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Assessment of diversity of Butterflies in Dhirkot, Azad Jammu and Kashmir, Pakistan

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ABSTRACT

Butterfly is considered as the symbol of attractiveness and charm since the beginning of the era and most recognized insect reason of his daytime habit and known by their elegant flights, bright and beautiful colors and shapes, which offer happiness to everyone. Butterflies are recorded from all continents except Antarctica, where the flowering flora are present. Analytically the butterflies have been observed since 18th century and 19,238 butterfly species had been recognized worldwide. The main objective of this study was to know the diversity of butterfly in Dhirkot, Azad Jammu and Kashmir, Pakistan. This research was started from March 2019 to August 2019 to know the diversity of butterfly at Dhirkot, Bagh Azad Jammu and Kashmir. Different methods were applied during research and survey. These were classified into two categories, first "direct field observations" and second "indirect observations" i.e. body parts, carcasses of butterfly and meetings with the locals. In present study rich diversity of butterflies was observed in Dhirkot. A total of 20 species of the butterflies were recorded during the study period. Most dominant butterflies were painted lady, common mormon, common punch and Himalayan brimstone. Shannon-wiener diversity index recorded was as 1.236, Simpson diversity Index was as 8.313071, Evenness Index was 0.950017.

Key words: Butterflies, Diversity, Dhirkot, Richness, Evenness, Himalayan, Mormon

INTRODUCTION

Butterfly is considered as the symbol of attractiveness (Roth, 2002) and charm (Platt, 2007) since the beginning of the era and most recognized insect reason of his daytime habit (Saarinen *et al.*, 2005) and known by their elegant flights, bright colours and beautiful shapes, which give pleasure to everyone (Wallace, 2016). Butterflies are recorded from all continents except Antarctica (Lewis and Chalmers-Hunt, 1973; Gullan and Cranston, 2004), where the flowering flora are present (Gilbert, 1980; Munir and Siddiqui, 2017). Analytically the butterflies species have been calculated since eighteenth century (Tiple, 2012) and 19,238 species had been recognized worldwide (Heppner, 1998).

Biological diversity is vital scientifically (Heyer *et al.*, 2014), economically (McNeely, 1988), socially (Cilliers, 2010), culturally (Maffi, 2005; Altaf *et al.*, 2017), aesthetically (Lindemann-Matthies *et al.*, 2010), ethnomedicinally (Umair *et al.*, 2017; Altaf *et al.*, 2018b; Farooq *et al.*, 2019) and educationally (Caro *et al.*, 2003) and it is the one of the major character of the fauna (Daly *et al.*, 1978). Diversity is the numeral of butterfly species present (Altaf *et al.*, 2013; Altaf, 2016). Diversity is niche period permanence reliant which means if many niche are present than it would support rich diversity (Daly *et al.*, 1978; Wiens and Graham, 2005). Higher numbers of species are present in the natural habitats while richness is higher in anthropogenically moderately modified landscapes (Altaf *et al.*, 2018a).

In measuring ecological change, butterflies have been confirmed as indicators of biodiversity and useful integrity that can be checked at a range of scales. Butterflies have been known as significant bio-indicators for measuring diversity and observed ecology responses to environmental issues (Akite, 2008). The main objective of this study was to know the diversity of butterfly in Dhirkot, Azad Jammu and Kashmir, Pakistan.

MATERIALS AND METHODS

The present study was carried out from March 2019 to August 2019 to study the butterfly's fauna at Dhirkot, Bagh Azad Jammu and Kashmir. Different methods were applied during research and survey. These were classified into two categories, first "direct field observations" and second "indirect observations" i.e. body parts, carcasses of butterfly and meetings with the locals.

Study area: Dhirkot area is located in lesser Himalayas (DRU, 2007). The study area lies in moist area in access of monsoon. Small area of Dhirkot has difference in rainfall and humidity in different parts due to variations in altitudes. The summer is moderate and the winter is harshly cold; and snowfall occurs at higher elevations. The average rainfall was recorded as; 150mm (Figure 1). The forest types are as; 1) Sub-tropical pine forests and 2) Himalayan mixed temperate forests (Bibi *et al.*, 2013).

Statistical Analysis: Various statistical diversity indices were applied to know diversity of butterfly e.g. Shannon-wiener diversity Index, Species richness Index and Species evenness Index.

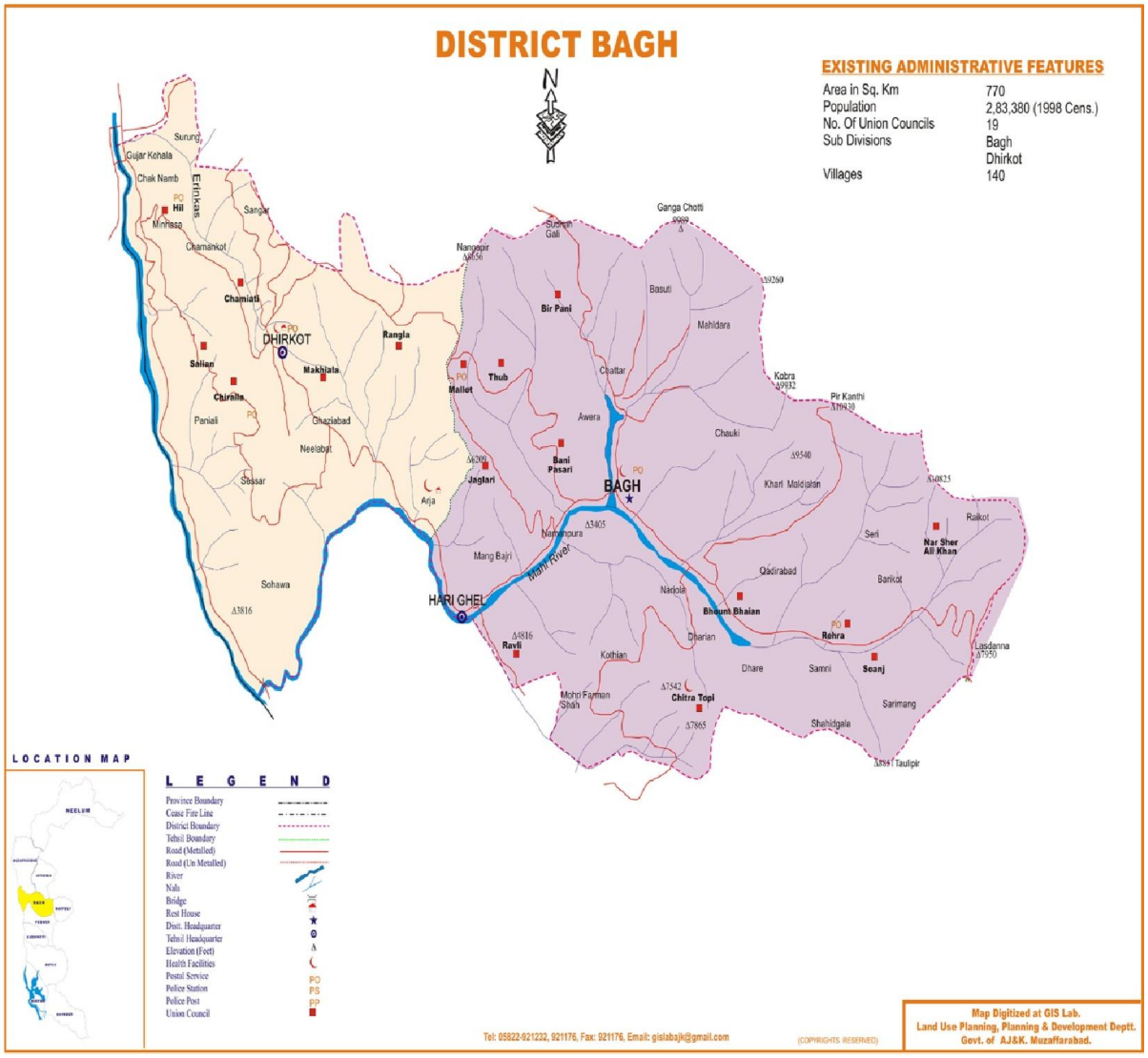

Figure 1: Map of the study area.

Shannon-wiener diversity Index: It was calculated based by formula given (Shannon and Weaver, 1949);

"H' = - [ΣPI In PI]"

Where, H' = Diversity Index.

PI=Relative abundance

Species richness Index: the It was calculated based by given formula (Margalef, 1958);

"SR =(S – 1)/logn N"

Where S= total number of butterfly species and N = total number of butterfly individuals present in the sample

Species evenness Index: was calculated based by given formula (Pielou, 1966);

"E = H'/ Logn S"

RESULTS AND DISCUSSION

In this research high diversity of butterflies was documented in Dhirkot. Total 20 butterfly species were observed during whole study time. The most abundant butterflies were painted lady, common mormon, common punch and Himalayan brimstone. Shannon-wiener diversity index recorded was as 1.236, Simpson diversity Index was as 8.313071, Evenness Index was 0.950017 (Table 1).

Asif *et al.* (2012) collected the total 456 specimens and 14 species from Multan, Punjab, Pakistan. Faiz *et al.* (2015) noted 3017 specimens of 22 butterfly from Tolipir National Park (TNP), Azad Jammu and Kashmir (AJ&K), Pakistan. Haroon and Ahmad (2013) documented 232 butterflies and 13 species were collected from Koaz Bahram Dheri, Khyber Pakhtunkhwa, Pakistan. Khan *et al.* (2007) reported 16 butterfly species from Kotli, 20 species from Mirpur and 19 species from Bhimber. Maalik *et al.* (2013) observed 2811 specimens and 14 species from Faisalabad. Mal *et al.* (2014) collected 67 species from Sindh. Khan *et al.* (2004) total 25 species were documented from district Muzaffarabad, Azad Jammu and Kashmir (AJ&K), Pakistan. Rahman *et al.* (2011) total 30 species were recorded from Murree, Punjab Pakistan.

Table 1: Diversity and statistical analysis of butterflies of Dhirkot.

Sr	Common Name	Scientific Name	RA/Pi	LogPi	PiLogPi
1	Himalayan Brimstone	*Gonepteryx nepalensis*	0.077720207	-1.10947	-0.08623
2	Common yellow Swallowtail	*Papilio machaon*	0.031088083	-1.50741	-0.04686
3	Common Wall	*Lasiommata schakra*	0.041450777	-1.38247	-0.0573
4	Common Peacock	*Papilio bianor polyctor*	0.07253886	-1.13943	-0.08265
5	Dark grass Blue	*Zizeeria knysna*	0.025906736	-1.58659	-0.0411
6	Indian Fritillary	*Argynnis hyperbius*	0.010362694	-1.98453	-0.02057
7	Painted Lady	*Vanessa cardui*	0.103626943	-0.98453	-0.10202
8	Great Windmill	*Byasa dasarada*	0.020725389	-1.6835	-0.03489
9	Blue Pansy	*Junonia orithya*	0.051813472	-1.28556	-0.06661
10	Chestnut Angle	*Odontoptilum angulata*	0.025906736	-1.58659	-0.0411
11	Bath White	*Pontia daplidice*	0.067357513	-1.17161	-0.07892

12	Common Mormon	*Papilio polytes*	0.088082902	-1.05511	-0.09294
13	Pale Grass Blue	*Pseudozizeeria maha*	0.046632124	-1.33131	-0.06208
14	Cabbage White	*Pieris rapae*	0.051813472	-1.28556	-0.06661
15	Common Beak	*Libythea lepita*	0.005181347	-2.28556	-0.01184
16	Large Three-ring	*Ypthima nareda*	0.067357513	-1.17161	-0.07892
17	Common Punch	*Dodona durga*	0.082901554	-1.08144	-0.08965
18	Brown Argus	*Aricua agestis*	0.046632124	-1.33131	-0.06208
19	Pallas Sailer	*Neptis sappho*	0.031088083	-1.50741	-0.04686
20	Common Windmill	*Byasa polyeuctes*	0.051813472	-1.28556	-0.06661
					-1.23585
Shannon-wiener diversity Index					1.236
Species richness Index					8.313071
Species evenness Index					0.950017

Conclusion: The diversity of butterfly has a high diversity and distribution in study area. However, impact of the possible human activities impact i.e. deforestation, urbanization, industrialization, agriculture intensification and environmental pollution on the fauna of butterflies cannot be ignored. More research is needed to note diversity, distribution and anthropogenic impact.

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Authors' contributions: Abbasi has designed project, collected data, Nazer and Altaf supervised the project, Awan helped in correct identification of butterfly species, Khan and Hamid helped in data collection and Abbasi helped in statistical analysis.

REFERENCES

Akite, P. 2008. Effects of anthropogenic disturbances on the diversity and composition of the butterfly fauna of sites in the Sango Bay and Iriiri areas, Uganda: implications for conservation. African Journal of Ecology. 46: 3-13.

Altaf, M. 2016. Assessment of Avian and Mammalian Diversity at Selected Sites along river Chenab University of Veterinary and Animal Sciences, Lahore-Pakistan.

Altaf, M., A. Javid, Irfan, M.A. Munir, S. Ashraf, K.J. Iqbal, M. Umair. 2013. Diversity, distribution and ecology of birds in summer season at head Khanki, Punjab, Pakistan. BIOLOGIA (PAKISTAN). 59: 131-137.

Altaf, M., A. Javid, A.M. Khan, M. Khan, M. Umair, Z. Ali. 2018a. Anthropogenic impact on the distribution of the birds in the tropical thorn forest, Punjab, Pakistan. Journal of Asia-Pacific Biodiversity. 11: 229-236.

Altaf, M., A. Javid, M. Umair, K.J. Iqbal, Z. Rasheed, A.M. Abbasi. 2017. Ethnomedicinal and cultural practices of mammals and birds in the vicinity of river Chenab, Punjab-Pakistan. Journal of ethnobiology and ethnomedicine. 13: 41.

Altaf, M., M. Umair, A.R. Abbasi, N. Muhammad, A.M. Abbasi. 2018b. Ethnomedicinal applications of animal species by the local communities of Punjab, Pakistan. Journal of ethnobiology and ethnomedicine. 14: 55.

Asif, S., S. Shafqat, B.-u.-D. Syed. 2012. Yearlong association of butterfly populations with flowering plants in Multan, Pakistan. Pakistan entomologist. 34: 105-110.

Bibi, S.S., R.A. Minhas, M.S. Awan, U. Ali, N.I. Dar. 2013. Study of Ethno-Carnivore relationship in Dhirkot, Azad Jammu and Kashmir (Pakistan). Journal of Animal and Plant Sciences. 23: 854-859.

Caro, T., M.B. Mulder, M. Moore. 2003. Effects of conservation education on reasons to conserve biological diversity. Biological Conservation. 114: 143-152.

Cilliers, S. 2010. Social aspects of urban biodiversity–an overview. In: N. Müller, P. Werner & J. Kelcey, Urban biodiversity and design—implementing the convention on biological diversity in towns and cities. p 81-100.

Daly, H.V., J.T. Doyen, P.R. Ehrlich. 1978. Introduction to insect biology and diversity. McGraw-Hill Book Company.

DRU. 2007. District Profile Bagh District Reconstruction Unit, Bagh and Earthquake. Reconstruction and Rehabilitation Authority and Affliated.

Faiz, A., Z. FI-Abbas, L. Zahra. 2015. Community structure and diversity of butterflies in tolipir national park, azad jammu and kashmir (ajk) Pakistan. The Journal of Animal & Plant Sciences. 25.

Farooq, A., M.S. Amjad, K. Ahmad, M. Altaf, M. Umair, A.M. Abb. 2019. Ethnomedicinal knowledge of the rural communities of Dhirkot, Azad Jammu and Kashmir, Pakistan. Ethnobiology and Ethnomedicine. 15: 1-45.

Gilbert, L.E. 1980. Ecological consequences of a coevolved mutualism between butterflies and plants. Coevolution of animals and plants. University of Texas Press, Austin. 210-240.

Gullan, P.J., P.S. Cranston. 2004. The insects: an outline of entomology Wiley-Blackwell.

Haroon, M.S., T. Ahmad. 2013. Diversity of butterfly fauna of Union Council Koaz Bahram Dheri. Pakistan. Journal of Entomology and Zoology Studies. 1: 113-117.

Heppner, J. 1998. Classification of Lepidoptera. Holarctic Lep.

Heyer, R., M.A. Donnelly, M. Foster, R. Mcdiarmid. 2014. Measuring and monitoring biological diversity: standard methods for amphibians. Smithsonian Institution.

Khan, M., M. Nasim, M.R. Khan, M. Rafi. 2004. Diversity of butterflies from district Muzaffarabad, Azad Kashmir. Pakistan Journal of Biological Sciences. 7: 324-327.

Khan, M.R., M.A. Rafi, M. Munir, S. Hussain, M.W. Baig, M.W. Khan. 2007. Biodiversity of Butterflies from Districts Kotli, Mirpur and Bhimber, Azad Kashmir. Pakistan Journal of Zoology. 39: 27.

Lewis, H.L., J. Chalmers-Hunt. 1973. Butterflies of the World. Harrap London.

Lindemann-Matthies, P., X. Junge, D. Matthies. 2010. The influence of plant diversity on people's perception and aesthetic appreciation of grassland vegetation. Biological Conservation. 143: 195-202.

Maalik, S., S.A. Rana, H. Khan, Ashfaq. 2013. Diversity and abundance of lepidopteran populations from selected crops of district Faisalabad, Pakistan. Pak. J. Agri. Sci. 50: 95-101.

Maffi, L. 2005. Linguistic, cultural, and biological diversity. Annu. Rev. Anthropol. 34: 599-617.

Mal, B., N. Memon, S.A. Memon, M. Ali, N.A.S. Shah, J.K. Turk. 2014. Diversity of pierid butterflies (lepidoptera: pieridae) in Jamshoro district, Sindh, Pakistan.

Margalef, R. 1958. Temporal succession and spatial heterogeneity in phytoplankton. In Perspective in Marine Biology (Buzzati-Traverso, A.A.,ed.), . University of California Press. Berkeley,California, USA.: 323–347.

McNeely, J.A. 1988. Economics and biological diversity: developing and using economic incentives to conserve biological resources. Iucn.

Munir, A., N.Y. Siddiqui. 2017. Assessment of growth of Lemon butterfly (*Papilio demoleus*) in Tando Muhammad Khan, lower Sindh, Pakistan. Journal of Wildlife and Ecology. 1: 25-34.

Pielou, E.C. 1966. The measurement of diversity in different types of biological collections. Journal of theoretical biology. 13: 131-144.

Platt, V. 2007. Burning Butterflies: Seals, Symbols and the Soul in Antiquity. BAR INTERNATIONAL SERIES. 1610: 89.

Rahman, U., K. Mahmood, T. Arif. 2011. Murree Biodiversity Park - Baseline Report on Entomofauna. IUCN. Islamabad, Pakistan.

Roth, S. 2002. Attracting Butterflies & Hummingbirds to Your Backyard: Watch Your Garden Come Alive with Beauty on the Wing. Rodale.

Saarinen, K., A. Valtonen, J. Jantunen, S. Saarnio. 2005. Butterflies and diurnal moths along road verges: does road type affect diversity and abundance? Biological Conservation. 123: 403-412.

Shannon, C.E., W. Weaver. 1949. 1963. The mathematical theory of communication.

Tiple, A. 2012. Butterfly species diversity, relative abundance and status in tropical forest research institute, Jabalpur, Madhya Pradesh, Central India. Journal of threatened Taxa. 2713-2717.

Umair, M., M. Altaf, A.M. Abbasi. 2017. An ethnobotanical survey of indigenous medicinal plants in Hafizabad district, Punjab-Pakistan. PloS one. 12: e0177912.

Wallace, A.R. 2016. On the habits of the butterflies of the Amazon Valley. Read Books Ltd.

Wiens, J.J., C.H. Graham. 2005. Niche conservatism: integrating evolution, ecology, and conservation biology. Annu. Rev. Ecol. Evol. Syst. 36: 519-539.