

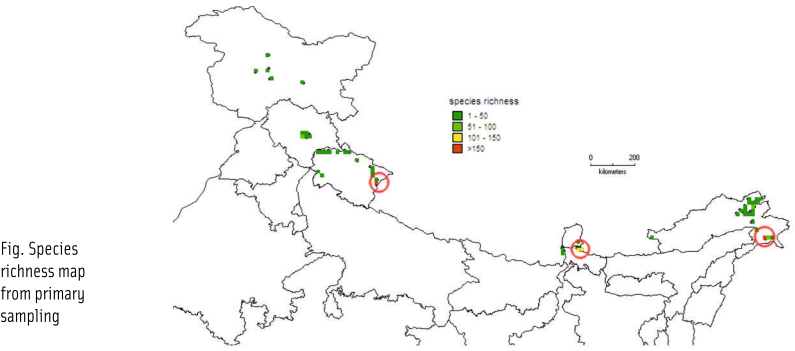
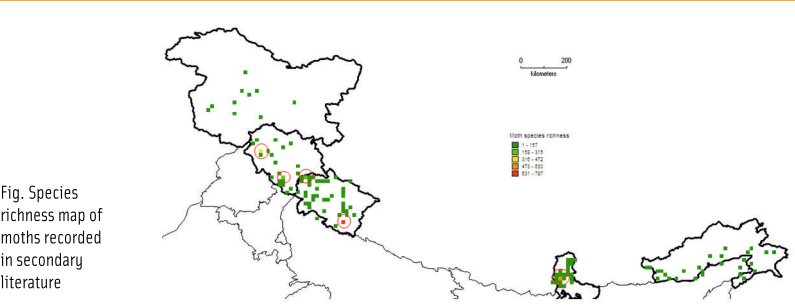
Significant altitudinal shifts and restricted taxa

- 7 species were recorded from altitude >2000m from its past known distribution
- *Trachea auriplena* (Noctuidae) & *Actias winbrechlini* (Saturniidae) showed >2500m ascend
- 42 species showed >1000m ascend from its past altitudinal records
- 13 genera are restricted to alpine meadows over 3500m
- Among them Ennominae genera like *Arichanna*, *Opisthograptis*, *Larentiinae*, *Photoscotosia*, *Noctuid*, *Phlogophora*, *Anaplectoides*, *Paraxestia* were dominant
- High altitude areas of Great Himalayan NP (Himachal Pradesh) harbours most diverse assemblage of high-altitude restricted species and should be a priority site for habitat conservation

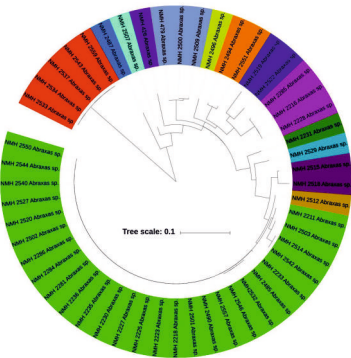
These species require constant monitoring, as they are most susceptible to climatic perturbations

Historical localities for repeat monitoring

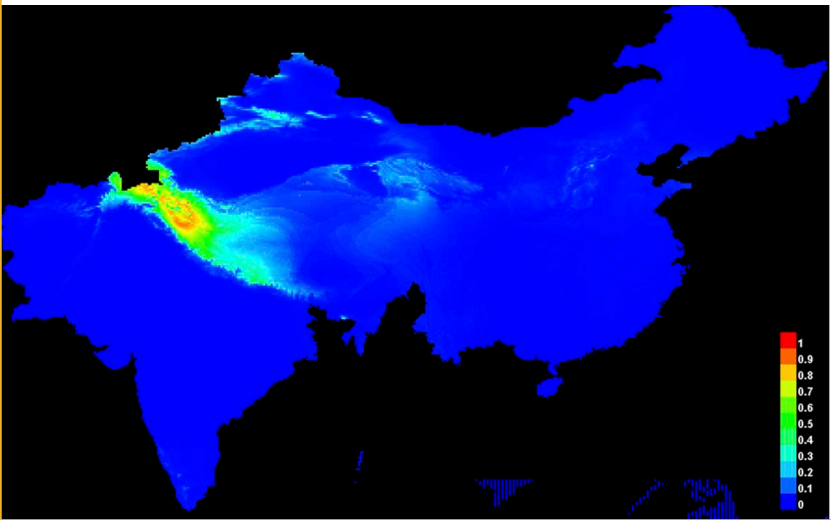
5 historical localities (marked with red circle) with high species records were identified for repeat sampling: Bhimtal area & Govind WLS (Uttarakhand), Darjeeling Hills (West Bengal) and Dharmasala & Simla (Himachal Pradesh)



Species richness was high in Askot WLS, Neora Valley NP and Namdapha NP



Phylogenetic tree of *Abraxas* complex showing 14 species



Habitat suitability map of *Parnassius epaphus* (Common Red Apollo) using Maximum Entropy (MAXENT) Modelling



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LEPIDOPTERA (INSECTA) AS
POTENTIAL INDICATOR TAXA
FOR TRACKING CLIMATE
CHANGE IN THE INDIAN
HIMALAYAN LANDSCAPE



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Himalayan biodiversity is under serious threat due to ongoing climate change, monitoring of which requires a suitable set of faunal indicator taxa. Lepidoptera (butterflies & moths) being highly diverse and closely associated with their immediate habitat due to herbivory, is showing changes in thier abundance, phenology and distribution range globally.Our overall aim is to enumerate diversity and distribution pattern of Lepidoptera and processes governing them in different Himalayan Biogeographic provinces, as well as, identifying species and assemblages which are most vulnerable to climatic perturbations.

OBJECTIVES

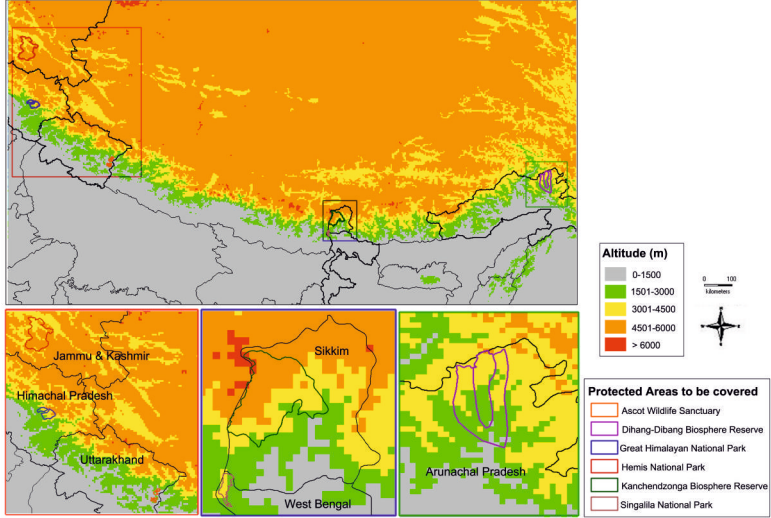
To investigate the differential processes influencing the diversity and distribution pattern of Lepidoptera assemblages in six Himalayan Biogeographic Provinces.

Repeating monitoring surveys in historical collection localities to assess changes in species distribution range.

To evaluate status and distribution of threatened Apollo butterflies and assessing their optimum habitat conditioning.

Generating barcode data base of Himalayan Lepidoptera and resolving cryptic species complex.

STUDY AREA



METHODOLOGY

stratified random sampling along altitudinal gradient was carried out.

Identification

- Initially following taxonomic literature
- Genitalia study for confusing species

Repeat Monitoring

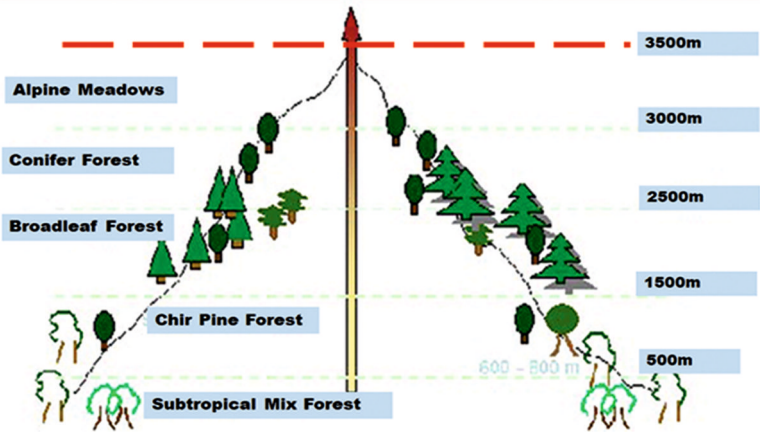
- Compiling Historical Records, thus generating database of Lepidoptera recorded from IHR
- Generating species richness maps of historical localities for identifying prominent sites for repeat sampling
- Comparing past & present altitude records to identify significant altitudinal shifts & restricted genera & species

Habitat suitability modelling of Apollos

- Compilation of Historical records of Apollo from Himalayas
- Maximum Entropy Modelling (MAXENT) with BioClim variables

Molecular Phylogenetics

- Generating Barcode database of Himalayan Lepidoptera
- Resolving species complexes & Crypticism through phylogenetic analysis



RESEARCH FINDINGS

Lepidoptera richness of Indian Himalaya Region (IHR)

- Extensive literature review reflected consolidated 4107 species belonging to 1726 genera of 52 families of moths & 1,249 subspecies/1,013 species belonging to 6 families of butterflies reported from IHR
- 719 moth species belonging to 452 genera of 23 families & 311 butterfly species belonging to 166 genera of 6 families have so far been reported from primary sampling
- 59 species of moths have so far been recorded for the first time from India: Geometridae (19 species), Erebidae (16 species), Noctuidae (10 species), Crambidae (8 species), Notodontidae (6 species), Saturniidae (4 species), Dreapanidae (2 species) & Thyrididae, Eutellidae and Nolidae (1 species each)
- 3 species of Geometridae of genera *Chiasmia* & *Psyra*, 1 species of Notodontidae of genera *Phalera*, 1 species each of Erebidae of genus *Cyana* & Noctuidae of genus *Donda* are probable new species to science



Fig. Probable new species of Genus *Phalera* (Notodontidae)

