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Can altitude effect the distribution of nymphalidae butterflies adjacent to the protected regions in the Eastern Himalayan landscape of West Bengal, India?

Panchali Sengupta

Department of Zoology, West Bengal State University, Berunanpukaria, Malikapur, Barasat, West Bengal, India (email:panchali17sg@gmail.com)

INTRODUCTION & AIM

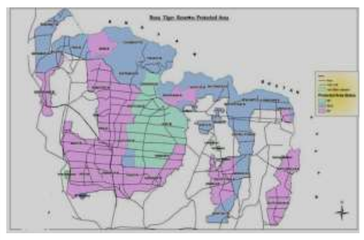
Studies on the influence of latitudinal and elevation gradient on the species distribution, diversity, richness and evenness are significant. Distribution and Diversity of butterflies within a particular habitat signifies floral diversity and habitat quality which holds the key to biological conservation. Interestingly, the physiographic and eco-climatic uniqueness of the Eastern Himalayan region of West Bengal, India sustains a healthy butterfly population.

STUDY AREA

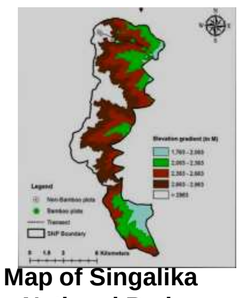
The study was conducted in the surrounding regions outside the jurisdiction of the protected areas of Eastern Himalayas:

- **Singalika National Park**
- **Neora Valley National Park**
- **Gorumara National Park**
- **Buxa Tiger Reserve**

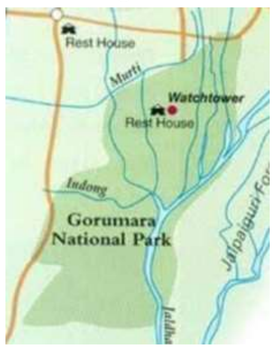
Map highlighting the Eastern Himalayan region of West Bengal, India



Map of Buxa Tiger Reserve



Map of Singalika National Park



Map of Gorumara National Park

Map of Neora valley National Park

METHOD

- Transects established at six altitudinal belts (<=1500 masl, 1501-2000 masl, 2001-2500 masl, 2501-3000 masl, 3001-3500 masl, >=3501 masl).
- Transect length was: 500-800 m
- **Determination of:**

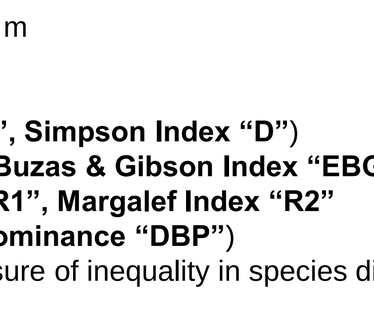
Diversity (**Shannon Index "H´", Simpson Index "D"**)
Evenness (**Pielou Index "E", Buzas & Gibson Index "EBG", Equitability Index "Eq"**)
Richness (**Menhinick Index "R1", Margalef Index "R2"**
Dominance (**Berger-Parker Dominance "DBP"**)
Gini's coefficient on the measure of inequality in species distribution

Identification of species was done according to published literature (Ghatak, S. & Roy, A. B. 2013; Haribal, M. 1992; Kehimkar, I. 2008)

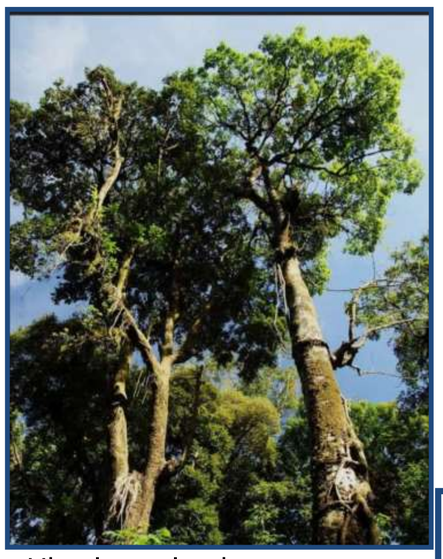
PHOTO GALLERY

Pristine Himalayan habitat

Neptis ananta

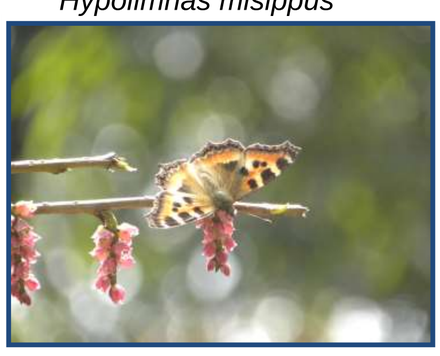


Hypolimnas misippus



Himalayan landscape

Vanessa cardui



Aglais cashmiriensis

Vanessa indica

RESULTS

High values of evenness index at >=3500 masl are probably indicative of lesser disturbance and greater homogeneity in the occurrence of studied species. This is also supported by lowest value of Gini coefficient (indicative of lowest inequality in species distribution) at the highest altitudinal belt in the study area (Table 1).

Altitudinal Belts (masl)

Indices	<=1500	1501-2000	2001-2500	2501-3000	3001-3500	>=3501
Pielou's index	1.402	1.420	1.418	1.423	1.419	**1.424**
Buzas & Gibson Index	0.892	0.933	0.927	0.942	0.934	**0.952**
Equitability Index	0.972	0.984	0.983	0.987	0.984	**0.987**
Berger-Parker Dominance	**0.047**	0.031	0.046	0.025	0.030	0.032
Gini's coefficient	**0.264**	0.205	0.184	0.185	0.202	0.153

Table 1 representing the values of Evenness, Dominance and Gini coefficient

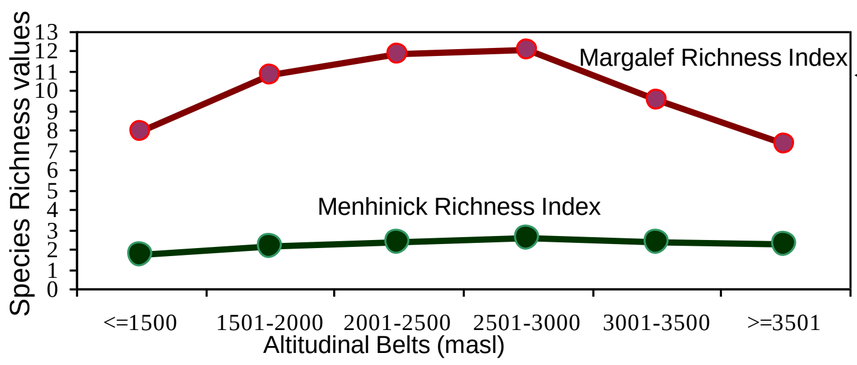


Figure depicting a mid-elevation peak in Species Richness curve

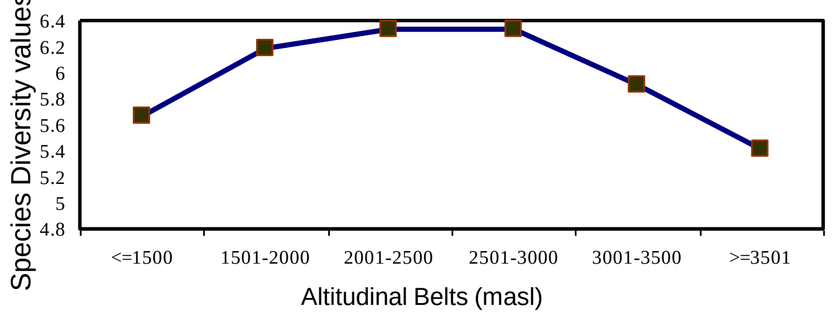


Figure representing a Hump-shaped pattern in Species Diversity curve

DISCUSSION & CONCLUSION

Rahbek (1995) observation on mid-elevation peak in species distribution and species richness was also observed here. Similar findings was also reported by Olson (1994) and Sanders *et al* (2002). Holloway *et al* (1994), Uniyal (2007) and Stefanescu *et al* (2011) described a similar pattern among lepidopterons.

Topographical uniqueness coupled with formation of cloud cover approximately at 2000 masl may provide a habitat sustaining montane forest specialist species. Significantly differences in altitude could probably influence the diversity and distribution of nymphalid butterflies in such a region with immense ecological significance. Therefore the present study enlightens the impact of floristic diversity in shaping the habitat quality in turn contributing towards conservation biology.

FUTURE SCOPE OF STUDY

Designing similar studies in surroundings of other protected areas of the Himalayan landscape could help in exploring the abundance and distribution of such species with ecological uniqueness. Association of lepidopterans with their food plants could also help us to highlight the butterfly-host plant interaction in such protected areas.

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