BUTTERFLY: THE ESSENCE OF NATURE AND THE CHALLENGES IN THEIR CONSERVATION

Abstract

Butterflies are among one the beautiful and colourful creature of nature. They play very vital role in the process of pollination and thus occupy a very crucial position the ecological niche. Out of the 17000 species reported worldwide, 1500 species of butterfly are also reported from India. Though being the most essential biological indicators many species of butterflies are at a greater risk of anthropogenic threat. Therefore, this study was conducted in order to throw light onto the importance of butterflies in nature and to create and awareness towards their conservation.

Keywords: Pollinators, Nymphalidae, Lycaenidae, biological indicators

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I. INTRODUCTION

Butterflies are commonly regarded as one of the most extensively researched cohorts of diurnal arthropods owing to their rigorous taxonomic categorization. (Robbins, et al., 1997). Around 1500 butterfly species are recorded in India, out of the 17,000 species that exist globally. The North-Eastern region of India and the Western Ghats are recognized as two of the 27 hotspots around the world that harbours a diverse array of butterfly species and are also home to a thriving population thereof. Due to its high ecological diversity and indigenousness, India is regarded as the most significant region for the conservation of butterfly diversity. Northeast India, being part of the 12th megadiversity centres worldwide, harbours a considerable number of rare and endemic butterfly species that are currently at risk of extinction. (Modak, et al., 2018).

Out of the 1504 species of butterflies found in India, 351 species are hosted by peninsular India and around 334 species by Western Ghats (Tiple, 2011). A comprehensive enumeration of 30 distinct butterfly species was documented, encompassing a diversity of families such as Hesperionidae, Papilionidae, Pieriidae, Nymphalidae, and Lycanidae, within the confines of the Neora Valley National Park of West Bengal (Roy et al., 2012). Rapid urbanization and a lot of disturbance to the natural ecosystem are resulting in loss and breach of habitat which in turn can have disastrous consequences both at territorial and global level. In and around 107 distinct species have been documented in Bhubaneswar, India. Notably, the family Nymphalidae boasts the highest recorded species count, accounting for 31.77% of the total. The family Lycaenidae follows closely behind, representing 25.23% of the observed species. In contrast, the family Papilionidae exhibits the lowest number of reported species, with a mere 8.41% representation. It is worth noting that among these species, 9 are legally protected under the Wildlife (Protection) Act of 1972 in India. Additionally, 17 of the documented species are newly discovered in the city (Samal et al., 2021).

II. BUTTERFLIES AS BIOLOGICAL INDICATORS AND THE THREAT TO THEIR EXISTENCE

Butterflies are widely regarded as indicators of biodiversity in relation to environmental shifts. The swift urbanisation that has led to the depletion of the natural habitats of butterflies, especially in urban areas, coupled with the improper management of natural resources, has placed our indigenous butterflies in a precarious state of vulnerability. Butterflies serve as crucial agents for pollination and also offer insight into the vitality and quality of not only their host plants, but also the wider ecosystem. The developmental activities occurring in the vicinity of Indian metropolitan cities have led to the deterioration of natural scenery and the loss of green environments. This degradation of the ecosystem and the escalating levels of pollution are rapidly eradicating our essential pollinators and entire wildlife populations. The diverse array of butterfly species can be found in locations that provide ample nectar sources, utilize fewer harmful pesticides, and offer open, bright spaces (Nair et al., 2014).

The primary hazards to the diversity of butterflies in Guma Reserve Forest of Western Assam, India was found to be deforestation, wildfire and habitat destruction. Besides these threats about 239 butterfly species are recorded from the forest area which belongs to 6 different families of butterfly (Choudhury et al., 2020). Butterflies are highly sensitive and

studies reveal that they are strictly seasonal and reside on specific natural surroundings (Kunte, 1997). The strong correlation between the range of butterfly species and their respective habitats has been extensively recorded across diverse regions of the Indian subcontinent (Ramesh et al., 2010; Tiple and Khurad, 2009).

III. ROLE OF BUTTERFLIES AS POLLINATORS

Butterflies are one of the most attractive insects that belong to order Lepidoptera and they are considered to be the "Flagship species" of insects (Raghavendra Gowda et al., 2011). Butterflies are of considerable importance in the provision of ecosystem services, owing to their proficiency as pollinators and their indispensable position in the food chain. A notable correlation has been established between the diversity of butterflies and the quantity of host plants, which serves as an indirect indicator of the diversity of flora in a given region (Kumar K et al., 2019). The human-induced disturbances to biodiversity serve as a major conservation challenge to biologists for protection of different flora and fauna across the globe (Roy et al., 2012).

IV. DISTRIBUTION OF BUTTERFLIES

The Guwahati University Campus, Jalukbari, of India is home to approximately 140 butterfly species, as reported by Saikia (2014). The species identified in all current studies displayed remarkable consistency with those recorded in previous studies, a fact likely attributable to comparable geographical formations (Roy et al., 2012; Harsh 2014; Saikia 2014; Mukherjee et al., 2015). Lepidopterans, particularly butterflies have been identified as a critical factor in sustaining ecological dynamics within protected areas (Virani, 2020). In a study of the literature conducted by Mukherjee et al. (2015), it was discovered that the city of Kolkata is the dwelling place of 96 distinct butterfly species, with the dominant family being that of the Lycaenidae. A comprehensive survey was executed within the confines of Raimona National Park, a geographical expanse encompassing 422 square kilometers, situated beneath the purview of the Kachugaon Forest Division, situated within the Kokrajhar district of Assam, India. The outcome of this study revealed an impressive observation of 150 distinct species (Islam et al., 2022).

The Dehing Patkai National Park, which is situated in the localities of Tinsukia and Dibrugarh, is a highly noteworthy constituent of the Indo-Myanmar biodiversity (Gogoi et al., 2023). Fd Butterflies are present in locations with a lot of blossoming plants, nectar, and food for larvae (Bensusan et al., 2014). In a study performed in both unprotected and protected areas of Lagos, Nigeria, insect nets and cameras were used to recognise a total of 171 species that are classified into four families: Nymphalidae, Lycaenidae, Papilionidae and Hesperiidae. These species were found in Lekki Conservation Centre (LCC), LUFASI Nature Park (LNP), Shodex Garden, and Co-operative Villa. The Nymphalidae family showcased the greatest variety and copiousness (Kehinde et al., 2023). In the Baruipur subsection, a study on butterfly diversity was done. It is situated along the gradient of human effect, on the periphery of Kolkata, West Bengal. The survey revealed 80 different species, with human induced disturbance having a noticeable negative effect on butterfly species (Mollah et al., 2022).

Due to herbicides' deadly effects on beneficial herbs, their use in crop fields has led to the decrease in butterfly populations (Mallick et al., 2023). In order to preserve butterfly species and carry out numerical diversity research, some research on butterfly diversity has been done. A total of 95 butterfly species were found during the study, which was conducted in the Kawal Tiger reserve in Telangana, India (Jaiswal et al., 2023).

Nymphalidae and Lycaenidae each had 29 species. A detailed analysis of the variety and geographical distribution of butterflies in several Northeast Indian microhabitats unveiled that Nymphalidae to the most diverse of all families (Karmakar er al., 2022). Moreover, a review of literature revealed that various construction projects, including those related to power generation, new road openings and the building of power transmission lines, have a significantly adverse effect on biodiversity in various areas (Gasparatos et al. 2017; Jones et al., 2015; Preston and Kim, 2016).

Butterflies exhibit a remarkable responsiveness to changes in the host plant's approachable and available nature, as well as changes in the ecology, microclimate, sun radiation, and temperature. For their egg deposition, larval development, and maturation, these elements are crucial (Meena, 2020). The abundance of bees showed a favourable link with the diversity of flowering plants and the availability of materials for ground nesting, whereas the local vegetation's structure promoted the visiting of hoverflies and butterflies (Herrmann et al., 2023). Species that are ecologically specialized, lead inactive lifestyles, and are endangered to benefit from habitat association. The average temperature and precipitation have a favorable impact on the diversity of species (Habel et al., 2021).

The aim of one of the recent study was to look into the butterfly diversity in Bankura District, West Bengal, India, across a variety of habitats. The district, which features a wide variety of intermediate environments, is located at the meeting point of the Gangetic plain and Chotanagpur plateau. Within the study area, 117 different species of butterflies were found thanks to our thorough survey (Mukherjee and Mondal, 2020). The high number of migratory species suggests that a significant segment of the butterfly community may be dependent on a combination of non-urban population growth and the condition of the local habitat in parks, which includes both broad area connectivity and local patch quality (Chowdhury et al., 2021).

The Suburban fringe area, which is characterized by larger and more connected green spaces, was shown to have much better butterfly species diversity and abundance. The crowded metropolitan core and suburban areas, on the other hand, were thought to be unfavourable for the expansion of butterfly populations (Tzortzakaki, et al., 2019). According to certain research (Aguilera et al., 2019), urban green spaces managed with traditional and rigorous approaches are unable to retain a significant level of butterfly variety over an extended length of time.

V. DISCUSSION

Even though the importance of insects in maintaining ecosystems is well known, their worldwide biodiversity is currently under serious threat. The extinction of a significant number of species within the next few decades may be caused, in part, by a notable decline in Lepidopteran populations (Sánchez-Bayo & Wyckhuys, 2019). Climate and land use both

have important effects on the structures of biodiversity, with diverse terrain having a major impact on the diversity of its niche position in turn, this causes the diversity of species, including specialized species, to accelerate. The maintenance of high levels of biodiversity is achieved by the fact that cultivation progress in higher elevations and on steep slopes is challenging and less desirable (Habel et al., 2021).

VI. FUTURE PROSPECTS

While land-use patterns are ubiquitous in the equatorial region, it is still unclear how well they protect biodiversity. A multidisciplinary approach incorporating experts in the plant, vertebrate, and invertebrate domains is essential given the recognized variety in the impact of human actions on biodiversity between taxonomic groupings and guilds (Schulze et al., 2004).

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