli, Bougainvillea glabra, Hibiscus rosa sinensis, Tecoma stans, Guava, Callindra surinamensis, Tagetes patula, Cleome viscose, Calotropis, Caesalpinia, Duranta erecta, Senna obtusifolia, Acacia indica, Butea monosperma, Delonix regia, Senna auriculata, Jatropha gossypifolia, Mesosphaerum suaveolens, Melochia corchorifolia etc,*

Tirumala limniace

Euploea core

Euchrysops cnejus

Belenois aurota

Kricogonia lyside

Catopsilia florella

Talicada nyseus

Junonia almanac

Byblia ilithyia

Hypolimnas misippus

Taracus balkanicus

Euthalia nais

Graphium nomius

Melanitis led

Pachliopta hector

Conclusion

The study revealed a rich diversity of butterfly species inhabiting various ecosystems within the Nizamabad district. Both common and rare species were observed, indicating the region's ecological health. Factors such as habitat type and seasonal variation were found to influence butterfly distribution. These findings provide valuable baseline data for conservation efforts and the preservation of butterfly habitats in the region. Understanding butterfly species' distribution is crucial for biodiversity conservation, ecological studies, and promoting ecotourism. Ongoing research and conservation efforts are necessary to safeguard these essential components of regional ecosystems. The documentation of 53 butterfly species during the survey highlights the rich biodiversity of butterflies in the Nizamabad district. These butterflies are found to occur in association with secondary vegetation, including plants like Lantana camera, Nerium, Tridax procumbens, and others. The species belong to various families such as Nymphalidae, Lycaenidae, Pieridae, and Papilionidae, indicating a diverse array of butterfly taxa inhabiting the region. The butterflies were observed engaging in various activities such as perching and feeding on a wide range of plant species, indicating their dependence on specific plant resources for survival. Overall, the study underscores the importance of preserving diverse habitats and plant species to support butterfly populations in the Nizamabad district. Conservation efforts aimed at protecting both butterflies and their associated plant species are essential for maintaining ecosystem balance and promoting biodiversity conservation in the region

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