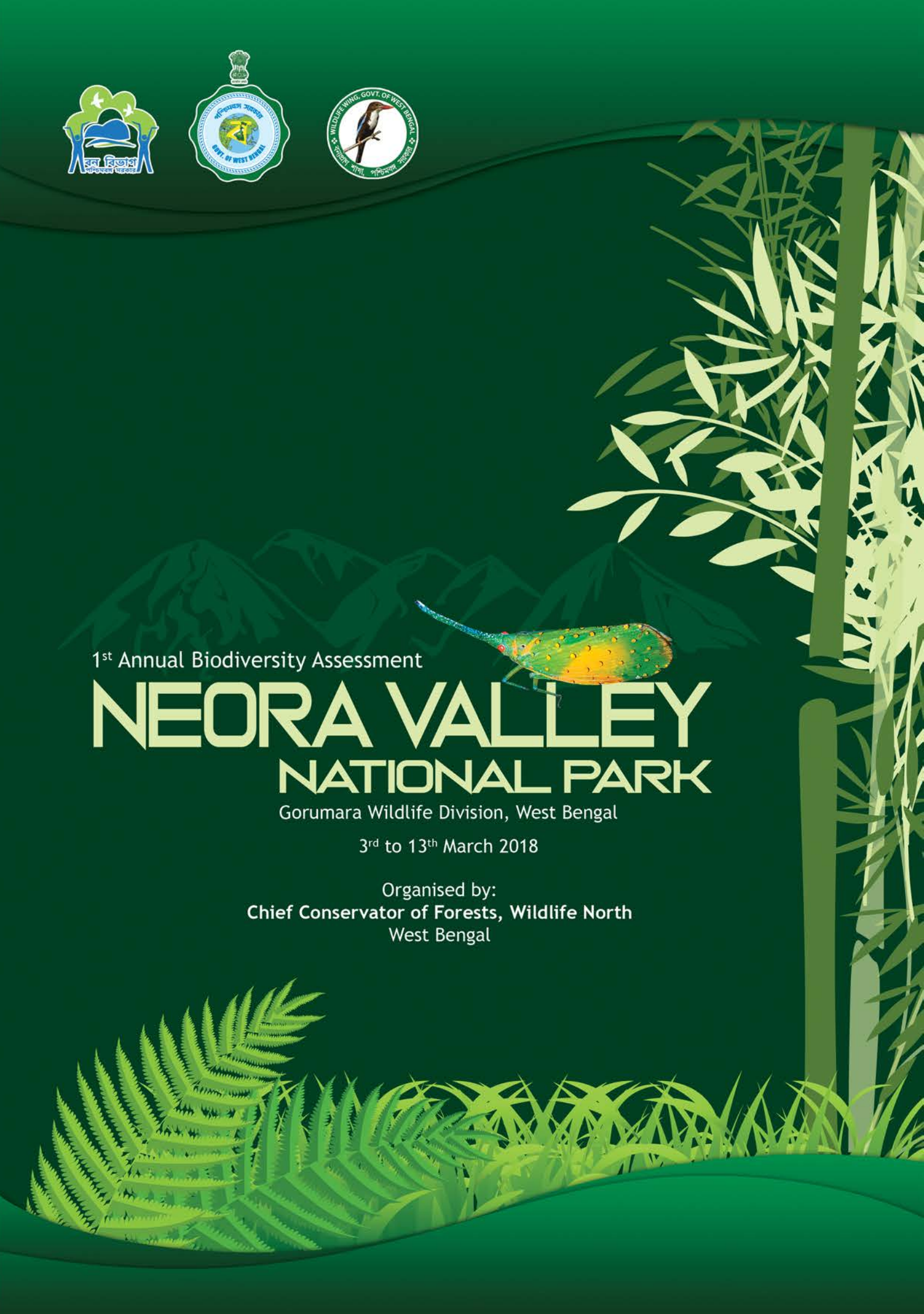

1st Annual Biodiversity Assessment

NEORA VALLEY NATIONAL PARK

Gorumara Wildlife Division, West Bengal

3rd to 13th March 2018

Organised by:

Chief Conservator of Forests, Wildlife North

West Bengal

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Pseudopoda sp. (Female)

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FOREWORD

Ravi Kant Sinha, IFS

सत्यमेव जयते

Principal Chief Conservator of Forests, Wildlife
& Chief Wildlife Warden,
Government of West Bengal

Neora Valley National Park, situated in the upper and lower catchment of Neora River in Kalimpong district of West Bengal, is one of the last pristine forest of the country. Even in times of production forestry, this area was classified into "Protection Working Circle" in previous Working Plans. The rich diversity of plants and animals was unknown till 1982, when an expedition was undertaken by the Himalayan Club, ZSI, Indian Army and our Forest Development Corporation. Since then, there have been no serious attempts to map the biodiversity of the area, mainly due to its inaccessibility.

Wildlife wing decided to organize a Biodiversity Camp, inviting some eminent scholars from West Bengal, to do a preliminary survey. The primary objective of this Camp was to attempt a rapid assessment of the area. It was a challenge for us as well, as the biodiversity richness of the National Park is due to the altitudinal variation from 500 mt to 3140 mt, its inaccessibility and adverse weather conditions for most part of the year.

With all the limitations, I have no doubt that the findings of the Camp will help develop and update our datasets and provide inputs to the Management Plan of Neora Valley National Park. We have plans of conducting this kind of Camps in near future in Singalila National Park, Senchal Wildlife Sanctuary and Mahananda Wildlife Sanctuary too.

I hope this compilation of data on biodiversity of Neora Valley National park will be stepping stone to the policy makers, forest managers, researchers and students. Future studies can be more detailed, mapping the distribution, abundance and related changes, and provide an input to larger global issues of climate change monitoring and mitigation.

I also thank all experts, volunteers and forest department staff, who have contributed in their own unique way in the making of this report.

Ravi Kant Sinha, IFS

Fire-tailed Sunbird

ACKNOWLEDGEMENT

This book on 1st Annual Biodiversity Assessment Camp of Neora Valley National Park (NVNP) is an effort to simply bring out the updated list of flora and fauna in selected locations of the PA. This book nearly lists out floral and faunal species encountered during the few survey being carried out by Wildlife North Circle, Wildlife Wing, West Bengal.

This book would not have been possible without the support and encouragement from the Principal Chief Conservator of Forests, Wildlife and Chief Wildlife Warden, West Bengal.

On behalf of Wildlife wing, Government of West Bengal, I would like to acknowledge the significant contribution of the following institutions for providing resource persons and individuals of different fields viz. (i) Nature Mates-Nature Club, Kolkata, (ii) BCKV, Kalyani, Nadia (iii) WWF-India (iv) Prakriti Sansad, Kolkata (v) HNAF, Siliguri & (vi) ICIMOD, Nepal.

Sincere appreciation to Himalayan Nature & Adventure Foundation (HNAF), Siliguri, its dynamic and energetic members for going into the field, installing and managing camp sites, staying in forest for days.

We would also like to extend our humble and sincere gratitude Dr Rajendra Yonzone of Kalimpong and Sri D B Basnet, WBFS, DFO Darjeeling Social Forestry Division for their immense support and expertise provided in the respective fields.

Our heartfelt thanks goes to Prof. Silanjan Bhattacharya, Head, Department of Zoology, West Bengal State University and Member, West Bengal Biodiversity Board who was instrumental in planning, compiling and analysing the raw data. It would not have been possible to bring out this extensive report within a short period of time without his guidance and active support.

Last but not the least, I express my appreciation to the officers and frontline staff of Gorumara Wildlife Division under the leadership of Miss Nisha Goswami, IFS, DFO Gorumara Wildlife Division in organizing the camp in such an inaccessible landscape and executing the plan properly and effectively.

I may have forgotten to mention names of individuals and organizations who have provided support in bringing out this valuable publication. They all deserve due acknowledgement.

Ujjal Ghosh

(**Sri Ujjal Ghosh**, IFS)
Chief Conservator of Forests
Wildlife North, West Bengal

Pleione praecox

CONTENTS

Leaf beetle

A flock of Scarlet finch

INTRODUCTION

Neora Valley National Park is probably one of the best wilderness area of our country. The National Park enjoys the distinction of being situated over one of the oldest reserve forest in India. The compact tract of forest is mostly virgin in nature because of its unique topography comprising of the hills which rise up abruptly from the piedmonts increasing northwards and having a mosaic of micro topographic units. Neora Valley National Park (NVNP) is situated in the Kalimpong District, West Bengal spread over an area of 159.78 km^2 notified in 1986 is one of the richest biological zones in the entire Northeast. The land of elegant Red Panda in the pristine undisturbed natural habitat with rugged inaccessible hilly terrain and rich diverse flora and fauna together make the park an important wilderness zone.

The forest in Neora Valley has such a luxurious growth that even sunlight finds it difficult to touch the ground. Much of the park is still inaccessible making it an adventurous place for the nature lovers & trekkers who can take the challenge to explore the still-unknown terrain in the Kalimpong hills. The park reaches up to an elevation of 3140 mt (10300 ft) at Rachela, the highest point of Neora Valley National park, which borders Sikkim and Bhutan.

The very first objective as stated in the DRAFT National Forest Policy 2018 of our country is the '*maintenance of environmental stability and conservation of biodiversity through preservation and conservation of natural forests*.' The strategy to achieve the above goal has also been written in the DRAFT National Forest Policy 2018 as

"(f) Biodiversity Conservation

Natural forests are rich repositories of biodiversity in the country. The following steps will be taken for the conservation of the biodiversity in the natural forests.

(i) *Biodiversity of the forest areas of the country will be surveyed and documented systematically, and sites having exceptional taxonomic and ecological value will be conserved. Legal and administrative measures for protection of biodiversity against bio-piracy will be taken, in sync with National Biodiversity Act.*

(ii) *Modern techniques of ex-situ conservation will be promoted for the preservation of Relic, Endangered and Threatened (RET) species*."

Considering the above mandate as a guideline it has been planned to conduct series of biodiversity assessment programmes of PAs of North Bengal over a period of next Five years. The first such attempt was made in Neora Valley National Park and assessing the biodiversity richness of such a pristine and inaccessible wilderness area was indeed a tough task. This kind of field exercise have been taken up for the first time by Wildlife North circle, West Bengal keeping the following objectives in mind.

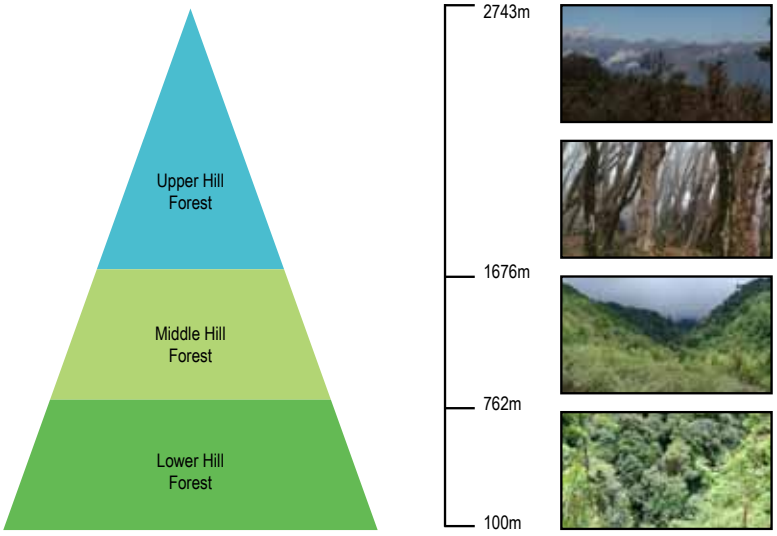
OBJECTIVES

- To identify different floristic composition of NVNP specially the added area including orchids, wild flora, medicinal herbs, trees etc.
- To identify different fauna of NVNP including lesser known groups like Snakes & Lizards, Spiders, Butterfly & Moths, Dragonfly & Damselfly, other insects as well as mammals.
- To prepare and upgrade checklist of Trees, Ferns, Wild flower, Orchids, Mammals, Avifauna, Harpetofauna, Insects etc.
- To impart training to frontline staff in identifying different bio-diversity elements.
- Documentation on biodiversity richness of NVNP

THE FOREST TYPES

According to Champion and Seth (1935), forest types are Neora Valley National Park, are as following.

i) Eastern Himalaya Moist mixed deciduous forest (3C/C- 3b).
ii) Sub Himalaya Secondary Wet mixed Forest (2B/2S-3).
iii) Eastern Himalaya Sub tropical Wet Hill forest of Northern Sub Tropical. Broad leaved Hill Sub group (8B/C 1).
iv) Eastern Himalaya West Temperate Forest of montane Wet Temperate Sub group - (11/B/C1).
v) Eastern Himalaya Subalpine Forest (Brich-Rhododendran- (14/C-2).



1) Lower Hill Forests

Streches from the plain to an elevation of 762 m above MSL fall under this type of forests. The extension of this zone is very large, extending both north-south and east-west with considerable differences of temperature, soil and rainfall. The forests over a greater part of the area are mainly deciduous but often approaching to semi evergreen type, where rainfall exceeds 160 inch annually. The aspect also affect vegetation, as tree density is greater on northern aspect.

a) Dry mixed forest - (3C/C-3b) Eastern Himalaya Moist mixed deciduous forest. These forests are found on the ridges and drier slopes of West Nar and East Nar blocks, below 1000 M. and are dominated by *Duabanga sonneratioides*, *Steriospermum parsonatum, Adina cordifolia*, *Pterospermum acerifolium*, *Terminalia tomentosa*, *Chukrasia tabularis, Terminalia bellirica, Dillennia pentagyna*.

b) Wet mixed forest - (2B/2S-3) Sub Himalayan secondary wet mixed forest of northern tropical semi evergreen subgroup. These are the evergreen Valley Forests which are mainly restricted to northern aspect and also on the damper areas and higher rainfall zone (>200"). It is a seral stage leading to the succession of tropical evergreen forest.

In the part of East Nar block (E.Nar 14a, 14b, 17), vegetation is intermediate type which marks a transition from mainly deciduous to evergreen forest. This is recognised by Cowan as Schima-Bauhinia hylium, which corresponds to 2B/C 1b (Eastern sub-montane, semi evergreen forest of northern tropical semi evergreen subgroup). The principal species is *Schima wallichi* mixed with *Bauhinia purpuria, Cedrela toona, Michelia champaca*, *Duabanga sonnertiodes, Acrocarpus fraxinifolius, Amoora wallichi*.

In the slopes of East and West Nar blocks, *Eugenia* mixed with *Terminalia myrocarpa, Turpinea pomifera, Phoebe hainesiana, Khumani stipulate, Milosma simpliofolia, Dysoxylum sp* is common. This is recognised as *Eugenia - Phoebe* hylium. This corresponds to 2B/C 1a (Assam alluvium plains semi evergreen forest of northern Tropical Semi evergreen group).

The undergrowth in the hill forest is composed of herbaceous annual, shrubs, climbers ferns represented by *Lycopodium* sp., *Selaginella* sp., *Botrychium* sp., *Clerodenrum viseosum, Morinda eitrifolia, Eupatorium odoratum, Girardiana palmata, Rauwolfia serpentina, Vitis repanda* etc.

2) Middle Hill Forests

The altitude range of these forests mainly covers the zone between 762 m. to 1676 m. (2514 ft - 5530 ft.). These forests occur on various geological formations including Darjeeling gneiss and Daling series of slates, quartzite, schist which form a sandy loam soil, responsible for development of this forest.

a) *Engelhardtia - Castonoposis - Schima - Betula* hylium - This is the principal association of subtropical zone as found between 1219 m. - 1676 m., characterised by high percentage of *Engelhardtia specata, Castonoposis tribuloides, Schima wallichi*. Below 1524 m. *Castonopsis* predominates, *Engelhardtia* sp. take dominance above 1524 m. followed by *Schima wallichi, Machilus edulis* with undergrowth dominated by - *Rubus* sp., *Virbernum* sp., *Lastrea disscecta*.

b) *Ostodes* hylium – is found in an elevation of 1219 m. to 1676 m., in localities exposed to full force of monsoon, and consequently heavy rainfall dominated by *Ostodes panicata, Machilus gammieana, Beilschieda sikkimensis, Terminalia chebula. Andromoda ovalifolia Schima wallichi, Engelhardtia spicata, Macaranga* sp., *Mallotus* sp., *Betula* sp.

The second storey comprises of *Aglaia pervirides, Meliosa simplicifolia, Eugennia kurzi, Khretia wallichii, Turpinia nepalensis, Litsea* sp., *Brassaiopis* sp.

3) Upper Hill Forest

The temperate zone ranges from an altitude of 1676 mt. to 3169 mt. The broad leave forest is restricted between 1676 mt. - 2743 mt. According to altitude vegetation types differ. In between 1676 - 2133 mt. One can find *Machilus edulis - Alcimandra cathcartii*, between 2133 - 2438 mt., *Quercus pachyphalla*, between 2438 - 2743 mt. - *Quercus lamellosa* with *Acer* sp. *&* *Magnolia* sp. Other species in this region are *Alcimandra cathcartii, Nyssa javanica, Maclulus edilis, Engethardtia spicates, Cephalostachysm capitation, Arundinaria gritithion*.

A) Lauraeeous Forest (*Machilus - Michelia* hylium) - This association occurs almost universally at an elevation between 1676 - 2133 mt. Principle sp. are *Machilus edulis, Alcimandra catahartii, Engelhardtia spicata, Schima Wallichii.*Herbs & shrubs include *Strobilanthes* sp., *Thumbergia, Dapne* sp., *Rubus* sp., *Oxalis* sp., *Thallictrum* sp., *Selaginella* sp. etc.

B) Oak Forest - (2133 - 2438 mt.) *Quercus lamellosa, Quercus lineata, Quercus spicata, Eleocarpus lanceaefolius, Echinocarpus, Acer campbeli* are found in this type of forests. Malling bamboo is found scattered all over with other species like *Rubus glaciate, Cardamine macrophylla, Ilex hookeri, Polygonum sp., Viburnum* sp., *Geranium nepalense*.

C) High level Oak Forest - (2430 - 2743 mt.) *Quercus pachyphylla* constitute 50% of the forest. Others include *Quercus lamellosa, Acer campbellii, Magnolia campbellii,* alongwith *Rhododendron* sp., *Symplocos* sp. Malling bamboo is found everywhere. Ferns include *Polypodium, Polystichum, Dryopteris, Cheiklanthes, Pteris, Botrychium. Asplanumum, Peraneum, Drynaria* etc.

4) Coniferous Forest

Mainly in Thosum block conifers like Hemlock occur in higher frequency. In other blocks, it is mostly restricted to exposed ridges and spurs having comparatively shallow soil. This community, may be described as an edaphic - preclimax. The range of distribution is also high. In Rachila block pure patches of hemlock (*Tsuga brunnoniana*) has been found at as low as 2282 mt. elevation on either side of Neora river with undergrowth of Rhododendron, whereas in the same block, hemlock has been found to occur scatteringly along ridges and spurs, as high up as at 2895 mt. with bamboo as undergrowth. In Rhenock, hemlock occurs on the top of the sides and steep rocky cliffs with Rhododendron and bamboo as undergrowth.

In Thosum block (Thosum-3, 4 compt.) large patches of hemlock mixed with yew (*Taxus baccata*) are seen almost in pure form. In one place they occupy the ground between 2590 mt. to 2733 mt. and in other place between 2743-2895 mt. *T. baccata* of this region grows to a good height and in bole form almost resembling *Tsuga*. Silver fir (*Abis densa*) is noted in area of altitude of 3,048 mt. near Rachila Peak, though their condition is not very good. However, regeneration status of these conifers is not satisfactory in Rhenock as only some poles of hemlock are seen here. In Rachila and Thosum blocks, scanty regeneration of hemlock and yew has been noticed.

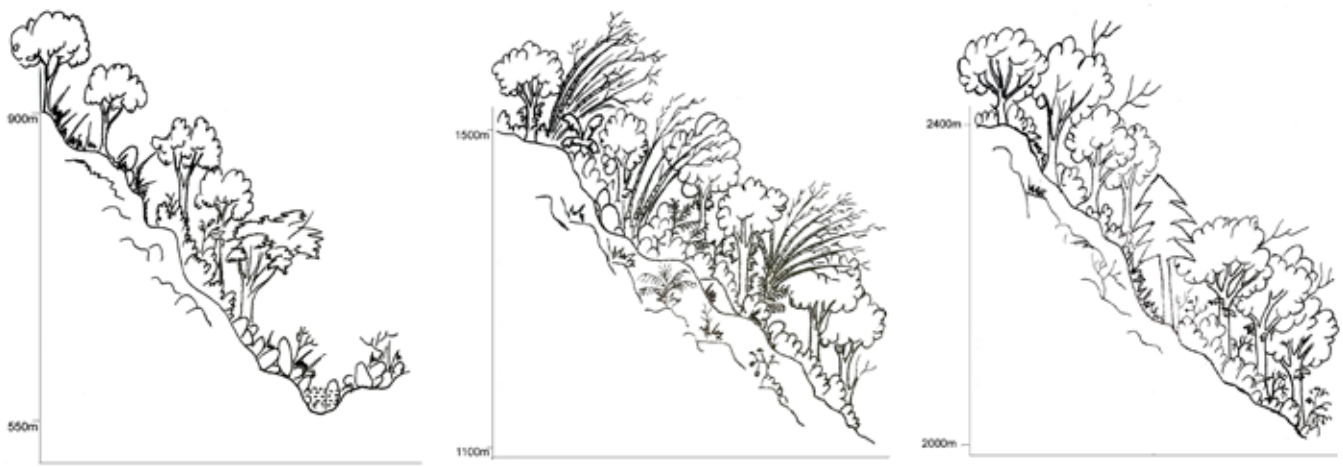
5) Rhododendron (Eastern Himalayan sub alpine -14/C-2) forest

Unlike other places of Eastern Himalayan the Rhododendron of the National Park don't exactly correspond to any of the Champion's climatic climax type and form pockets of pure patches, on the exposed hill tops with *Arundenaria pantlingii*. Common species are *Rhododendron arboruem, R. barbatum, R. falconeri, R. dalhousiae*. This community is perhaps a bio-edaphic climax peculiar to this area. It is found above 2743 mt. Undergrowth on open patches includes. *Swertia chirata, Swertia bimaculata, Swertia nervosa, Swertia dilatata, Cardamine hersuta, Geranum nepalense, Capsella bursa-pastores, Drymaria villosa, Polygala arillata, Viburnum nervosum, Thalictrum foliolosum, Thalictrum jaranicum, Polygonum molle, Polygonum chinense*.

6) Himalayas Moist Temperate Forest

Montane Bamboo breaks (DS1 group-12) occur between 2,438 mt. - 3048 mt. particularly in areas exposed to heavy fire, adjoining the boundary of Sikkim state. Pockets of bamboo occur without any overwood in many places. *Arundinaeria panlingii, A. griffithiana, A. aristata, A. maling, A. falconeri, A. racemosa* are the main species. In damp area epiphytic moss on old bamboo is found. Grassland flora include - *Poa* sp., *Oplismenos, Imperata, Potentila, Cyperus* sp.

Forest types and other habitat features around the three camp sites:



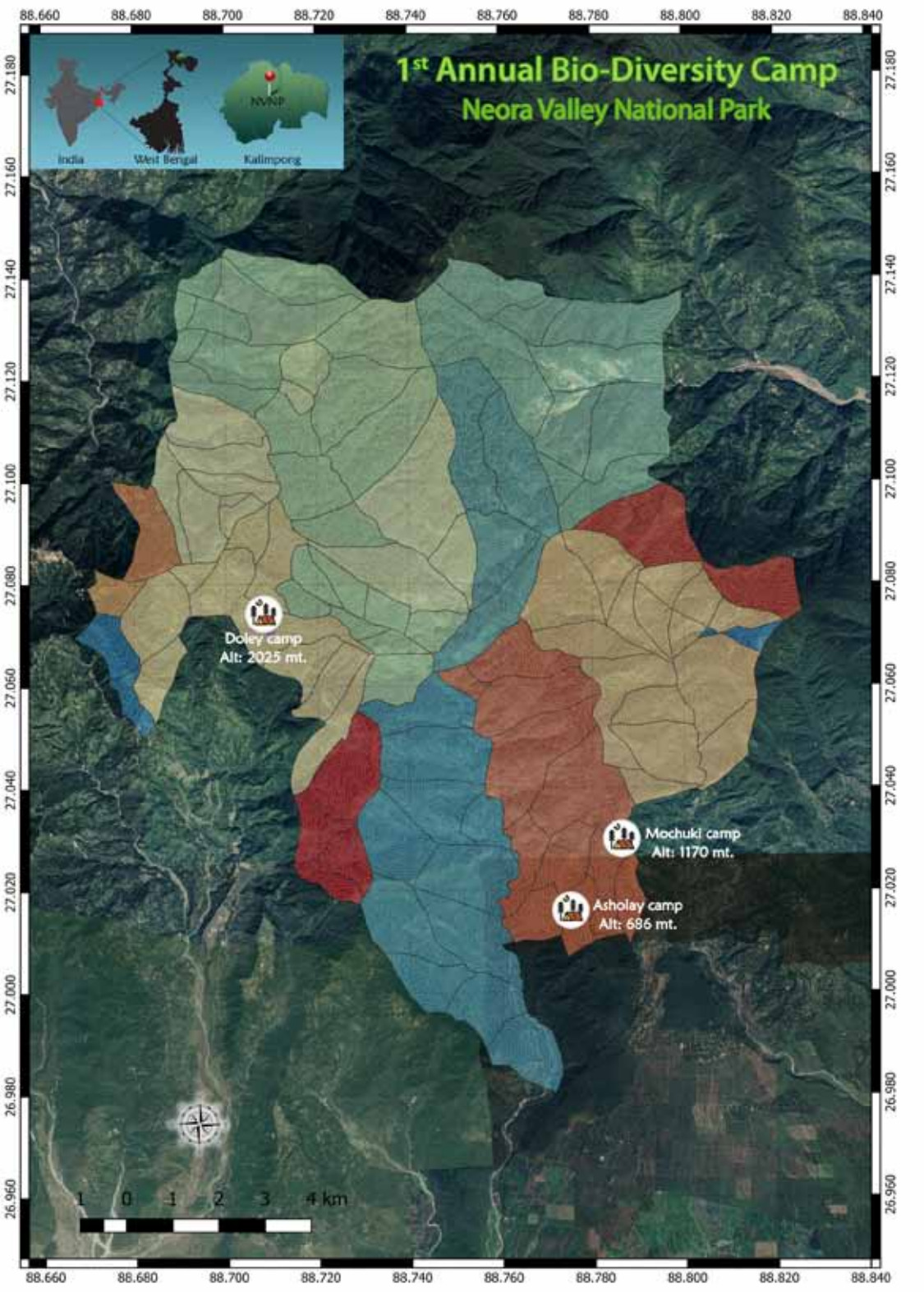
Schematic profile and vegetational physiognomy of three different survey locations

(Field drawing by Sri Soumya Sarkar)

LOCATIONS OF CAMPS

Two of the camps were set up in Lower Neora Range covering an altitude of 500 mt. to 1500 mt. whereas the other one was at Upper Neora Range covering an altitudinal range of 1800 mt. to 2200 mt.

- **Doley camp**, NVNP - N 27^{0}04'14.51", E 88^{0}42'34.36", Altitude: 2025 mt.
- **Ashaley camp**, NVNP- N 27^{0}00'46.3", E 88^{0}46'29.4", Altitude: 686 mt.
- **Mouchuki camp**, NVNP- N 27^{0}01'36.48", E 88^{0}47'10.05", Altitude: 1170 mt.



GENERAL METHODOLOGY OF BIODIVERSITY ASSESSMENT

The present survey of biodiversity in the NVNP was undertaken early in the month of March 3rd to 13th in three different locations of the park at three altitudes, namely Ashaley camp (700 msl), Mouchuki camp (1200 msl) and Doley Camp (2000 msl).

The observations were mostly *ad libitum* and 'scan a block', i.e. intensive search in all the potential habitats for a target group of the fauna or flora in a patches of forests by the field experts for that group included in the survey team.

Encounter frequencies with different species during the surveys at different camp sites as experienced by the field team members were scaled from 0 to 3 in a hierarchical fashion to reflect the apparent abundance of each species in the surveyed locations, they are being **0 = not encountered, 1 = rarely encountered, 2 = common and 3 = highly abundant**.

No specimen was collected to respect the permission restrictions, but digital photography was done in abundance to document the species and its variations as and when possible. This has allowed confirmation of the field identification of a species at leisure with identification resources back in Kolkata.

All species or morpho-species (when a specimen could be noted as a distinct species visually but its species nomenclature could not be confirmed yet) reported, are directly observed in the field.

Secondary information regarding the species of snakes, lizards and amphibians, the ones which are difficult to sight in this time of the year, were collected by interacting with the local forest staff and people from fringe villages.

THE WEATHER DURING THE SURVEY

During the camping days' **rain** was not a hindrance except the last two days at Doley camp where it was raining intermittently making field exploration almost difficult. However, the muddy track and rain couldn't restrict the movements of the campers completely during these two days. Maximum and minimum **temperature** recorded during the camp was 23^0C and 12^0C respectively. **Humidity** appeared to be approximately 90 to 95 %. No significant **Frost**, **Dew**, **Fog** was recorded during the camp except the foggy night time at Doley camp in the last two days. **Wind Speed** was normal.

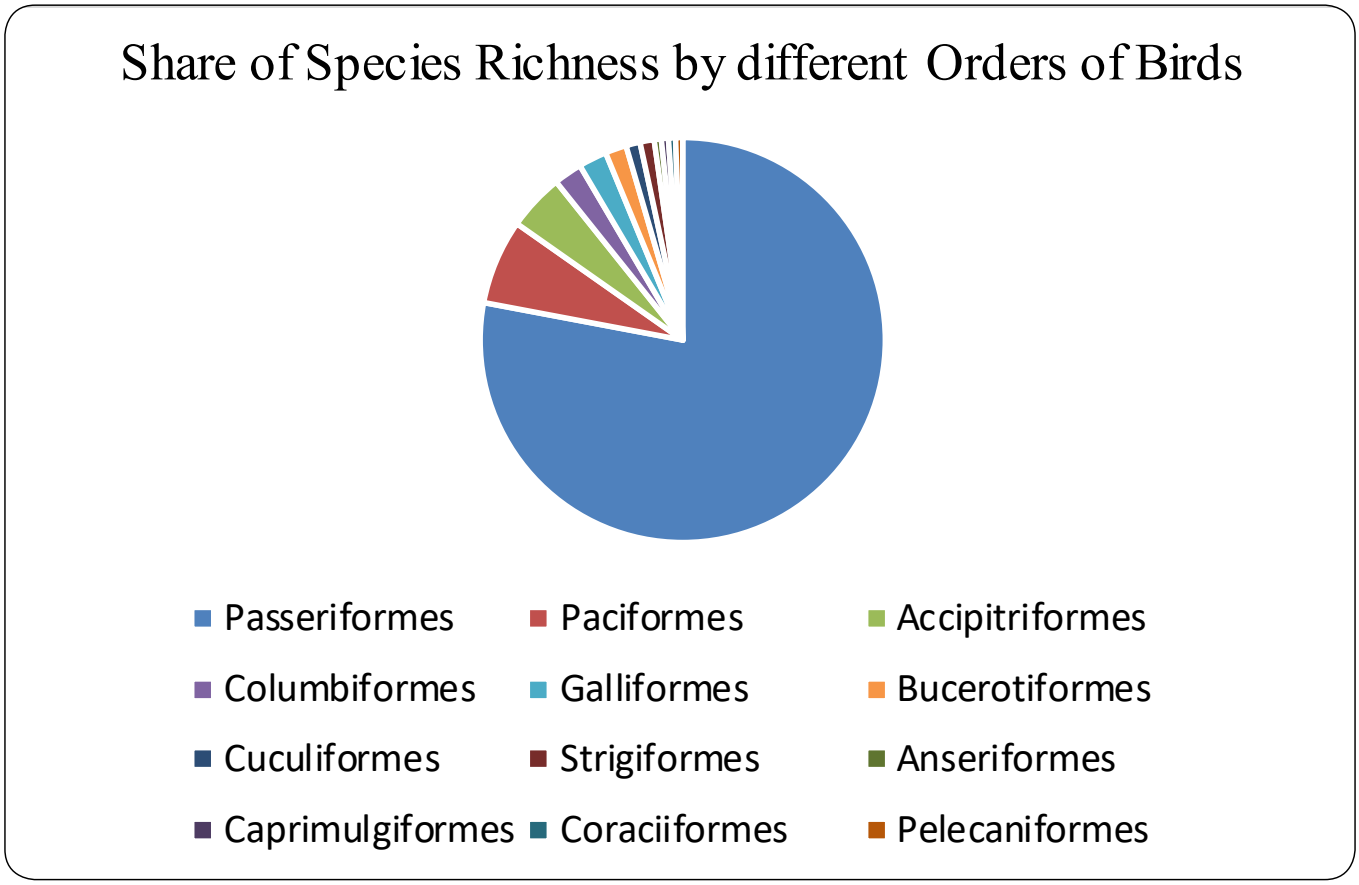
Yellow-billed Blue Magpie

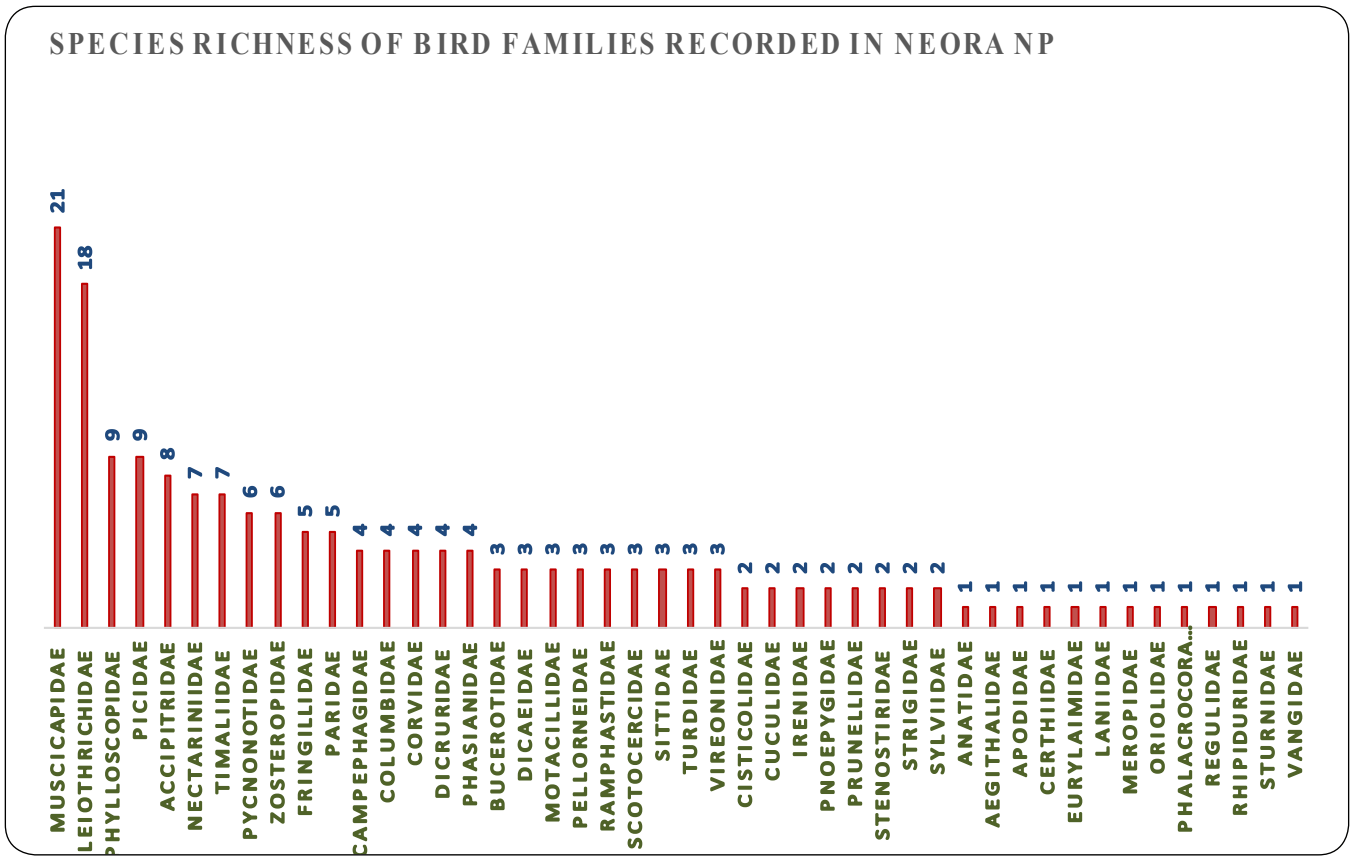
BIRDS

Avifauna, i.e. birds is arguably best documented group in West Bengal, thanks to the emergence of passionate amateur birders in large numbers in recent years along with some great ornithologists from ZSI, Kolkata, in the past. Yet, NVNP remains comparatively lesser explored area in the state due to its difficult terrains. The remarkable report on birds and other wildlife from this pristine wildness is available from the `Note Book on Biodiversity of Neora Valley National Park' published by the Dept. of Forests, GoWB, in 2010. In this book, the number of bird species reported to be inhabitants of NVNP is 308!

Total number of orders of birds recorded	**12**
Total number of bird families recorded	**46**
Total number of bird genera recorded	**122**
Total number of bird species recorded	**177**

Total number of birds recorded at Ashaley camp (700 msl), Mouchuki camp (1200 msl) and Doley Camp (2000 msl) were 114, 105 and 94 respectively. A brief overview of distribution and abundance of each species at three surveyed localities at three different altitudes is given in the **Table no. 01** An analysis on the similarity/dissimilarity in species composition across the three camps showed that Ashaley and Mouchuki had very similar composition. However, species composition at Doley varied considerably from both Ashaley and Mouchuki. The similarity in species composition at Ashaley and Mouchuki could be attributed to the fact that both these locations are located in the Subtropical belt and vary in elevation by less than 300 mt. in elevation. On the other hand, Doley is situated in the temperate habitat that supports perceptibly different avian species.





Altitudinal distributions of Bird Species Richness in Neora Valley N.P	
Bird Species recorded only in Lower Neora	27
Bird Species recorded only in Middle Neora	10
Bird Species recorded only in upper Neora	42
Bird Species recorded in Lower and Middle Neora but not in Upper Neora	36
Bird Species recorded in all three Neora altitude zones	46
Bird Species recorded in Lower and Upper Neora but not in Middle Neora	3
Bird Species recorded in Middle and Upper Neora but not in Lower Neora	11


Rufous-bellied Niltava


Slender-billed Scimitar Babbler

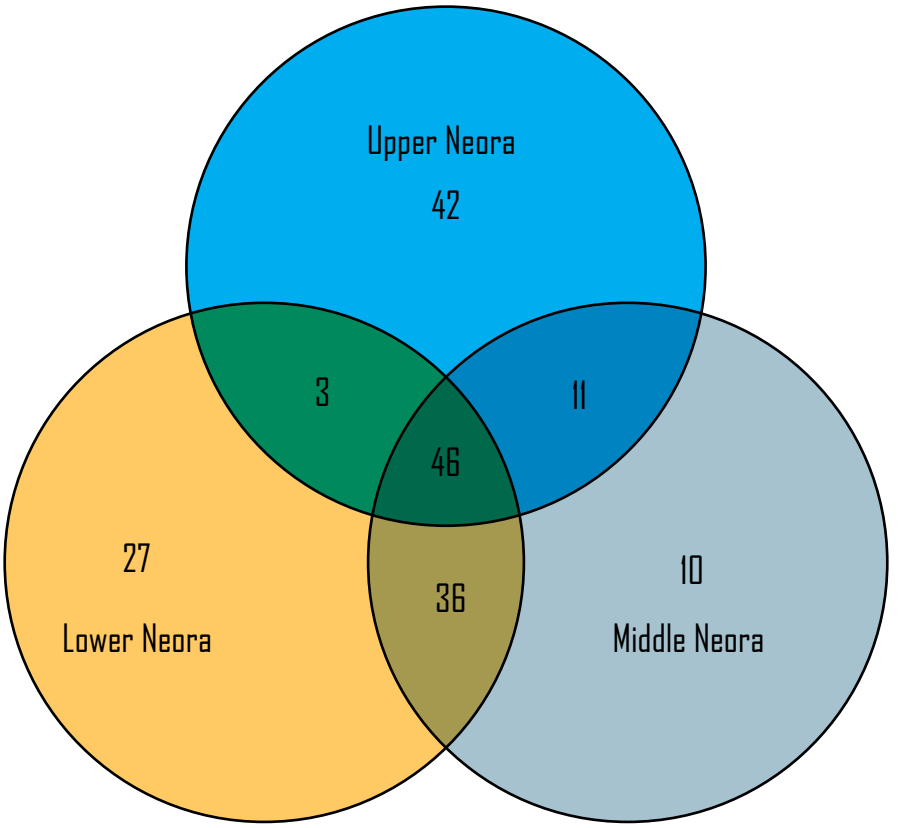


Figure No. Venn diagram depicting unique and shared bird species diversity between three survey localities at three altitudes

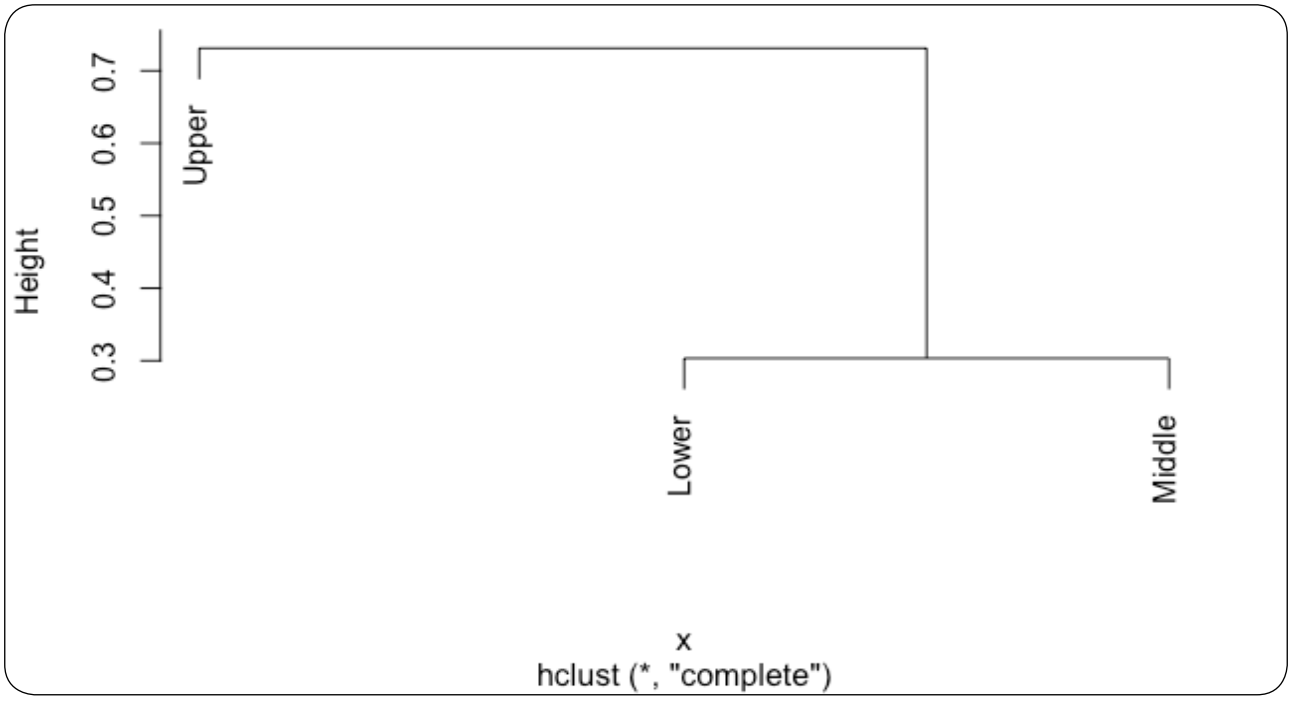


Figure No. Dendrogram showing the affinities between three survey locations based on similarities / difference in bird species compositions

Table No. 01: Birds species and their abundances recorded at different altitudinal zones of the Neora Valley NP (0 = not encountered, 1 = rarely encountered, 2 = common and 3 = highly abundant)

Sl.	Genus	Species	Family	Common Name	Zonation Abundance		
					Lower	Middle	Upper
1	*Abrornis*	*pulcher*	Phylloscopidae	Buff-barred Warbler	2	1	0
2	*Abrornis*	*humei*	Phylloscopidae	Hume's Leaf Warbler	1	1	0
3	*Abrornis*	*maculipennis*	Phylloscopidae	Ashy-throated Warbler	0	0	2
4	*Abroscopus*	*schisticeps*	Scotocercidae	Black-faced Warbler	0	0	2
5	*Accipiter*	*gentilis*	Accipitridae	Northern Goshawk	1	1	0
6	*Accipiter*	*virgatus*	Accipitridae	Besra	0	0	1
7	*Aceros*	*nipalensis*	Bucerotidae	Hornbill Rufous-necked	2	3	0
8	*Actinodura*	*egertoni*	Leiothrichidae	Rusty-fronted Barwing	0	1	2
9	*Adelura*	*frontalis*	Muscicapidae	Redstart Blue-fronted	0	2	2
10	*Aegithalos*	*concinnus*	Aegithalidae	Black-Throated Tit	0	0	3
11	*Aerodramus*	*brevirostris*	Apodidae	Himalayan Swiftlet	2	3	1
12	*Aethopyga*	*ignicauda*	Nectariniidae	Fire-tailed Sunbird	1	2	3
13	*Aethopyga*	*saturata*	Nectariniidae	Black-throated Sunbird	1	0	0
14	*Aethopyga*	*nipalensis*	Nectariniidae	Green-tailed Sunbird	1	2	3
15	*Aethopyga*	*gouldiae*	Nectariniidae	Mrs Gould'sSunbird	0	0	2
16	*Alcippe*	*nipalensis*	Leiothrichidae	Nepal Tit Babbler	1	0	0
17	*Alophoixus*	*flaveolus*	Pycnonotidae	White-throated Bulbul	2	1	0
18	*Anser*	*indicus*	Anatidae	Bar-headed Goose	0	0	1
19	*Anthracoceros*	*albirostris*	Bucerotidae	Oriental Pied Hornbill	2	0	0
20	*Anthus*	*hodgsoni*	Motacillidae	Olive-backed Pipit	1	3	2
21	*Arachnothera*	*magna*	Nectariniidae	Streaked Spiderhunter	4	3	2
22	*Arachnothera*	*longirostra*	Nectariniidae	Little Spiderhunter	2	1	0
23	*Arborophila*	*torqueola*	Phasianidae	Common Hill Partridge	2	1	1
24	*Argya*	*malcolmi*	Leiothrichidae	Large-grey Babbler	0	1	0
25	*Blythipicus*	*pyrrhotis*	Picidae	Bay Woodpecker	1	1	1
26	*Buceros*	*bicornis*	Bucerotidae	Great Hornbill	1	1	0
27	*Cacomantis*	*passerinus*	Cuculidae	Grey-bellied Cuckoo	0	1	0
28	*Certhia*	*nipalensis*	Certhiidae	Rusty-flanked Treecreeper	0	0	2
29	*Cettia*	*castaneocoronata*	Scotocercidae	Chestnut-headed Tesia	1	1	0
30	*Chaimarrornis*	*leucocephalus*	Muscicapidae	White-capped Water Redstart	2	2	0
31	*Chalcoparia*	*singalensis*	Nectariniidae	Ruby-cheeked Sunbird	0	1	0
32	*Chelidorhynx*	*hypoxanthus*	Stenostiridae	Yellow-bellied Fairy Fantail	3	3	2
33	*Chloropsis*	*aurifrons*	Irenidae	Golden-fronted Leafbird	2	1	0

Sl.	Genus	Species	Family	Common Name	Zonation Abundance		
					Lower	Middle	Upper
34	*Chloropsis*	*hardwickii*	Irenidae	Orange-bellied Leafbird	0	1	0
35	*Chrysominla*	*strigula*	Leiothrichidae	Chestnut-tailed Minla	0	2	2
36	*Chrysophlegma*	*flavinucha*	Picidae	Greater Yellow-naped Woodpeker	2	2	1
37	*Cissa*	*chinensis*	Corvidae	Common Green Magpie	2	2	0
38	*Cochoa*	*viridis*	Turdidae	Green Cochoa	0	1	0
39	*Columba*	*hodgsonii*	Columbidae	Pegion Speckled Wood	1	0	0
40	*Corvus*	*macrorhynchos*	Corvidae	Large-billed Crow	0	0	1
41	*Culicicapa*	*ceylonensis*	Stenostiridae	Grey-headed Canary Flycatcher	2	3	3
42	*Cutia*	*nipalensis*	Leiothrichidae	Cutia	2	2	0
43	*Cyanoderma*	*chrysaeum*	Timaliidae	Golden Babbler	0	0	1
44	*Cyanoderma*	*ruficeps*	Timaliidae	Rufous-capped Babbler	0	2	2
45	*Cyornis*	*tickelliae*	Muscicapidae	Tickell's Blue Flycatcher	2	2	0
46	*Dendrocitta*	*formosae*	Corvidae	Grey Treepie	2	3	0
47	*Dendrocopos*	*macei*	Picidae	Fulvous-breasted Pied Woodpecker	2	2	0
48	*Dendrocopos*	*darjellensis*	Picidae	Darjeeling Woodpecker	1	2	1
49	*Dicaeum*	*erythrorhynchos*	Dicaeidae	Pale-billed Flowerpecker	2	0	0
50	Dicaeum	*ignipectus*	Dicaeidae	Fire-breasted Flowerpecker	1	1	1
51	*Dicaeum*	*concolor*	Dicaeidae	Plain Flowerpecker	0	1	0
52	*Dicrurus*	*aeneus*	Dicruridae	Bronzed Drongo	4	3	0
53	*Dicrurus*	*hottentottus*	Dicruridae	Hair-crested Drongo	3	2	0
54	*Dicrurus*	*leucophaeus*	Dicruridae	Ashy Drongo	2	0	0
55	*Dicrurus*	*paradiseus*	Dicruridae	Greater Racket-tailed Drongo	2	1	0
56	*Ducula*	*badia*	Columbidae	Mountain Imperial Pigeon	1	1	0
57	*Elachura*	*formosa*	Timaliidae	Spotted Wren Babbler	0	0	2
58	*Enicurus*	*scouleri*	Muscicapidae	Little Forktail	2	0	0
59	*Enicurus*	*schistaceus*	Muscicapidae	Slaty-backed Forktail	2	0	0
60	*Enicurus*	*maculatus*	Muscicapidae	Forktail Spotted	2	0	1
61	*Eumyias*	*thalassinus*	Muscicapidae	Verditer Flycatcher	2	2	0
62	*Ficedula*	*strophiata*	Muscicapidae	Rufous-gorgetted Flycatcher	2	2	0
63	*Ficedula*	*westermanni*	Muscicapidae	Little Pied Flycatcher	2	3	0
64	*Ficedula*	*sapphira*	Muscicapidae	Flycatcher Sapphire	2	1	0
65	*Ficedula*	*parva*	Muscicapidae	Red-breasted Flycatcher	1	1	0
66	*Ficedula*	*hodgsoni*	Muscicapidae	Pygmy-blue Flycatcher	0	0	1
67	*Gallus*	*gallus*	Phasianidae	Red Junglefowl	3	0	0

Sl.	Genus	Species	Family	Common Name	Zonation Abundance		
					Lower	Middle	Upper
68	*Garrulax*	*leucolophus*	Leiothrichidae	White-crested Laughingthrush	2	2	0
69	*Garrulax*	*pectoralis*	Leiothrichidae	Greater Necklaced Laughingthrush	1	1	0
70	*Garrulax*	*albogularis*	Leiothrichidae	White-throated Laughingthrush	0	0	3
71	*Gecinulus*	*grantia*	Picidae	Pale-headed Woodpecker	0	1	1
72	*Glaucidium*	*brodiei*	Strigidae	Collared Owlet	1	0	2
74	*Grammatoptila*	*striata*	Leiothrichidae	Striated Laughingthrush	0	0	2
75	*Gyps*	*himalayensis*	Accipitridae	Himalayan Vulture	0	1	0
76	*Haematospiza*	*sipahi*	Fringillidae	Scarlet Finch	0	1	3
77	*Hemixos*	*flavala*	Pycnonotidae	Ashy Bulbul	2	1	0
78	*Heterophasia*	*picaoides*	Leiothrichidae	Long-tailed Sibia	3	0	0
79	*Heterophasia*	*capistrata*	Leiothrichidae	Rufous Sibia	3	3	2
80	*Hierococcyx*	*sparverioides*	Cuculidae	Large Hawk Cuckoo	0	0	3
81	*Hypsipetes*	*leucocephalus*	Pycnonotidae	Black Bulbul	3	4	2
82	*Ictinaetus*	*malaiensis*	Accipitridae	Black Eagle	1	2	1
83	*Ixos*	*mcclellandii*	Pycnonotidae	Mountain Bulbul	1	0	0
84	*Kittacincla*	*malabarica*	Muscicapidae	White-rumped Shama	1	0	0
85	*Lanius*	*schach*	Laniidae	Long-tailed Shrike	1	2	0
86	*Leiothrix*	*argentauris*	Leiothrichidae	Silver-eared Mesia	1	1	0
87	*Leiothrix*	*lutea*	Leiothrichidae	Red-billed Leothrix	0	1	1
88	*Lophotriorchis*	*kienerii*	Accipitridae	Rufous-bellied Eagle	0	1	0
89	*Lophura*	*leucomelanos*	Phasianidae	Kalij Pheasant	0	0	2
90	*Machlolophus*	*xanthogenys*	Paridae	Black Lored Tit	0	0	3
91	*Machlolophus*	*spilonotus*	Paridae	Yellow-cheeked Tit	0	0	3
92	*Macropygia*	*unchall*	Columbidae	Barred Cuckoo Dove	2	1	1
93	*Melanochlora*	*sultanea*	Paridae	Sultan Tit	0	2	0
94	*Microcarbo*	*niger*	Phalacrocoracidae	Little Cormorant	1	0	0
95	*Minla*	*ignotincta*	Leiothrichidae	Red-tailed Minla	2	3	2
96	*Monticola*	*rufiventris*	Muscicapidae	Chestnut-bellied Rockthrush	0	2	2
97	*Motacilla*	*alba*	Motacillidae	White Wagtail	0	1	1
98	*Motacilla*	*flava*	Motacillidae	Western Yellow Wagtail	0	0	1
99	*Mycerobas*	*melanozanthos*	Fringillidae	Spot-wing Grossbeak	0	0	1
100	*Myophonus*	*caeruleus*	Muscicapidae	Blue-whistiling Thrush	2	2	2
101	*Myzornis*	*pyrrhoura*	Sylviidae	Fire-tailed Myzornis	0	0	1
102	*Niltava*	*sundara*	Muscicapidae	Rufous-bellied Niltava	2	2	1
107	*Nyctyornis*	*athertoni*	Meropidae	Blue-bearded Bee-eater	1	1	0

Sl.	Genus	Species	Family	Common Name	Zonation Abundance		
					Lower	Middle	Upper
108	*Oriolus*	*traillii*	Oriolidae	Maroon Oriole	3	2	0
109	*Orthotomus*	*sutorius*	Cisticolidae	Common Tailorbird	2	0	0
110	*Paradoxornis*	*flavirostris*	Sylviidae	Black-brested Parrotbill	0	0	2
111	*Parus*	*monticolus*	Paridae	Green-backed Tit	0	2	3
112	*Pericrocotus*	*ethologus*	Campephagidae	Long-tailed Minivet	3	2	1
113	*Pericrocotus*	*flammeus*	Campephagidae	Scarlet Minivet	2	2	0
114	*Pericrocotus*	*solaris*	Campephagidae	Grey-chinned Minivet	1	0	0
115	*Pericrocotus*	*brevirostris*	Campephagidae	Short-billed Minivet	1	0	0
116	*Picumnus*	*innominatus*	Picidae	Spekled Piculet	0	1	0
117	*Picus*	*chlorolophus*	Picidae	Lesser Yellow-naped Woodpeker	2	2	0
118	*Picus*	*canus*	Picidae	Grey-headed Woodpecker	1	0	0
119	*Pnoepyga*	*pusilla*	Pnoepygidae	Pygmy Wren Babbler	0	0	2
120	*Pnoepyga*	*albiventer*	Pnoepygidae	Scaly-breasted Wren Babbler	0	0	2
121	*Pomatorhinus*	*superciliaris*	Timaliidae	Slender-billed Scimitar Babbler	0	0	2
122	*Pomatorhinus*	*ruficollis*	Timaliidae	Streak-breasted Scimitar Babbler	0	0	2
123	*Prinia*	*atrogularis*	Cisticolidae	Hill Prinia	1	0	0
124	*Procarduelis*	*nipalensis*	Fringillidae	Dark-breasted Rosefinch	0	0	1
125	*Prunella*	*immaculata*	Prunellidae	Maroon-backed Accentor	0	0	2
126	*Prunella*	*strophiata*	Prunellidae	Rufous-breasted Accentor	0	0	1
127	*Psarisomus*	*dalhousiae*	Eurylaimidae	Long-tailed Broadbill	2	2	0
128	*Psilopogon*	*virens*	Ramphastidae	Great Barbet	2	3	2
129	*Psilopogon*	*franklini*	Ramphastidae	Golden-throated Barbet	1	1	0
130	*Psilopogon*	*asiaticus*	Ramphastidae	Blue-throated Barbet	1	0	0
131	*Pteruthius*	*rufiventer*	Vireonidae	Black headed Shrike Babbler	1	2	0
132	*Pteruthius*	*melanotis*	Vireonidae	Black-eared Shrike Babbler	1	2	2
133	*Pteruthius*	*aeralatus*	Vireonidae	Blyth's Shrike Babbler	1	2	0
134	Pycnonotus	*leucogenis*	Pycnonotidae	Himalayan Bulbul	2	2	0
135	*Pycnonotus*	*striatus*	Pycnonotidae	Striated Bulbul	2	2	1
136	*Pyrrhoplectes*	*epauletta*	Fringillidae	Golden-naped Finch	0	0	2
137	*Pyrrhula*	*erythrocephala*	Fringillidae	Red-headed Bulfinch	0	0	1
138	*Regulus*	*regulus*	Regulidae	Goldcrest	0	0	1
139	*Rhipidura*	*albicollis*	Rhipiduridae	White-throated Fantail	3	3	2
140	*Rhyacornis*	*fuliginosa*	Muscicapidae	Plumbeous Water Redstart	2	2	0

Sl.	Genus	Species	Family	Common Name	Zonation Abundance		
					Lower	Middle	Upper
141	*Rimator*	*malacoptilus*	Pellorneidae	Long-billed Wren Babbler	0	0	1
142	*Sasia*	*ochracea*	Picidae	White-browed Piculet	1	0	0
143	*Saxicola*	*ferreus*	Muscicapidae	Grey Bushchat	2	2	2
144	*Schoeniparus*	*cinereus*	Pellorneidae	Yellow-throated Fulvetta	1	1	1
145	*Schoeniparus*	*castaneceps*	Pellorneidae	Rufous-winged Fulvetta	0	0	1
146	*Seicercus*	*affinis*	Phylloscopidae	White-spectacled Warbler	2	1	1
147	*Seicercus*	*poliogenys*	Phylloscopidae	Grey-cheeked Warbler	2	2	2
148	*Seicercus*	*castaniceps*	Phylloscopidae	Chestnut-crowned Warbler	2	2	1
149	*Seicercus*	*trochiloides*	Phylloscopidae	Greenish Leaf Warbler	2	2	1
150	*Seicercus*	*xanthoschistos*	Phylloscopidae	Grey-hooded Warbler	2	1	0
151	*Seicercus*	*reguloides*	Phylloscopidae	Blyth's Leaf Warbler	0	0	1
152	*Sibia*	*nipalensis*	Leiothrichidae	Hoary-throated Barwing	0	1	2
153	*Sitta*	*castanea*	Sittidae	Chestnut-bellied Nuthatch	3	3	2
154	*Sitta*	*himalayensis*	Sittidae	White-tailed Nuthatch	2	2	0
155	*Sitta*	*formosa*	Sittidae	Nuthatch Beautiful	2	3	0
156	*Siva*	*cyanouroptera*	Leiothrichidae	Blue-winged Minla	2	2	0
157	*Spelaeornis*	*caudatus*	Timaliidae	Rufous-throated Wren Babbler	0	0	2
158	*Spilornis*	*cheela*	Accipitridae	Eagle Crested Serpent	2	0	0
159	*Stachyris*	*nigriceps*	Timaliidae	Grey-Throated Babbler	1	0	1
160	*Sturnia*	*malabarica*	Sturnidae	Chestnut-tailed Starling	2	0	0
161	*Sylviparus*	*modestus*	Paridae	Yellow-browed Tit	0	0	2
162	*Tarsiger*	*rufilatus*	Muscicapidae	Himalayan Blue Robin	0	0	2
163	*Tephrodornis*	*virgatus*	Vangidae	Large Woodshrike	1	1	0
164	*Tickellia*	*hodgsoni*	Scotocercidae	Broad-billed Warbler	0	0	1
165	*Tragopan*	*satyra*	Phasianidae	Satyr Tragopan	0	0	1
166	*Treron*	*sphenurus*	Columbidae	Wedge-tailed Green Pigeon	1	1	0
167	*Trochalopteron*	*erythrocephalum*	Leiothrichidae	Chestnut-crowned Laughingthrush	2	2	3
168	*Trochalopteron*	*affine*	Leiothrichidae	Black-faced Laughingthrush	0	0	2
169	*Turdus*	*boulboul*	Turdidae	Grey-winged Blackbird	1	0	0
170	*Uroissa*	*flavirostris*	Corvidae	Yellow-billed Blue Magpie	2	2	2
171	*Yuhina*	*gularis*	Zosteropidae	Stripe-throated Yuhina	4	4	4
172	*Yuhina*	*flavicollis*	Zosteropidae	Whiskered Yuhina	3	3	3
173	*Yuhina*	*nigrimenta*	Zosteropidae	Black-chinned Yuhina	2	0	0
174	*Yuhina*	*occipitalis*	Zosteropidae	Rufous Vented Yuhina	2	2	3

Sl.	Genus	Species	Family	Common Name	Zonation Abundance		
					Lower	Middle	Upper
175	*Yuhina*	*bakeri*	Zosteropidae	White-naped Yuhina	1	1	0
176	*Zoothera*	*mollissima*	Turdidae	Alpine Thrush	0	0	1
177	*Zosterops*	*palpebrosus*	Zosteropidae	White Eye Oriental	2	2	1

Kalij Pheasant (Melonata)

Himalayan Cutia

Dark-breasted Rosefinch

Maroon-backed Accentor

Streak-breasted Scimitar Babbler

Chestnut-crowned Warbler

Golden-breasted fulvetta

Sapphire flycatcher

Golden-throated barbet

Rusty-fronted barwing

Satyre tragopan

Rufous-vented yuhina

Black-faced warbler

Black bulbul

HERPETOFAUNA

Snakes and Lizards play important role in any terrestrial ecosystem as major predators of the preys of biomass range according their sizes. While frogs do the same they form one of the important prey bases for the snakes too. Thus, diversity of the herpetofauna is important for understanding the dynamics and status of any forest ecosystem including those are lying within NVNP. Moreover, the least explored status of NVNP demands serious attention to this fauna, with a hope of discovering populations of rare, endangered, lesser known or completely unknown species.

Early March in Neora Valley is not a good time for homeotherms like reptiles and amphibians to come out of their hidden shelters and move around, as the temperature remains still quite low. Yet, to have the seasonal feelings of this important element of faunal biodiversity of the NVNP, both `scan a block' and *ad libitum* methods of observations were followed to spot the snakes, lizards, frogs, toads etc.

During the present survey, efforts were also made to collect data on snake bite cases from the fringe villages of around the surveyed localities and to understand the awareness status regarding the snakes and snake bite treatments among the local people. A small team was formed with two forest guards (Mr. D. K. Gurung and Mr. Kumar) led by Anirban Chaudhuri. The team visited 3 villages and talked to various members of the families staying in there. A simple questionnaire was designed. The villagers were asked the same questions and discussion went on in a very informal manner. A wisely intervention by Mr. Chaudhuri into a snake bite case following the camps is recorded as a case study on the results of the human dimensions of the present biodiversity field survey (see Annexure).

It is needless to say that reporting just 1 species of snake, 6 species of lizards and 7 species of frogs and toads is far from being any representation of a least explored faunal group from a high biodiversity locality like NVNP. It indicates at the most the lay off season for this faunal group. On the other hand, the survey in the fringe villages by interacting with local human inhabitants secondary, but important information were collected that suggest April to September or early October is the best period of the year to sight snakes.

Banded Wolf Snake (*Lycodon fasciatus*)

Cascade Frog (*Amolops* sp.)

Shrub Frog (*Philautus* sp.)

Common Toad (*Duttaphrynus melanostictus*)

Table No. 02: Reptiles reported at different altitudinal levels in NVNP (0 = not encountered, 1 = rarely encountered, 2 = common and 3 = highly abundant)

Sl.	Genus	Species	Family	Common Name	Zonation Abundance		
					Lower	Middle	Upper
1	*Lycodon*	*fasciatus*	Colubridae	Banded Wolf Snake	1	0	0
2	*Calotes*	*versicolor*	Agamidae	Common Garden Lizard	0	2	0
3	*Japalura*	*variegata*	Agamidae	Variegated Mountain Lizard	1	0	0
4	*Cyrtodactylus*	*cf. khasiensis*	Gekkonidae	Khasi hill bent toed gecko	2	0	0
5	*Hemidactylus*	*platyurus*	Gekkonidae	Flat tailed house gecko	0	2	0
6	*Asymblepharus*	*sikkimensis*	Scincidae	Sikkim Ground Skink	1	1	1
7	*Eutopis*	*Unidentified*	Scincidae	Grass Skink	0	1	0

Table No. 03: Secondary information on snakes from the fringe villages

Villages (Locations)	Sighting Seasons	Snakes mentioned / identified
Lepcha Gao (N 27° 01' 36.2"; E 88° 47' 10.5")	Highest : June to September Lowest: November to February	Mountain Pit Viper (Gurbe), Assam Snail Eater, Rat snake (Probably *P. korros*), Green Pit Viper, Mock Viper, False Cobra, Cobra (monocle or king?) McCelland's Coral (?), Black Krait, Many Banded Wolf Snake, Red Necked Keelback, *Trachischiuk* sp.
Bhujel Gao (N 27° 01' 29.4"; E 88° 47' 16.0")	Highest : April to August (till October sometimes) Lowest: November to February	Mountain Pit Viper (Gurbe), , Green Pit Viper, Rat Snake, Banded Wolf Snake (not sure), Banded Trinket
Badey Village (N 27° 03' 35.0" ; E 88° 41' 53.2")	Highest : May to August Lowest: November to March	Mountain Pit Viper (Gurbe), Green Pit viper, Sirse (? Claimed to be poisonous)

Table No. 04: Frogs and toads reported at different altitudinal levels in NVNP (0 = not encountered, 1 = rarely encountered, 2 = common and 3 = highly abundant)

Sl.	Genus	Species	Family	Common Name	Zonation Abundance		
					Lower	Middle	Upper
1	*Amolops*	*Unidentified*	Ranidae	Cascade Frog	3	0	0
2	*Amolops*	*cf. gerbillus*	Ranidae	Gerbil Stream Frog	3	0	0
3	*Hoplobatracus*	*crassus*	Dicroglossidae	Jerdon's Bull Frog	0	1	0
4	*Philautus*	*Unidentified*	Rhacophoridae	Shrub Frog	0	1	0
5	*Megophrys*	*Unidentified*	Megophryidae	Horned frog	0	0	1
6	*Duttaphrynus*	*melanostictus*	Bufonidae	Common Indian Toad	1	0	0
7	*Duttaphrynus*	*himalayanus*	Bufonidae	Himalayan Toad	0	0	1

BUTTERFLIES

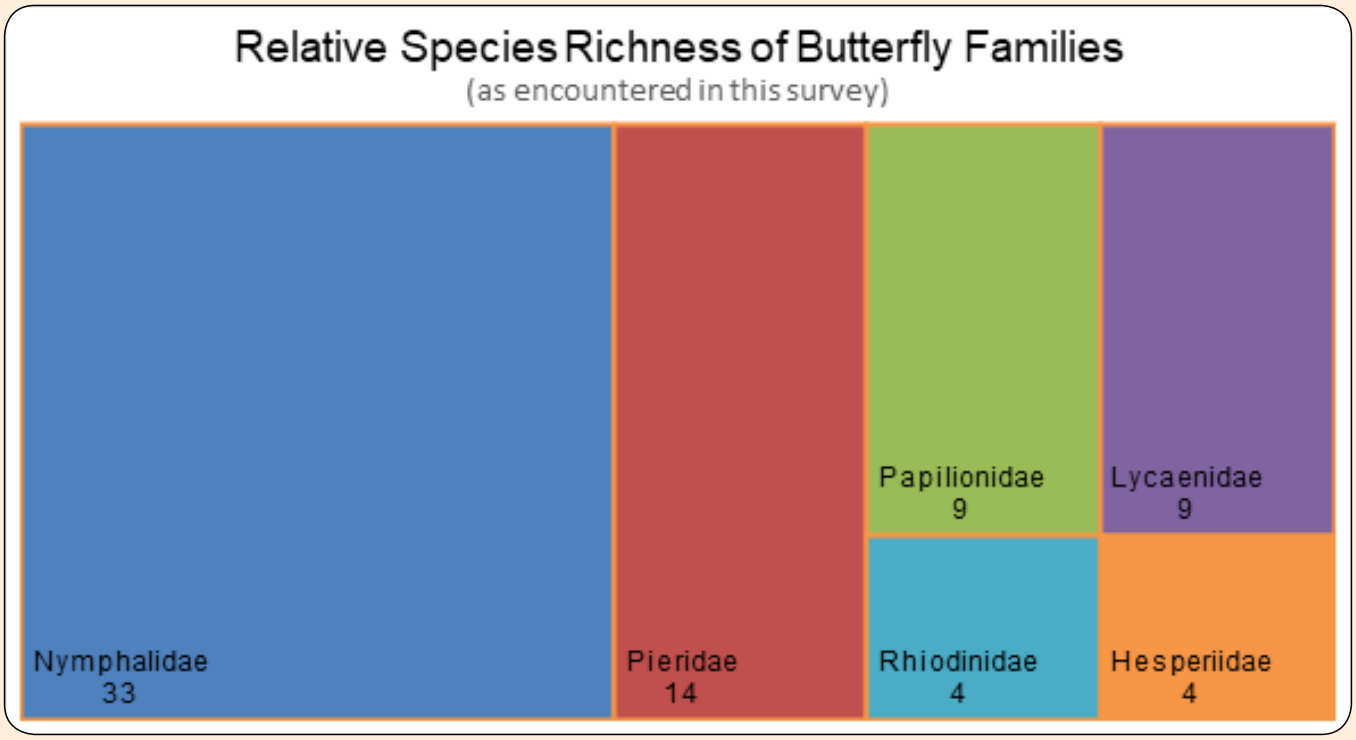
This field survey was done in the month of early March in three different parts of Neora Valley National park in three different altitudes, namely Ashaley camp (700 mt), Mouchuki camp (1200 mt) and Doley Camp (2000 mt) to explore the butterfly diversity in this least explored, best preserved forested mountain terrains.

As, it was a rapid survey, we adopted the simple technique of random point sampling. To do this, we have looked for butterflies is various points for a given period of 20 to 30 minutes and have noted the diversity. Points were selected in a fashion, which have covered most of the habitat qualities like open sunny area, damp and dark areas, stream lines etc.

We did some catch and release operations for identification purpose. No specimens were collected. Digital photographs were taken in every possible opportunity. Several literatures and websites were consulted for identification of the specimens.

Common Windmill (*Byasa polyeuctes*) | F- Papilionidae

Striped Punch (*Dodona adonira*) | F- Riodinidae



Interestingly, no butterfly recorded at the higher altitude.

Table No. 05: List of Butterflies recorded at different elevations (0 = not encountered, 1 = rarely encountered, 2 = common and 3 = highly abundant)

Sl.	Genus	Species	Family	Common Name	Zonation Abundance		
					Lower	Middle	Upper
1	*Graphium*	*sarpedon*	Papilionidae	Common Blue Bottle	3	0	0
2	*Papilio*	*nephelus*	Papilionidae	Yellow Helen	3	0	0
3	*Papilio*	*memnon*	Papilionidae	Great Mormon	0	3	0
4	*Papilio*	*protenor*	Papilionidae	Spangle	0	3	0
5	*Pachliopta*	*aristolochiae*	Papilionidae	Common Rose	0	2	0
6	*Papilio*	*polytes*	Papilionidae	Common Mormon	0	3	0
7	*Papilio*	sp.	Papilionidae	Peacock sp.	2	3	0
8	*Papilio*	*helenus*	Papilionidae	Red Helen	0	3	0
9	*Byasa*	*polyeuctes*	Papilionidae	Common Windmill	0	1	0
10	*Catopsilia*	*pomona*	Pieridae	Common Emigrant	3	0	0
11	*Pareronia*	*avatar*	Pieridae	Pale Wanderer	1	0	0
12	*Leptosia*	*nina*	Pieridae	Psyche	1	0	0
13	*Delias*	*pasithoe*	Pieridae	Red-base Jezebel	2	0	0
14	*Delias*	*descombesi*	Pieridae	Red-spot Jezebel	3	0	0
15	*Ixias*	*pyrene*	Pieridae	Yellow Orange-tip	3	0	0
16	*Pieris*	*canidia*	Pieridae	Indian cabbage white	3	3	0
17	*Pareronia*	*hippia*	Pieridae	Common wanderer	2	0	0
18	*Appias*	*lyncida*	Pieridae	Chocolate albatross	3	0	0
19	*Delias*	*hyparete*	Pieridae	Painted Jezebel	1	1	0
20	*Colias*	*fieldii*	Pieridae	Dark Clouded Yellow	0	1	0
21	*Hebomoia*	*glaucippe*	Pieridae	Great Orange Tip	0	2	0
22	*Eurema*	*hecabe*	Pieridae	Common Grass Yellow	0	2	0
23	*Pieris*	*brassicae*	Pieridae	Large Cabbage White	0	2	0
24	*Lampides*	*boeticus*	Lycaenidae	Pea Blue	3	3	0
25	*Arhopala*	*amantes*	Lycaenidae	Large Oak Blue	1	0	0
26	*Acytolepis*	*puspa*	Lycaenidae	Common Hedge Blue	2	2	0
27	*Heliophorus*	*epicles*	Lycaenidae	Purple Sapphire	3	0	0
28	*Heliophorus*	sp.	Lycaenidae	Sapphire Sp.	1	0	0
29	*Castalius*	*rosimon*	Lycaenidae	Common Pierrot	1	0	0
30	*Kallima*	*knyvettii*	Lycaenidae	Scarce Blue Oak Leaf	1	1	0
31	*Celastrina*	*lavendularis*	Lycaenidae	Plain Hedge Blue	0	2	0
32	*Ticherra*	*acte*	Lycaenidae	Blue Imperial	0	2	0
33	*Abisara*	*fylla*	Riodinidae	Dark Judy	3	3	0
34	*Zemeros*	*flegyas*	Riodinidae	Punchinello	3	0	0
35	*Dodona*	*ouida*	Riodinidae	Mixed Punch	0	1	0
36	*Dodona*	*adonira*	Riodinidae	Striped Punch	0	1	0
37	*Euploea*	*algea*	Nymphalidae	Long Branded Blue Crow	3	0	0
38	*Parantica*	*sita*	Nymphalidae	Chestnut Tiger	2	0	0

Sl.	Genus	Species	Family	Common Name	Zonation Abundance		
					Lower	Middle	Upper
39	*Junonia*	*iphita*	Nymphalidae	Chocolate Pansy	3	3	0
40	*Parantica*	*melaneus*	Nymphalidae	Chocolate Tiger	2	2	0
41	*Symbrenthia*	*lilaea*	Nymphalidae	Common Jester	3	3	0
42	*Pantoporia*	*hordonia*	Nymphalidae	Common Lascar	3	0	0
43	*Parantica*	*aglea*	Nymphalidae	Glassy Tiger	3	0	0
44	*Neptis*	sp.	Nymphalidae	Sailer	1	1	0
45	*Junonia*	*lemonias*	Nymphalidae	Lemon Pansy	2	2	0
46	*Symbrenthia*	*hypselis*	Nymphalidae	Spotted Jester	1	0	0
47	*Mycalesis*	*anaxias*	Nymphalidae	White-bar Bushbrown	1	0	0
48	*Symbrenthia*	*niphanda*	Nymphalidae	Blue-tailed Jester	1	0	0
49	*Cirrochroa*	*aoris*	Nymphalidae	Large Yeoman	3	3	0
50	*Hestinalis*	*nama*	Nymphalidae	Circe	2	0	0
51	*Tanaecia*	*lepidea*	Nymphalidae	Grey Count	2	0	0
52	*Euploea*	*mulciber*	Nymphalidae	Striped Blue Crow	3	3	0
53	*Euploea*	*midamus*	Nymphalidae	Blue Spotted Crow	3	0	0
54	*Euploea*	*sylvester*	Nymphalidae	Double-branded Blue Crow	2	0	0
55	*Ypthima*	*baldus*	Nymphalidae	Common Five Ring	2	2	0
56	*Cethosia*	*cyane*	Nymphalidae	Leopard Lacewing	2	0	0
57	*Cethosia*	*biblis*	Nymphalidae	Red Lacewing	2	0	0
58	*Lethe*	*sinorix*	Nymphalidae	Tailed Red Forester	1	0	0
59	*Sumalia*	*daraxa*	Nymphalidae	Green Commodore	1	0	0
60	*Mycalesis*	sp.	Nymphalidae	Bush Brown sp.	0	1	0
61	*Euploea*	*klugii*	Nymphalidae	Brown King Crow	0	1	0
62	*Junonia*	*almana*	Nymphalidae	Peacock Pansy	0	2	0
63	*Danaus*	*genutia*	Nymphalidae	Striped Tiger	0	2	0
64	*Vanessa*	*indica*	Nymphalidae	Indian Red Admiral	0	2	0
65	*Tirumala*	*septentrionis*	Nymphalidae	Dark Blue Tiger	0	3	0
66	*Tirumala*	*limniace*	Nymphalidae	Blue Tiger	0	2	0
67	*Vanessa*	*cardui*	Nymphalidae	Painted Lady	0	1	0
68	*Aglais*	*caschmirensis*	Nymphalidae	Tortoiseshell	0	2	0
69	*Elymnias*	*hypermnestra*	Nymphalidae	Common Palmfly	0	2	0
70	*Celaenorrhinus*	sp.	Hesperiidae	Flat sp.	1	0	0
71	*Pseudocoladenia*	*dan*	Hesperiidae	Fulvous Pied Flat	2	0	0
72	*Celaenorrhinus*	*patula*	Hesperiidae	Flat sp.	0	1	0
73	*Telicota*	sp.	Hesperiidae	Dart sp.	0	1	0

Cethosia biblis

Aglais caschmirensis

Cethosia cyane

Circe (*Hestinalis nama*) | F - Nymphalidae

Blue Imperial (*Ticherra acte*) | F - Lycaenidae

Indian cabbage white (*Pieris canidia*) | F - Pieridae

Punchinello (*Zemeros flegyas*) | F - Riodinidae

Indian Red Admiral (*Vanessa indica*) | F - Nymphalidae

Great Mormon (*Papilio memnon*) | F - Papilionidae

Table No. 06: Host plants of butterflies encountered during the survey in Neora Valley National Park

	Butterfly		Host Plant	
Sl.	Common Name	Scientific Name	Family	Scientific Name
1	Common Mormon	*Papilio polytes romulus* Cramer, 1775	Rutaceae	*Murraya koenigii*
2	Red Helen	*Papilio nephelus chaon* Westwood, 1845	Rutaceae	*Evodia fraxinifolia*
3	Common Rose	*Pachliopta aristolochiae aristolochiae* Fabricius, 1775	Aristolochiaceae	*Aristolochia tagala*
4	Purple Sapphire	*Heliophorus epicles latilimbata* Fruhstorfer, 1908	Polygonaceae	*Polygonum chinense*
5	Dark-banded Judy	*Abisara bifasciata* Moore, 1877	Myrsinaceae	*Maesa indica*
6	Punchinello	*Zemeros flegyas flegyas* Cramer, 1780	Myrsinaceae	*Maesa montana*
7	Himalayan Kaiser-i-Hind	*Teinopalpus imperialis imperialis* Hope, 1843	Magnoliaceae	*Magnolia campbellii*

Aristolochia tagala

Evodia fraxinifolia

Maesa indica

Maesa montana

Polygonum chinensis

Magnolia campbellii

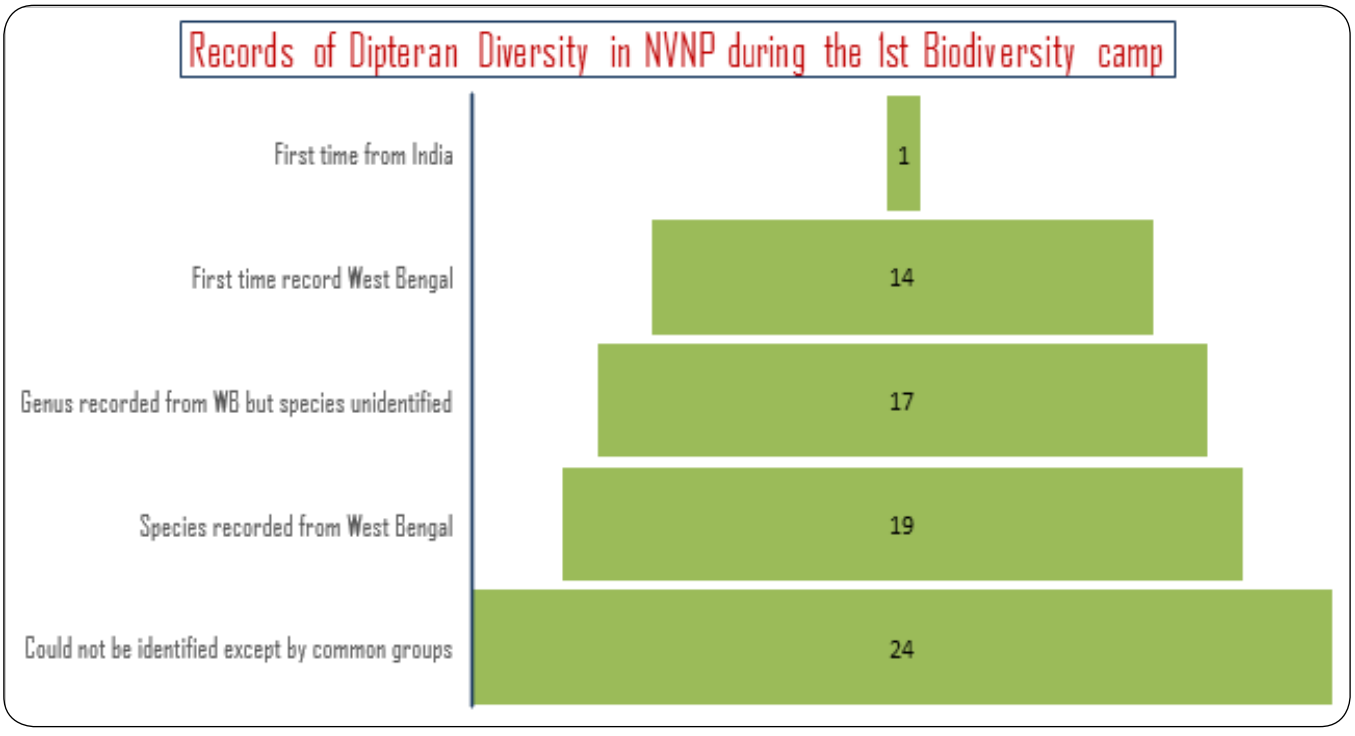
DIPTERA

Remarkable documentations of diversity have been made in this survey, of the tiny two winged insects, the dipterans, thanks to the expertise of one the significant team members, Dr. Suvro Kanti Sinha.

Table. No. 07: Dipteran species diversity recorded in NVNP

Status	No. of Species
First time record from India	1
First time record from West Bengal	14
Genus recorded from West Bengal but species unidentified	17
Species recorded from other parts of West Bengal	19
Could not be identified fully except by common group names	24
Total Species recorded	75

All the 75 species of dipterans recorded during this first survey camp of NVNP could be the first ever record from NVNP, thanks to the fact that NVNP was probably never explored for this group of insects before.



Nemopoda pectinulata | F - Sepsidae

Stomorhina sp. | F - Calliphoridae

Baccha maculata | F - Syrphidae

Table. No. 08: Different Common groups of Dipterans recorded

SL.	Common Name	Family	No./Sp
1	Bee fly	Bombylidae	2
2	Biting Midges	Ceratopogonidae	1
3	Black Scavanger fly	Sepsidae	3
4	Blow Fly	Calliphoridae	11
5	Crane fly	Tipulidae	2
6	Dung fly	Scathophagidae	1
7	Flesh fly	Scathophagidae	2
8	Fungus gnats	Mycetophilidae	1
9	Gall midges	Cecidomyiidae	1
10	Hover fly	Cecidomyiidae	3
11	Hover fly	Syrphidae	2
12	Lake fly	Chironomidae	1
13	Large fruit fly	Chironomidae	1
14	Large fruit fly	Tephritidae	1
15	March fly	Bibionidae	1

SL.	Common Name	Family	No./Sp
16	Marsh fly	Sciomyzidae	1
17	Mosquito	Culicidae	1
18	Muscid fly	Muscidae	18
19	Pointed-wing fly	Lonchopteridae	1
20	Robber fly	Lonchopteridae	1
21	Robber fly	Asilidae	1
22	Root maggot fly	Anthomyiidae	3
23	Scuttle fly	Phoridae	1
24	Small flower fly	Pipunculidae	1
25	Small fruit fly	Drosophilidae	1
26	Soldier fly	Stratiomyidae	1
27	Stalk-eyed fly	Diopsidae	1
28	Stilt-legged fly	Micropezidae	1
29	Tachina fly	Micropezidae	3
30	Tachina fly	Tachinidae	5

Linnaemya sp. | F - Tachinidae

Calliphora calliphoridae | F - Calliphoridae

Episyrphus syrphidae | F - Syrphidae

Asarkina sp. | F - Syrphidae

Anthrax sp. | F - Bombylidae

Episyrphus balteatus | F - Syrphidae

Microstylum sp. | F - Asilidae

Villa sp. | F - Bombylidae

Thelaira sp. | F - Tachinidae

ODONATA

Non-favourable season and climates, inaccessible water sources appeared to be the major reasons for the record of only seven species of Odonates, a group which are linked to aquatic and arboreal food chains at different developmental stages of the same life.

Table No. 09: Different Odonates recorded in NVNP (0 = not encountered, 1 = rarely encountered, 2 = common and 3 = highly abundant)

Sl.	Genus	Species	Family	Common Name	Zonation Abundance			
					Lower	Middle	Upper	Stage
1	*Neurothemis*	*fulvia*	Libellulidae	Fulvous Forest Skimmer	1	0	0	Adult
2	*Neurothemis*	*intermedia*	Libellulidae	Intermediate Skimmer	1	0	0	Adult
3	*Palpopleura*	*sexmaculata*	Libellulidae	Blue-tailed Yellow Skimmer	1	0	0	Adult
4	*Vestalis*	*gracilis*	Calopterygidae	Clear winged Forest Glory	1	0	0	Adult
5	Unknown	Unknown	Chlorogomphidae	Torrent Hawk	1	0	0	Larva
6	Unknown	Unknown	Gomphidae	Clubtail	1	0	0	Larva
7	Unknown	Unknown	Unknown	Damselfly	0	0	1	Larva

Chlorogomphus Larva

Neurothemis intermedia

Palpopleura sexmaculata

Palpopleura sexmaculata (Male)

OTHER INSECTS

With enormous species diversity and unaccountable population size, insect forms the largest group of organisms at any ecosystem. Especially those are forest insects. In a forest ecosystem, insects perform a very pivotal role in food chain. They contribute their part in decomposing organic matters, pollinate blossoms. From these species reservoir, a good number are Phytophagous which can become menace by killing or damaging forest plants. Contrarily, predaceous and parasitic insects diminish the agony through a natural check on would be pest population. Forest serves as shelter for both insect pest and their natural enemies. The colorful appearance of many insects is of aesthetic value which attracts nature lovers. All these point compelled us to generate knowledge on forest insect biodiversity which was the key stimuli for the present survey work on 'Coleoptera and other insect' at Neora Valley National Park on the event of 1st Annual Biodiversity Camp during 3rd to 13th March, 2018. Therefore, this maiden attempt was made to investigate the presence of those insects at different altitudes. The results of this survey are expected to provide baseline data for future study at different altitude in this habitat.

Scorpiops sp.

Poecilocoris sp.

Weaver ant (*Oecophylla* sp.)

MATERIALS AND METHOD

1. Study area

This present survey was carried out in Neora Valley National Park (27°04' N 88°42' E) situated in Kalimpong, India. It was declared as National park in the year 1986 with total geographical area of 159.78 Km^2. Three elevations were selected i.e. Asholay camp (N,E), Mouchuki camp (N,E) and Doley camp(N,E). The elevation of the study sites were geo-referenced by GPS device was categorized into 650 meter, 1150 meter and 2100 meter respectively above sea level.

2. Sampling method and identification

We studied the insect's biodiversity by using the following trapping techniques i.e. aerial nets, sweeping, handpicking and visual observations. We used sweeping net for vegetative, flying insects to observe it closely and visual observations were done for various insects. All the insects were photographed, identified in the field itself and released. Identification of insects was done mainly through observation and photography only. A minimum of five hours (between 8.00 AM to 1.00 PM at day time) was used for each sampling period each day over a period of eleven days. The insects were collected randomly walk by three persons for each site. The insects were identified by using identification keys with the help of available literatures and books.

Fireflies

Millipede

RESULTS

During the present investigation about 77 species (75 insect & 2 acarine) distributed over 75 Genera belonging to 49 families of insects were recorded. Out of 77 species, 22 were very common, 49 species were common and 6 were rare. The present study establishes that Coleopteran was the dominating insect order which included 32 species. Within coleopteran, the family Chrysomelidae contained 8 species, Coccinellidae contained 5 species, Scarabaeidae and Staphylinidae contained 3 species each. Order Hemiptera was also a very dominating insect order which contained 18 species under different family like Alydidae, Aphididae, Cicadelidae, Cicadidae, Coreidae, Delphacidae, Diaspididae, Fulgoridae, Gerridae, Membracidae, Miridae, Pentatomidae, Pyrrhocoridae and Scutelleridae. In case of other insect order like Orthoptera, hymenoptera, Lepidoptera, Plecoptera, Isopteran, Megaloptera, Mecoptera, Thysanoptera also reported during the present survey. Coleopterans richness and abundance in forest is related to the benefits obtained by these creatures from the plant, soil and micro-climate stability provided by forests. During the entire survey period abundance of different kind of insect fauna at Neora Valley National Park shows that the potential of the study area in retaining, conserving insects and contributing high diversity to that particular area over a long time. Due to the comprehensive variation in altitudes into the deep forest which might have resulted in a variety of micro-habitats and ecological niches affecting different insect's survival as a species.

CONCLUSION

Insects can be used as a bio-indicator of environmental health. This study may produce a basis for understanding the ecology of insect's community and the importance of extensive scientific surveys for conservation of species as well as the habitats concerned. Today the concept of biodiversity has risen with the understanding of insect's community loss due to the increasing human impact and mismanagement of the environment; so that in respect to insect diversity which needs upkeep at local, regional and national levels.

During this survey, only 77 species of insects belonging to 54 families of insects (along with 4 which could not be identified even at family level!) excluding Dipterans, Butterflies and Odonates, could be recorded giving just a glimpse of the insect diversity of this hitherto least explored NP in the state. Given the fact that insects are the greatest diverse group on earth and beetles alone outnumber others heavily and the present record of more than 5500 species of insects reported so far (following ZSI), this could be considered as a gross underestimate.

But, due to the absence of specialists for different groups of insect orders other than Diptera, Odonata and Lepidoptera in the team, short window of time during a non-conducive period of the year particularly for this high altitude remotely accessible forested habitats, and most importantly, not being able to collect and preserve the specimens for closer taxonomic exhibitions, this estimate indicates a unique richness of insect diversity in the NVNP. They remain to be explored in depth and may take the unique biodiversity of the state, hence of the country to a new high.

Table No. 10: Beetles and other insects recorded in NVNP

Families					
1	Acrididae	18	Diaspididae	35	Oligotomidae
2	Alydidae	19	Dytiscidae	36	Passalidae
3	Aphididae	20	Forficulidae	37	Pentatomidae
4	Apidae	21	Formicidae	38	Phasmatidae
5	Arctiidae	22	Fulgoridae	39	Pterophoriodae
6	Attelabidae	23	Geometridae	40	Pyrgomorphidae
7	Cantharidiae	24	Geotrupidae	41	Pyrrhocoridae
8	Carabidae	25	Gerridae	42	Scarabaeidae
9	Chrysomelidae	26	Gryllacrididae	43	Scutelleridae
10	Cicadellidae	27	Gryllidae	44	Sphingidae
11	Cicadidae	28	Hymenopodidae	45	Staphylinidae
12	Coccinellidae	29	Ixodidae	46	Teneobranidae
13	Coreidae	30	Lampyridae	47	Termitidae
14	Corydalidae	31	Lucanidae	48	Tettigonidae
15	Cucujidae	32	Lycidae	49	Thripidae
16	Curculionidae	33	Membracidae	50	Trombidiidae
17	Delphacidae	34	Miridae		

White grub (*Holotrichia* sp.)

Leaf beetle (*Agasta formosa*)

Lady bird beetle (*Coccinella septempunctata*)

Unidentified

Earth boring dung beetle (*Geotrupes* sp.)

Banana root borer (*Cosmopolites* sp.)

Flea beetle (*Longitarsus* sp.)

Tortoise beetle (*Cassida* sp.)

Flat bark beetle (*Cucujus* sp.)

SPIDERS

Spiders are often good indicators of different terrestrial ecosystems playing predators in the lower biomass food chains and being prey to birds, lizards, birds etc.

Spider fauna of Darjeeling Hills has not yet been studied in a comprehensive manner, and Neora Valley National Park is one of most unexplored area in this district as well as in our country. Although, there are several published papers on the spiders on Darjeeling (Pocock, 1900 & 1901; Simon 1906; Gravely 1931; Sinha 1951; Tikader 1970; Tikader 1980 & 1982; Sethi & Tikader 1988; Majumder & Tikader 1991; Biswas & Biswas 1992), so far as the spider fauna of Neora Valley National Park is concerned, the published information indeed lack compilation and comparative descriptions to visualize the extraordinary richness of this fauna in the diverse mountain habitats of Darjeeling hills. The present work was undertaken to initiate exploreation and studies of the Arachnid fauna of Neora Valley National Park with special emphasis on spiders in a systematic fashion. From last study in Darjeeling district of ZSI by Majumder and Talukder 2013, spiders of 119 species of 23 families from entire Darjeeling district. In this preliminary study, we had got 90 genus of 27 family and more than 200 morpho-species. Due to lack of collection permit, we were unable to identify spiders up to species level, hence our preliminary list comprises of family and genera names based on field and digital photograph based identifications.

Heteropoda sp. (Female)

Olios sp.

Pardosa sp.

Olios sp. (Juvenile)

Heteropoda sp.

Opiliones sp.

Table No. 11: Spider diversity recorded at NVNVP (0 = not encountered, 1 = rarely encountered, 2 = common and 3 = highly abundant)

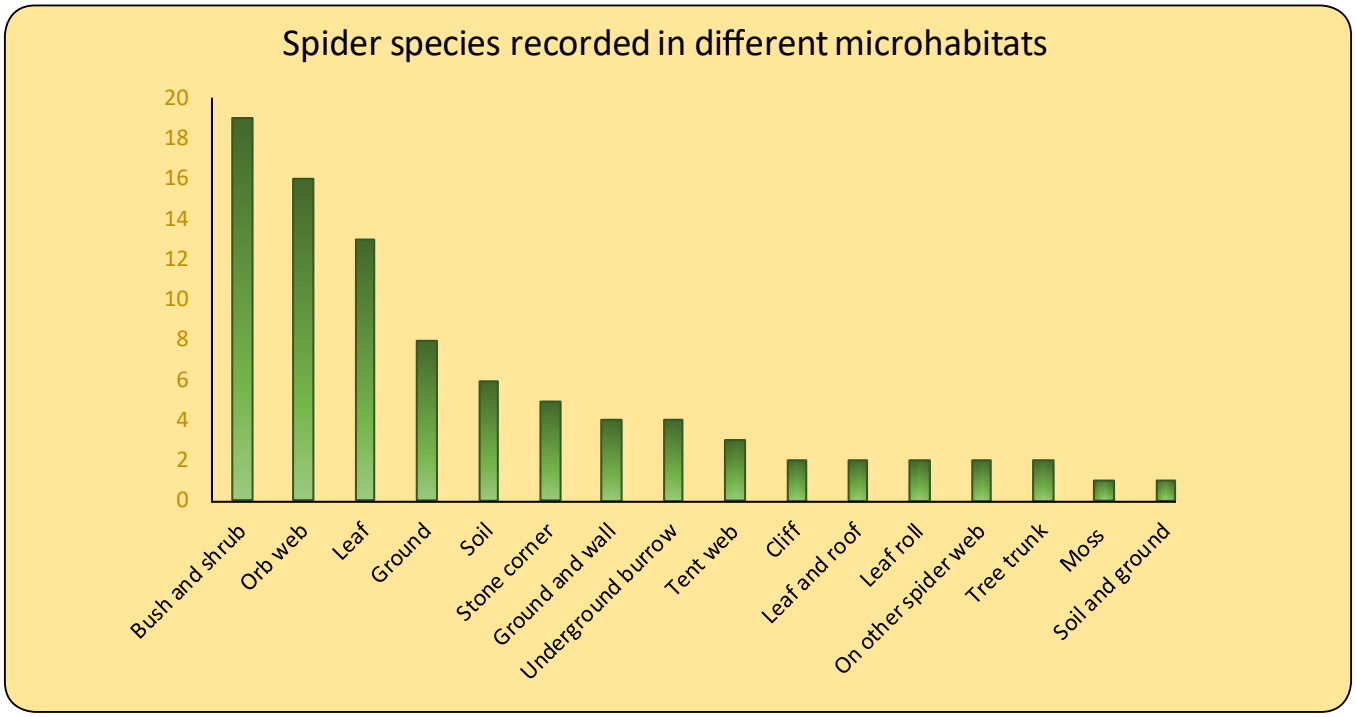
Sl.	Habitat	Common Names	Genus	Family	Zonation Abundance		
					Lower	Middle	Upper
1	Bush and shrub	Jumping Spider	*Bianor* sp.	Salticidae	2	0	0
2	Bush and shrub	Jumping Spider	*Carrhotus* sp.	Salticidae	2	0	0
3	Bush and shrub	Jumping Spider	*Chrysilla* sp.	Salticidae	1	0	0
4	Bush and shrub	Jumping Spider	*Epocilla* sp.	Salticidae	0	1	0
5	Bush and shrub	Lynx Spider	*Hamataliwa* sp.	Oxyopidae	2	2	0
6	Bush and shrub	Jumping Spider	*Hyllus* sp.	Salticidae	1	2	0
7	Bush and shrub	Jumping Spider	*Menemerus* sp.	Salticidae	3	3	0
8	Bush and shrub	Crab Spider	*Misumena* sp.	Thomisidae	1	2	0
9	Bush and shrub	Jumping Spider	*Myrmarachne* sp.	Salticidae	2	2	0
10	Bush and shrub	Lynx Spider	*Oxyopes* sp.	Oxyopidae	3	2	0
11	Bush and shrub	Jumping Spider	*Phelgra* sp.	Salticidae	1	0	1
12	Bush and shrub	Jumping Spider	*Phintella* sp.	Salticidae	2	1	0
13	Bush and shrub	Jumping Spider	*Plexippus* sp.	Salticidae	3	2	0
14	Bush and shrub	Jumping Spider	*Telamonia* sp.	Salticidae	2	2	0
15	Bush and shrub	Crab Spider	*Thomisus* sp.	Thomisidae	3	3	0
16	Bush and shrub	Jumping Spider	*Thyene* sp.	Salticidae	1	0	0
17	Bush and shrub	Crab Spider	*Xysticus* sp.	Thomisidae	0	1	0
18	Bush and shrub	Lynx Spider	*Hamadraus* sp.	Oxyopidae	1	1	0
19	Bush and shrub	Lynx Spider	*Peucetia* sp.	Oxyopidae	1	0	0
20	Cliff	Funnel web Spider	*Macrothele* sp.	Macrothelidae	0	3	0
21	Cliff	Mess Weaver	*Pscherus himalayanus*	Pscheridae	3	2	0
22	Ground	Wolf Spider	*Arctosa* sp.	Lycosidae	4	2	1
23	Ground	Ant Mimic Spider	*Casteneira* sp.	Corinnidae	1	2	0
24	Ground	Sac Spider	*Clubiona* sp.	Clubionidae	1	3	1
25	Ground	Wolf Spider	*Evippa* sp.	Lycosidae	0	1	2
26	Ground	Wolf Spider	*Hippasa* sp.	Lycosidae	2	1	0
27	Ground	Wolf Spider	*Lycosa* sp.	Lycosidae	4	4	3
28	Ground	Wolf Spider	*Wadicosa* sp.	Lycosidae	2	2	0
29	Ground	Ground Spider	*Callilepis* sp.	Gnaphosidae	0	1	0
30	Ground and wall	Huntsman Spider	*Heteropoda* sp.	Sparassidae	4	4	2
31	Ground and wall	Huntsman Spider	*Pseudopoda* sp.	Sparassidae	3	3	0
32	Ground and wall	Huntsman Spider	*Sinopoda* sp.	Sparassidae	1	0	0
33	Ground and wall	Huntsman Spider	*Spariolenus* sp.	Sparassidae	1	0	0
34	Leaf	Cob-web Spider	*Achaearanea* sp.	Theridiidae	0	0	1
35	Leaf	Cob-web Spider	*Chrysso* sp.	Theridiidae	0	1	0
36	Leaf	Orb Weaver	*Cyrtarachne* sp.	Araneidae	1	2	0
37	Leaf	Nursery web Spider	*Dendrolycosa* sp.	Pisauridae	0	2	0
38	Leaf	Sheet web Spider	*Liniphya* sp.	Liniphydae	1	0	0
39	Leaf	Running crab Spider	*Philodromus* sp.	Philodrmidae	0	2	0

Sl.	Habitat	Common Names	Genus	Family	Zonation Abundance		
					Lower	Middle	Upper
40	Leaf	Crab Spider	*Runcinia* sp.	Thomisidae	0	1	0
41	Leaf	Crab Spider	*Synema* sp.	Thomisidae	0	1	0
42	Leaf	Running crab Spider	*Thanatus* sp.	Philodrmidae	0	1	0
43	Leaf	Cob-web Spider	*Theridion* sp.	Theridiidae	0	2	0
44	Leaf	Cob-web Spider	*Theridula* sp.	Theridiidae	0	1	0
45	Leaf	Running crab Spider	*Tibelus* sp.	Philodrmidae	0	1	1
46	Leaf	Cob-web Spider	*Twatisieta* sp.	Theridiidae	0	1	0
47	Leaf and roof	Feather-legged Weaver	*Uloborus* sp.	Uloboridae	1	0	0
48	Leaf and roof	Feather-legged Weaver	*Miagramopes* sp.	Uloboridae	1	0	0
49	Leaf roll	Orb Weaver	*Acusilas* sp.	Araneidae	0	0	1
50	Leaf roll	Yellow sac Spider	*Cheiracanthium* sp.	Eutichoridae	1	2	0
51	Moss	Crevice weaver Spiders	*Filistita* sp.	Filistiidae	0	1	0
52	On other spider web	Cob-web Spider	*Argyrodes* sp.	Theridiidae	0	2	0
53	On other spider web	Jumping Spider	*Portia* sp.	Salticidae	0	1	0
54	Orb web	Orb Weaver	*Anepsion* sp.	Araneidae	2	0	0
55	Orb web	Orb Weaver	*Araneus* sp.	Araneidae	3	1	0
56	Orb web	Orb Weaver	*Argiope* sp.	Araneidae	2	0	0
57	Orb web	Orb Weaver	*Cyclosa* sp.	Araneidae	2	2	0
58	Orb web	Orb Weaver	*Eriovixia* sp.	Araneidae	2	1	0
59	Orb web	Orb Weaver	*Gasteracantha* sp.	Araneidae	1	2	0
60	Orb web	Orb Weaver	*Guizygiella* sp.	Araneidae	1	1	0
61	Orb web	Long-jawed Spider	*Leucauge* sp.	Tetragnathidae	3	2	1
62	Orb web	Orb Weaver	*Neoscona* sp.	Araneidae	3	2	0
63	Orb web	Orb Weaver	*Nephila* sp.	Araneidae	2	2	0
65	Orb web	Orb Weaver	*Poltys* sp.	Araneidae	0	1	0
66	Orb web	Long-jawed Spider	*Tetragnatha* sp.	Tetragnathidae	2	2	0
67	Orb web	Orb Weaver	*Thelacantha* sp.	Araneidae	0	1	0
68	Orb web	Long-jawed Spider	*Tylorida* sp.	Tetragnathidae	0	2	0
69	Orb web	Orb Weaver	*Zygiella* sp.	Araneidae	0	1	0
70	Soil	Mothering Spider	*Amourbias* sp.	Amourbidae	0	2	0
71	Soil	Ground Spider	*Drassodes* sp.	Gnaphosidae	0	0	2
72	Soil	Ground Spider	*Gnaphosa* sp.	Gnaphosidae	2	2	0
73	Soil	Ground Spider	*Poecilochoria* sp.	Gnaphosidae	1	2	0
74	Soil	Ground Spider	*Sergiolus* sp.	Gnaphosidae	0	0	1
75	Soil	Goblin Spider	*Triaeris* sp.	Oonopidae	1	1	0
76	Soil and ground	Wandering Spiders	*Ctenus* sp.	Ctenidae	2	2	0
77	Stone corner	Daddy Long-legs Spider	*Artema* sp.	Pholcidae	0	1	2
78	Stone corner	Daddy Long-legs Spider	*Crossopriza* sp.	Pholcidae	3	3	0
79	Stone corner	Cob-web Spider	*Parasteatoda* sp.	Theridiidae	2	1	0
80	Stone corner	Daddy Long-legs Spider	*Pholcus* sp.	Pholcidae	2	2	0
81	Stone corner	Spitting Spider	*Scytodes* sp.	Scytodidae	1	0	2
82	Tent web	Orb Weaver	*Cyrtophora* sp.	Araneidae	1	2	0
83	Tent web	Sheet web Spider	*Leptophantys* sp.	Liniphidae	0	2	3

Sl.	Habitat	Common Names	Genus	Family	Zonation Abundance		
					Lower	Middle	Upper
84	Tent web	Sheet web Spider	*Neireine* sp.	Liniphidae	0	2	0
85	Tree trunk	Orb Weaver	*Herennia multipuncta*	Araneidae	1	2	0
86	Tree trunk	Two tailed Spider	*Hersila* sp.	Herselidae	3	1	0
87	Underground burrow	Tarantula	*Chilobrachys* sp.	Theraposidae	1	1	0
88	Underground burrow	Wishbone Spiders	*Damarchilus* sp.	Nemesiidae	1	1	0
89	Underground burrow	Tarantula	*Lyrognatus* sp.	Theraposidae	1	2	0
90	Underground burrow	Tarantula	*Selenocosmia* sp.	Theraposidae	0	1	0

Pseudopoda sp. (Female)

Chilobrachys sp. (Female)



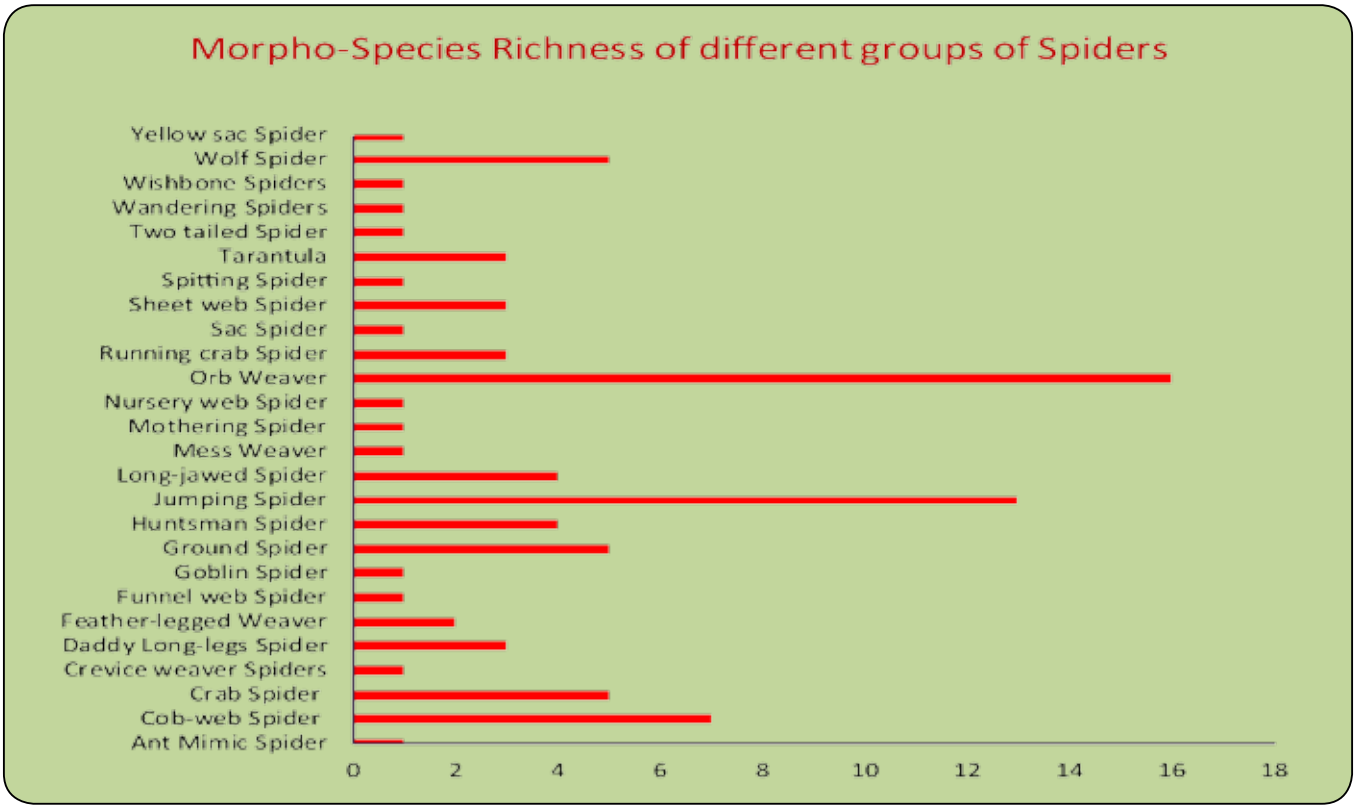


Table No. 12: Spider diversity recorded at different altitudes

Altitudinal Zones	Morpho-Species Richness
Upper Zone	15
Middle Zone	71
Lower Zone	59

Table No. 13: Total Number of Herbs, Shrubs, Trees, some ferns present

Sl.	Scientific Name	Local Name	Family	Habit	Status
1	*Acer campbelli* Hook.f. & T. ex Hiern	Kapasi	Santalaceae	T	Common
2	*Acer sterculiaceum* Wall. *Ssp. thomsonii* (Miq.) A. E. Murray	Melo Kapasi	Sapindaceae	T	Common
3	*Achyranthes aspera* L.	Apamarg	Amaranthaceae	H	Common
4	*Achyranthes bidentata* Blume	Rato Apamarg	Amaranthaceae	H	Common
5	*Acmella paniculata* (Wall.ex DC) R.K.Jans.	Lato Jhar	Asteraceae/ Compositae	H	Common
6	*Aconogonom molle* (D.Don)Hara	Thotne	Polygonaceae	Cl _S	Common
7	*Acrocarpus fraxinifolius* Arnott.	Mandane	Fabaceae	T	Less common
8	*Actinodaphnae obovata* (Nees)Blume	Runche pat	Lauraceae	T	RARE
9	*Aeschynanthus acuminatus* Wall .ex A.DC.		Gesneraceae	H	Less common
10	*Aeschynanthus novogracilis* W.T.Wang		Gesneraceae	H	Less common
11	*Aeschynanthus parviflorus* (D.Don) Spreng.		Gesneraceae	H	RARE
12	*Agapetes serpens* (Wight) Sleumer		Eriaceaec	CL_S	Less common
13	*Ageratina adenophora* (Sprengel) R.M.King &H.Rob.	Kalo Banmara	Asteraceae/ Compositae	S	Common
14	*Ageratum conyzoides* L.	Ilame Jhar	Asteraceae/ Compositae	H	Common
15	*Ailanthus excelsa* Roxb.	Gokul	Simaroubaceae	T	Common
16	*Albizzia lebbeck* (L.) Benth.	Kalo siris	Fabaceae/ Caesalpinioideae	T	Common
17	*Albizzia procera* (Roxb.) Benth.	Seto Siris	Fabaceae/ Caesalpinioideae	T	Common
18	*Alnus nepalensis* D.Don.	Utis	Betulaceae	T	Common
19	*Alsophila glaucas* (Sw.)Urb.	Rukh unio	Cyatheacea	Fern	RARE
20	*Alstonia scholaris* (L.)R.Br.	Chatiwan	Apocynaceae	T	Common
21	*Amomum dealbatum* Roxb.	Churumpha	Zingiberaceae	S	Less common
22	*Anaphalis contorta (*D. Don) Hook.f.	Bukiphul	Asteraceae/ Compositae	H	Common
23	*Anaphalis margaritacea* (L.)Benth & Hook.f.		Asteraceae/ Compositae	H	Common
24	*Angiopteris evecta* (G.Forst.) Hoffm.	Gaikhurae	Marratiaceae	Fern	RARE
25	*Anisomeles indica* (L.) Kuntze	Rato Charpate	Lamiaceae	H	Common
26	*Aphanamixis polystachya* (Wall.) R.N.Parker	Lhasunae	Meliaceae	T	LC,CAMP,WB,2007
27	*Aralia leschenaultii* (DC.) J. Wen.	Chinde	Araliaceae	T	RARE
28	*Aralia gigentea* J. Wen.	Chindey	Araliaceae	CL_ S	RARE
29	*Ardisia macrocarpa*Wall.	Damai phal	Primulaceae	S	RARE
30	*Ariesaema nepenthoides* (Wall.)Mart. ex Schott	Tuwa	Araceae	H	RARE

Sl.	Scientific Name	Local Name	Family	Habit	Status
31	*Aristolochia saccata* Wall		Aristolochiaceae	S	RARE
32	*Artemisia indica* Willd.	Titepati	Asteraceae/ Compositae	S	Common
33	*Asparagus racemosus* Willd.	Kurilo	Liliaceae	S	RARE
34	*Astilbe rivularis* Buch-Ham. ex D.Don	Buro okhati	Saxifragaceae	S	Common
35	*Asystasia macrocarpa* Nees		Acanthacea	S	Common
36	*Baccaurea ramiflora* Lour.	Kusum	Phyllanthaceae	T	RARE
37	*Bauhinia purpurea* L.	Tanki/Koirala	Fabaceae	T	Common
38	*Bauhinia vahlii* Wight & Arnott.	Bharla	Fabaceae	CL_S	RARE
39	*Beaumontia grandiflora* Wall.	Chimale lahara	Apocynaceae	CL_S	RARE
40	*Begonia dioica* Buch._Ham. Ex D.Don	Mangarkanche	Begoniaceae	H	Common
41	*Begonia picta* Sm.	Magarkache	Begoniaceae	H	Less common
42	*Begonia rubella* Buch._Ham. Ex D.Don	Magar kanche	Begoniaceae	H	Common
43	*Beilschmiedia clarkei* Hook.f.	Tarsing	Lauraceae	T	RARE
44	*Beilschmiedia roxburghiana* Nees	Thulo Tarsing	Lauraceae	T	RARE
45	*Betula alnoides* D.Don var. cylindrostychya (Wall)Winkler	Saur	Betulaceae	T	RARE
46	*Betula alnoides* D.Don	Saur	Betulaceae	T	Less common
47	*Bidens pilosa* L.	Kalo Kuro	Asteraceae/ Compositae	H	Common
48	*Bischofia javanica* Blume	Kainjal	Phyllanthaceae	T	Common
49	*Boehmeria macrophylla* Horne.	Kamle	Urticaceae	S	common
50	*Boehmeria macrophylla* Horne.*var. Platyphylla*	Kamle	Urticaceae	S	Common
51	*Boehmeria rugulosa* Weddell	Dar	Urticaceae	T	Less common
52	*Boenninghausenia albiflora* (Hook.) Reichb. ex Meisn.	Ankuree	Rutaceae	H	Common
53	*Bombax ceiba* L.	Simal	Malvaceae	T	Less common
54	*Brassaiopis mitis* C.B.Clarke	Chuletro/Phutta	Araliaceae	T	Less common
55	*Brassaiopsis glomerulata* (Blume) Reg.	Kalo Chuletro	Araliaceae	S	Less common
56	*Brassaiopsis hainla* (Buch.-Ham. Ex D.Don) Seem	Seto Chuletro	Araliaceae	S	Less common
57	*Brassaiopsis hispida* Seem	Putta	Araliaceae	S	Less common
58	*Bridelea retusa* (L.) Juss.	Gayo lahara	Phyllanthaceae/ Euphorbiaceae	CL_S	Less common
59	*Bridelia stipularis* (L.) Blume	Gayo lahara	Euphorbiaceae	CL_S	Less common
60	*Caesalpinia cucullata* Roxb.	Boksi Kara	Fabaceae/ Caesalpinioideae	CL	Less common
61	*Calamus erectus* Roxb.	Bet	Arecaceae	CANES/ CL_S	RARE
62	*Calamus latifolius* Roxb.	Phekre Bet	Arecaceae	CANES/ CL_S	RARE
63	*Calamus tenuis* Roxb.	Kukhre bet	Arecaceae	CANES/ CL_S	RARE
64	*Callicarpa arborea* Roxb.	Guenlo	Verbenaceae	T	Common

Sl.	Scientific Name	Local Name	Family	Habit	Status
65	*Callicarpa vestita* Wall. Ex C.B.Clarke	Guenlo	Verbenaceae	T	Common
66	*Calophyllum polyanthum* Wall. Ex Choisy	Rate	Clausiaceae	T	Common
67	*Canarium sikkimense* King.	Gokul Dhup	Burseraceae	T	RARE
68	*Carex baccans* Nees ex Wight	Harkatta	Cyperaceae	GRASS/H	common
69	*Carex filicina* Nees	Harkatta	Cyperaceae	GRASS/H	Common
70	*Caryota urens* L.	Rangbhang	Arecaceae	PALM & CANES/T	RARE
71	*Casaeria glomerata* Roxb.	Barkaulae	Salicaceae	T	Common
72	*Castanopsis hystrix* Hook f & Thomson	Jat/Patle Katus	Fagaceae	T	Less common
73	*Castanopsis indica* (Roxb.exLindley) A.de Cand.	Dhalnae Katus	Fagaceae	T	Less common
74	*Castonopsis tribuloides* (Sm.) A.DC	Musarae Katus	Fagaceae	T	Less common
75	*Catunaregam spinosa* (Thunb.) Tirveng.	Maidal	Rubiaceae	S	Common
76	*Cautleya gracilis* (Sm).Dandy		Zingiberaceae	H	Common
77	*Celtis tetranda* Roxb.	Khari	Ulmaceae	T	Common
78	*Celtis timorensis* Span	Khari	Ulmaceae	T	Common
79	*Centella asiatica* (L.) Urb.	Athane Jhar	Apiaceae	H	Common
80	*Cephalostachyum capitatium* Munro	Gope/ Dallo Bans	Poaceae	H	Less common
81	*Chamabainia cuspidata* Wight		Urticaceae	H	Common
82	*Chromolaena odorata* (L.) R.M.King & H.Rob.	Aula Banmara	Asteraceae/ Compositae	H	common
83	*Chukrasia tabularis* A. Juss.	Chekrasi	Meliaceae	T	common
84	*Cinnamomum bejolghota* (Buch.-Ham.) Sweet	Bahale Sinkowli	Lauraceae	T	VU,CAMP,WB,2007
85	*Cinnamomum glanduliferum* (Wall.) Meissner	Malagiri	Lauraceae	T	Less common
86	*Cinnamomum tamala* (Buch.-Ham.) Nees & Eberm.	Sinkowli/Tejpata	Lauraceae	T	Less common
87	*Cinnmomum impressinerviun* Meisn.	Sissi	Lauraceae	T	Less common
88	*Cissampelos pareira* L.	Batulpate	Menispermaceae	C_L	Less common
89	*Citrus medica* L.	Bimiro	Rutaceae	S	Less common
90	*Clematis buchnaniana* DC.	Pinase Lahara	Menispermaceae	CL_S	Common
91	*Clemitis acuminata* DC.	Pinase Lahara	Menispermaceae	CL_S	Common
92	*Clerodendrum infortunatum* L.	Bhante	Verbenaceae	S	Common
93	*Colocasia affinis* Schott	Ban piralu	Araceae	H	Common
94	*Combretum album* Pers.	Thakauli/Seti Lahara	Combretaceae	CL_S	Common
95	*Compylandra aurantiaca* Baker	Nakima	Liliaceae	H	RARE
96	*Cordia myxa* L.	Bohri	Boraginaceae	T	RARE
97	*Cornus capitata* Wall. Ex Roxb.	Bamora	Cornaceae	T	Common
98	*Croton caudatus* Geis.	Supare Lahara	Euphorbiaceae	CL_S	common
99	*Cryptocaria amygdalina*Nees	Patpatae	Lauraceae	T	Common
100	*Cryptomeria japonica* (L.f.) D.Don.	Dhupi	Taxodiaceae	T	Common
101	*Cupressus cashmeriana* Carriere	Kasmiri Dhupi	Cupressaceae	T	Common

Mauwa (*Engelhardtia spicata*) | F-Juglandaceae

Gante or Ramphal (*Gynocardia odorata*) | F-Flacourtiaceae

Michelia excelsa | F-Magnoliaceae

Oroxylum indicum | F-Bignoniaceae

Gagun (*Saurauia nepaulensis*) | F - Actinidiaceae

Bhakimlo (*Rhus javanica*) | F - Anacardiaceae

Pani Saj (*Terminalia myriocarpa*) | F - Combretaceae

Piplli (*Symingtonia populnea*) | F - Hamamelidaceae

Sl.	Scientific Name	Local Name	Family	Habit	Status
102	*Cyanotis vaga* (Lour.) J.A & J.H.Sc.		Commelinaceae	H	Common
103	*Cyanthillium cinereum* (L.) H.Rob.	Cineria	Asteraceae/ Compositae	H	Common
104	*Cyathea brunoniana* (Wall.ex Hook.) Clarke & Baker	Rukh unio	Cyatheacea	Fern	RARE
105	*Cyathea spinulosa* Wall ex Hook	Rukh unio	Cyatheacea	Fern	RARE
106	*Cynadon dactylon* (L.) Pers.	Dubo	Poaceae	H	Common
107	*Dactylicapnos scandens* (D.Don.) Hutch.	Mutu Jhar	Papaveraceae	H	Common
108	*Dalbergia stipulacea* Roxb.	Lahare Siris	Fabaceae/ Papilionaceae	CL_S	Less common
109	*Daphne papyraceae* Wall. Ex G.Don	Lokoti	Thymelaeceae	S	Less common
110	*Daphne sureil* W.W.Sm.& Cave		Thymelaeceae	S	Less common
111	*Daphniphyllum himalayense* (Benth.) Mull.	Lal or Rakta chandan	Daphniphyllaceae	T	Less common
112	*Debregeasia longifolia* (Burman f.) Weddell	Tusarae	Urticaceae	T	Common
113	*Dendrocalamus hamiltonii*Nees & Arn.ex Munro	Choya Bans	Poaceae	BAMB	Common
114	*Dendrocnide sinuata* (Blume) Chew	Morngay	Urticaceae	S	Less common
115	*Dichroa febrifuga* Lour.	Basak	Hydrangeaceae	S	Common
116	*Dichrocephala integrifolia* (L.f.) Kuntze	Hadchun Jhar	Asteraceae/ Compositae	H	Common
117	*Dillenia indica* L.	Panchphale	Dilleniaceae	T	Less common
118	*Dioscorea belophylla* (Prain)Voigit ex Haines	Tarul	Dioscoreceae	CL	Less common
119	*Dioscorea bulbifera* L.	Ban Tarul	Dioscoreceae	CL	Less common
120	*Dobinea vulgaris* Buch. Ham.ex D.Don	Sangli phul	Anacardiaceae	S	Less common
121	*Drymaria villosa* Cham .& Schl.	Abhijal	Caryophylaceae	H	Common
122	*Duabanga grandiflora* (Roxb.ex DC.)Walpers.	Lampatae	Lythraceae	T	Common
123	*Duchesnea indica* (Jacks) Focke		Rosaceae	H	Less common
124	*Dysoxylum binectariferum* (Roxb.) Hook.f. ex Bedd.	Lhasune	Meliaceae	T	Less common
125	*Dysoxylum excelsum* Blume	Lhasune	Meliaceae	T	Less common
126	*Edgeworthia gardneri*(Wall.) Meissn.	Argeli	Thymelaeceae	S	Common
127	*Elaeocarpus lanceifolius* Roxb.	Bhadrasae	Elaeocarpaceae	T	Less common
128	*Elaeocarpus sikkimensis* Mast.	Bhadrasae	Elaeocarpaceae	T	Common
129	*Elatostema reptans* Hook.f.	Gagleto	Urticaceae	H	Common
130	*Elatostema sessile* Forster	Gagleto	Urticaceae	H	Common
131	*Eleocarpus varunua* Buch._ Ham.	Bhadrasae	Elaeocarpaceae	T	Less common
132	*Elsholtzia blanda* (Benth.) Benth.		Lamiaceae	H	Less common
133	*Elsholtzia strobilifera* (Benth.) Benth.	Ban Babri	Lamiaceae	H	Less common
134	*Endospermum chinense* Benth	Seti Kath	Euphorbiaceae	T	Less common
135	*Engelhardita spicata var. colebrookeana* (Lindl.ex Wall.)Koord	Mauwa	Juglandaceae	T	Less common
136	*Engelhardita spicata* Lesch.ex Blume	Mauwa	Juglandaceae	T	Less common
137	*Entada phaseoloides* (L.) Merr.	Pangra	Fabaceae	CL_S	RARE

Sl.	Scientific Name	Local Name	Family	Habit	Status
138	*Equisitum debile* Roxb.ex Voucher	Kurkure Jhar	Equisetaceae	Fern	Less common
139	*Eranthemum indicum* (Nees) C.B.Clarke	Acanthaceae	Seto Chuwa	H	Less common
140	*Erigeron bellidioides* DC.	Tare phul	Asteraceae/ Compositae	H	Common
141	*Eriobotrya petiolata* Hook.f.	Maya	Rosaceae	T	Common
142	*Erythrina stricta* Roxb.	Phaledo	Fabaceae	T	Common
143	*Eurya accuminata* DC.	Sanu Jhiganae	Theaceae	T	Common
144	*Eurya japonica* Thunb.	Jhigni	Theaceae	T	Common
145	*Exbucklandia populnea* (R.Br.ex Griff.) R.W.Br.	Pipli	Hamamelidaceae	T	Common
146	*Ficus auriculata* Lour.	Nevaro	Moraceae	T	Common
147	*Ficus benjamina* L. *var. comosa*	Swami	Moraceae	T	Less common
148	*Ficus neriifolia* J.E.Smith	Dudhilo	Moraceae	T	Less common
149	*Ficus pubigera* Miquel	Dude Lahara	Moraceae	CL	Common
150	*Ficus sabincisa* J.E.Smith	Lutae Khanium	Moraceae	S	Common
151	*Ficus sarmentosa* J.E.Smith	Dude Lahara	Moraceae	CL	Common
152	*Ficus semicordata* J.E.Smith	Khanium	Moraceae	T	Common
153	*Fragaria nubicola* (Lindl. Ex Hook.f.) Lac.	Bhuin Aselu	Rosaceae	H	Common
154	*Gallium elgans* Wall. Ex Roxb.	Lahare Kuro	Rubiaceae	H	Common
155	*Gamblea ciliata* C.B.Clarke	Kursimla	Araliaceae	T	Less common
156	*Garcina cornea* L.	Chunyel	Clusiaceae/ Guttiferae	S	Common
157	*Garuga floribunda* Decne.	Dabdabe	Burseraceae	T	Common
158	*Garuga pinnata* Roxb.	Dabdabe	Burseraceae	T	Common
159	*Geranium nepalense*Edgew.&Hook.f.	Jerenium	Geraniaceae	H	Common
160	*Girardiana diversifolia* (Link) Friis	Bhangre sisnu	Urticaceae	S	Common
161	*Gleichenia gigantea* Wall.exHook.	Kalame uneo	Gleicheneaceae	Fern	Common
162	*Glochidion acuminatum* Mull.	Lati Kath	Phyllanthaceae/ Euphorbiaceae	T	Common
163	*Gonostegia hirta* (Blume ex Hassk.) Miq.	Chiple	Urticaceae	H	Common
164	*Gordonia dipterosperma* Kurz.	Hinguwa	Theaceae	T	Common
165	*Grewia sapida* Roxb.ex DC.	Kuail	Malvaceae	S	Common
166	*Gynocordia ordorota* R.Br.	Gante/Bandare	Flacourtiaceae	T	EN,CAMP,WB,2007
167	*Gynura cusimbua* (D.Don)S.Moore		Asteraceae/ Compositae	S	Common
168	*Hedychium coccineum* Buch.-Ham ex Sm.	Sara	Zingirberaceae	H	Common
169	*Hedychium ellipticum* Buch.-Ham ex Sm.	Rato Sara	Zingirberaceae	H	Common
170	*Hedyotes scandens*Roxb.	Bakhra Kanae	Rubiaceae	CL _S	Common
171	*Helewingia himalaica* Hook.f.&T. exC.B.Clarke	Pipli	Hamamelidaceae	S	RARE
172	*Helicia nilgerica* Bedd.	Bandare	Proteaceae	T	Less common
173	*Helixanthera ligustrina*(Wall.)Danser	Aijaru	Loranthaceae	S	Less common
174	*Helixanthera parasitica* Lour.(Wall.)	Sanu Aijaru	Loranthaceae	S	Less common

Sl.	Scientific Name	Local Name	Family	Habit	Status
175	*Hemiphragma heterophyllum* Wall.	Nashe/Lalgeri Jhar	Scrophulariaceae	H	Common
176	*Heteropanax fragrans* Seeman.	Lal Totola	Araliaceae	T	RARE
177	*Himalayacalamus hookerianus* (Munro) Stapl.	Pareng Bans	Poaceae	BAMB	Common
178	*Holboelia angustifolia* Wall.	Gufla	Lardizabalaceae	CL_S	Less common
179	*Holboelia latifolia* Wall.	Gufla	Lardizabalaceae	CL_ S	Less common
180	*Holmskioldia sanguinea* Retz.	Hare lahara/Jhule phul	Verbenaceae	CL_S	Less common
181	*Hoya parasitica* (Roxb.)Wall.ex Wight		Asclepiadaceae	CL	Less common
182	*Hydrangea aspera* D.Don	Phirphire ghans	Hydrangeaceae	S	Less common
183	*Hydrocotyl himalaica* P.K.Mukh.	Golpatta	Umbelliferae	H	Common
184	*Hydrocotyl javanica* Thunb.	Dhungrijhar	Umbelliferae	H	Common
185	*Hymenodictyon orixense* (Roxb.) Mabb.	Latikaram	Rubiaceae	T	Less common
186	*Jasminum elongatum* (Berg.) Willd.	Jasmin	Oleaceae	S	RARE
187	*Jasminum scandens* (Retz.) Vahl.	Hade lahara	Oleaceae	CL_S	RARE
188	*Juglans regia* L.	Okhar	Juglandaceae	T	RARE
189	*Justicia adhatoda* L.	Basak	Acanthaceae	S	Common
190	*Lagerstroemia parviflora*Roxb.	Buridhangero	Lythraceae	T	Common
191	*Lagerstroemia speciosa* (L.) Pers.	Jarul	Lythraceae	T	Common
192	*Laportea terminalis* Wight.	Patle sisnu	Urticaceae	S	RARE
193	*Leea asiatica* (L.)Rid.	Galeni	Leeaceae	S	Common
194	*Leucoseptrum canum* Sm.	Gurpis	Lamiaceae	S	Common
195	*Lithocarpus fenestratus* (Roxb.) Rehder	Arkawlo	Fagaceae	T	RARE
196	*Lithocarpus pachyphyllus* (Kurz) Rehder	Sungure katus	Fagaceae	T	RARE
197	*Lithocarpus elegans* (Blume) Soep	Arkawlo	Fagaceae	T	RARE
198	*Litsea hookeri* (Meisn.D.G.	DudheLampatae	Lauraceae	T	Less common
199	*Litsea lancifolia* (Roxb.ex Nees) Benth.& Hook.f.	Kali pahenle/ Makaikath	Lauraceae	T	Less common
200	*Litsea monopetala* (Roxb.)Pers.	Kutmero	Lauraceae	T	Common
201	*Litsea salicifolia* (Wall.exNees)Hook. f.	Sano Pahalae	Lauraceae	T	Less common
202	*Lycopodium clavatum* L.	Nagbeli	Lycopodiaceace	CL	RARE
203	*Lygodium flexosum* (L.)Sw.	Parawa andri	Schizaeaceae	CL	Less common
204	*Lygodium japonicum* (Thunb.)Sw.	Parawa andri	Schizaeaceae	CL	Less common
205	*Macaranga denticulata*(Blume)Mull.	Jogi Malata	Euphorbiaceae	T	Common
206	*Macaranga indica*Wight	Rani Malata	Euphorbiaceae	T	common
207	*Macaranga peltatus* (Geis.) Mull.	Malata	Euphorbiaceae	T	Common
208	*Macaranga roxburghianus* Mull.	Phusre Malata	Euphorbiaceae	S	Common
209	*Machilus edulis* King ex Hook.f.	Lapche Kawlo	Lauraceae	T	RARE
210	*Machilus gammieana* King ex Hook.f.	Chiple Kawlo	Lauraceae	T	Less common
211	*Machilus glaucescens* (Nees)Wight	Bhainsi Kawlo	Lauraceae	T	Less common
212	*Maesia chisia* Buch-Ham ex D. Don	Bilaunae	Myrsinaceae??	S	Common

Sl.	Scientific Name	Local Name	Family	Habit	Status
213	*Maesia indica* (Roxb.)A.de Cand*olle*	Kalo Bilaunae	Myrsinaceae	S	Common
214	*Magnolia doltsopa* (Buch.-Ham. Ex DC.) Figlar	Rani/Mithe Champ	Magnoliaceae	T	Less common
215	*Magnolia cathcartii* (Hook.f.& T.) Noot.	Tite champ	Magnoliaceae	T	Common
216	*Magnolia hodgsonii* (Hook.f.&T.) H.Keng	Patpate	Magnoliaceae	T	RARE
217	*Magnolia lanuginosa* (Wall.) Figlar & Noot	Phusre Champ	Magnoliaceae	T	Less common
218	*Mallotus nudiflorus* (L.) Kuju	Pitali	Euphorbiaceae	T	Common
219	*Mallotus philippensis* (Lam.) Muller	Sindure	Euphorbiaceae	T	Common
220	*Mangifera sylvatica* Roxb.	Chuche Anp	Anacardiaceae	T	RARE
221	*Mazus surculosus* D.Don	Malati Jhar	Scrophulariaceae	H	Common
222	*Melastoma malabathricum* L.	Chulesi	Melastomataceae	S	Common
223	*Melocana baccifera* (Roxb.) Kurz	Philing bans	Poaceae	BAMB	Common
224	*Mesia montana* A.DC.	Kalo Bilaunae	Myrsinaceae	S	Common
225	*Michelia champaca* (L.) Bail. Ex Pierr*e*	Aule Champ	Magnoliaceae	T	RARE
226	*Mikania cordata* (Burm.f.) B.L.Rob.	Mikane lahara	Asteraceae/ Compositae	H	Common
227	*Mimosa himalayana* Gamble	Ararae kanra	Fabaceae	CL_S	Less common
228	*Morinda angustifolia* Roxb.	Hardi Kath	Rubiaceae	S	RARE
229	*Morus macroura* Miquel	Kimbu	Moraceae	T	RARE
230	*Mucuna macrocarpa* Wall.	Baldengra	Fabaceae/ Papilionaceae	CL	RARE
231	*Mucuna pruriens* (L) DC	Kaoucho	Fabaceae/ Papilionaceae	CL	EN,CAMP,WB,2007
232	*Musa balbisiana* Colla.	Bankera	Musaceae	H	Less common
233	*Musa thompsonii* (King ex Schu.) Cowan & Cowan	Ban Kera	Musaceae	H	Less common
234	*Nasturtium officinale* R. Br.	Simrayo	Brassicaceae	H	Common
235	*Natsiatum herpeticum* Buch.-Ham. Ex Arn.	Seti Lahara	Icacinaceae	CL_S	Less common
236	*Neolamarckia cadamba* (Roxb.) Bosser	Kadam	Rubiaceae	T	Less common
237	*Nephrolepis cordifolia* (L.) C. Persl.	Pani Amla	Dryopteridaceae	H	Common
238	*Nyssa javanica* (Blume)Wangerin	Lekh chiloune	Nyssaceae	T	Less common
239	*Ophiopogon intermedius* D. Don.	Kaligeri	Liliaceae	H	Common
240	*Oroxylum indicum*(L.) Kurz.	Totola	Bignoniaceae	T	RARE
241	*Osbeckia nepalensis* Hook.f.	Anger/Seto Chulesii	Melastomataceae	S	Common
242	*Ostodes paniculata* Blume	Bepari	Euphorbiaceae	T	Common
243	*Oxalis corniculata* L.	Chariamilo	Oxalidaceae	H	Common
244	*Oxyspora paniculata* (D.Don) DC	Chulesi	Melastomataceae	S	Common
245	*Paederia cruddasiana* Prain	Pade/Bire Lahara	Rubiaceae	C	Common
246	*Pandanus furcatas* Roxb.	Tarika	Pandanaceae	T	Less common
247	*Paris polyphylla* Sm.	Satuwa	Liliaceae	H	RARE
248	*Parthinosissus semicordata* (Wall.) Planch.	Charcharae(Thulo)	Vitaceae	CL S	Common

Sl.	Scientific Name	Local Name	Family	Habit	Status
249	*Peperomia pellucida* (L.) Kunth	Silverbush	Piperaceae	H	Common
250	*Persicaria chinensis* (L.) H.Gross	Kukur Thotnae	Polygonaceae	CL_S	Common
251	*Phlogacanthus pubinervius* T. Anderson	Chuwa	Acanthacea	S	Less common
252	*Phlogacanthus thyrsiformis* (Roxb.ex Hard.) D. J. Mab.	Chuwa	Acanthacea	S	Less common
253	*Phoebe attenuata* (Nees) Nees	Aule lapchae kawla	Lauraceae	T	Less common
254	*Phoebe hainesiana* Brandis	Angare	Lauraceae	T	RARE
255	*Phoebe lanceolata* (Nees) Nees	Jhakri Kath	Lauraceae	T	Less common
256	*Phoenix rupicola* T. Anders	Cliff date Palm	Arecaceae	PALM	Near threatened
257	*Phyllanthus embelica* L.	Aonla	Phyllanthaceae/ Euphorbiaceae	T	Less common
258	*Phyllanthus urinaria* L.	Bhumi Amla	Phyllanthaceae/ Euphorbiaceae	H	Less common
259	*Pilea bracteosa* Weddell		Urtcaceae	H	Common
260	*Pilea cordifolia* Hook f.	Gaglato	Urticaceae	H	Common
261	*Pilea scripta* (D.Don) Weddell	Seto Gagleto	Urticaceae	H	Common
262	*Pilea umbrosa* Blume		Urticaceae	H	Common
263	*Pinus roxburghii* Sargent	Dhup	Pinaceae	T	Less common
264	*Piper boehmeriifolium* (Miq.)Wall. ex DC.	Chaba	Piperaceae	CL_S	Common
265	*Piper hamiltonii* DC.	Chabo or Jungli Pan	Piperaceae	CL_S	Less common
266	*Piper longum* L.	Pipla	Piperaceae	CL_S	RARE
267	*Piper mullesua* Buch.-Ham. Ex D. Don	Hill pepper	Piperaceae	CL	Less common
268	*Plantago asiatica ssp.erosa* (Wall.) Z.Yu.Li	Nasey jhar	Plantaginaceae	H	Common
269	*Pogonatherum paniceum* (Lam.) Hack	Kharuki	Poaceae	H	Less common
270	*Polyalthia simiarum* (Buch. Ham.ex Hook.f.&T.) Benth.	Lapche Kath/ Khutikath	Anonaceae	T	RARE
271	*Polygala arrilata* Buch-Ham ex D.Don	Marcha	Polemoniaceae	S	RARE
272	*Polystichium lentum* (D.Don.) T.Moore	Kuthurke Ningro	Dryopteridaceae	Fern	Common
273	*Porgonetherum paniceum* (Lamarck) Hack.	Kharuki	Graminae/ Poaceae	BAMB/ Grass	Less common
274	*Potentella lineata* Trevir.	Bansupari	Rosaceae	H	Common
275	*Pothos scandens* L.	Sanu kanchirna	Araceae	CL_S	Less common
276	*Pouzolzia sanguinea* (Blume) Merrill	Chiple	Urticaceae	H	Common
277	*Premna longifolia* Roxb.	Gineri	Verbenaceae	T	Less common
278	*Premna scandens* Roxb.	Gineri Lahara	Verbenaceae	CL_S	Less common
279	*Pseudo gnaphilum affine* (D.Don.) Anderb.	Buki phul	Asteraceae/ Compositae	H	Common
280	*Pseudostachyum polymorphium* Munro	Philing bans	Poaceae	BAMB	Common
281	*Pteris biaurita* L.	Unio	Pteridaceae	Fern	Common
282	*Pterospermum acerifolium* (L.)Willd.	Hatipailae	Malvaceae	T	RARE

Sl.	Scientific Name	Local Name	Family	Habit	Status
283	*Pyrularia edulis* (Wall.ex Roxb.) A.DC	Amphi	Santalaceae	T	RARE
284	*Quercus lamellosa* Smith.	Buk	Fagaceae	T	RARE
285	*Quercus thomsoniana* A.DC	Phalant	Fagaceae	T	RARE
286	*Ranunculus diffusus* DC.	Nakkore Jhar	Ranunculaceae	H	Less common
287	*Raphidophora decursiva* (Roxb.) Schott	Kanchirna	Araceae	CL	Less common
288	*Raphidophora glauca* (Wall.) Schott	Kanchirna	Araceae	CL	Less common
289	*Rauwolfia serpentina* (L.) Benth.ex Kurz.	Nagbeli	Apocynaceae	H	EN,CAMP,WB,2007
290	*Rhododendron dalhousae* Hook. f.	Lahare chimal	Ericaceae	S	RARE
291	*Rhododendron grande* Wight	Patle korlinga	Ericaceae	T	RARE
292	*Rhus chinensis* Mill.	Bhakimlo	Anacardiaceae	T	Common
293	*Rubia manjith* Roxb.ex Fleming	Manjito	Rubiaceae	CL _S	Less common
294	*Rubia sikkimensis* Kutz.	Bhale Majito	Rubiaceae	CL_ S	Less common
295	*Rubus ellipticus* Sm.	Aselu	Rosaceae	S	Common
296	*Rubus lineatus* Rein. Ex Blume	Ghyampe Aselu	Rosaceae	H	Common
297	*Rubus moluccanus* L.	Bhote Pan	Rosaceae	CL_S	Common
298	*Rubus paniculatus* Sm.	Kalo Aselu	Rosaceae	CL_ S	Common
299	*Rubus rosifolius* Sm.	Gempe Aselu	Rosaceae	S	Common
300	*Rumex nepalensis* Spreng.		Polygonaceae	H	Common
301	*Sambucus adnata* Wall.	Moti phool	Adoxaceae	S	Less common
302	*Sapindus mukorossi* Gaertn.	Ritha	Sapindaceae	T	RARE
303	*Saurauia nepaulensis* DC.	Gogun	Actinidiaceae	T	Common
304	*Saurauria fasciculata* Wall.	Gogun	Actinidiaceae	T	Common
305	*Saurauria roxburgii* Wall.	Aulae gagun	Actinidiaceae	T	Common
306	*Schefflera elata*(Buch.-Ham.) Harms	Gufla	Araliaceae	T	Less common
307	*Schefflera rhododendrifolia* (Griff.) Frodin	Bhalu Chinde	Araliaceae	T	Less common
308	*Schima wallichii* (DC.) Korth.	Aule Chilaunae	Theaceae	T	Common
309	*Scurrula parasitica* L.	Aijaru	Loranthaceae	S	Less common
310	*Selaginella monospora* Spring		Selagenellaceae	Fern	Common
311	*Sida acuta* Burm.f.	Khareto	Malvaceae	H	Common
312	*Smilax zeylanica* L.	Kukurdaine	Smilacaceae	CL_S	Common
313	*Solanum capsicoides* All.	Kanre Bee	Solanaceae	S	Common
314	*Spatholobus parviflorus (*DC.)Kuntze	Debre Lahara	Fabaceae	CL	Less common
315	*Stellaria media*(L.)Vill.	Boksi Jhar	Caryophyllaceae	H	Common
316	*Stephania glabra* (Roxb.) Miers.	Nimi Lahara/ Tambarke	Menispermaceae	CL	Less common
317	*Stephania japonica* (Thunb.) Mier.	Tambarkae	Menispermaceae	CL	Less common
318	*Stereospermum chelonoides* (L.f.) DC.	Parari	Bignoniaceae	T	Common
319	*Strobilanthes capitata* Nees	Ankhle	Acanthacea	H	Common
320	*Strobilanthes divaricatus* (Nees)T. Anders.	Aakhlae	Acanthacea	S	Common
321	*Strobilanthes wallichii* Nees	Ankhle	Acanthacea	S	Common

Sl.	Scientific Name	Local Name	Family	Habit	Status
322	*Swertia bimaculata* (Sieb.&Zucc.) Hook.f.&T.	Bhale Chirowto	Gentianaceae	H	Common
323	*Swertia chirayita* (Roxb.)H.Karst.	Chiraito	Gentianaceae	H	CR,CAMP,WB,2007
324	*Symplocos glomerata* King ex C.B.Clarke	Kharane	Symplocaceae	T	Common
325	*Symplocos lucida* (Thunb.) Sieb & Zucc.	Ghole/Kharane	Symplocaceae	T	Common
326	*Syzigium claviflorum* (Roxb.)Wall.ex A.M.Cowan & Cowan	Hare jamuna	Myrtaceae	T	Common
327	*Syzigium formosum* (Wall.) Masam	Ambakae	Myrtaceae	T	Less common
328	*Syzigium formosum* (Wall.) Masam	Ambake	Myrtaceae	T	Less common
329	*Syzigium ramosissimum* (Blume) N.P.Bal.	Jhare Jamuna	Myrtaceae	T	Common
330	*Tabernaemontana divericata* (L.) R.Br.ex Roem.Schult.	Chandnee/Tagar	Apocynancea	S	Common
331	*Terminalia arjuna* (Roxb.ex DC.) Wight & Arn.	Arjun	Combretaceae	T	Less common
332	*Terminalia bellirica* (Gaertn.)Roxb.	Barra	Combretaceae	T	Less common
333	*Terminalia crenulata* Roth.	Pakasajh	Combretaceae	T	Less common
334	*Terminilia myriocarpa* Van Heurck & Muller	Panisaj	Combretaceae	T	Less common
335	*Tetradium fraxinifolium* (Hook.f.) T.G.Hart.	Khanakpa	Rutaceae	T	Common
336	*Tetradium glabrifolium* (Champ.ex Benth.) T.G.Hart.	Thulo Khankpa	Rutaceae	T	Common
337	*Tetrameles nudiflora* R. Br.	Maina	Tetramelaceae	T	RARE
338	*Tetrastigma bracteolatum* (Wall.) Planch.	Charcharae lahara	Vitaceae	CL_S	Common
339	*Tetrastigma serrulatum* (Roxb.) Planch.	Charchare (Syaano)	Vitaceae	CL_S	Common
340	*Thrysanolena latifoila* (Roxb.ex Horn.) Honda	Kuchoo or Amliso	Poaceae	S	Common
341	*Thunbergia fragrance* Roxb.	Kanasae Lahara	Acanthacea	CL_S	Common
342	*Tinsopora sinensis* (Lour.)	Gurjo Lahara	Menispermaceae	CL	Less common
343	*Toona ciliata* M. Roem.	Tooni	Meliaceae	T	VU,CAMP,WB,2007
344	*Toxicodendron hookeri* (Sahni & Bahadur) C.I.Wu &T.L.Ming	Kag bhalayo	Anacardiaceae	T	Common
345	*Toxicodendron succedaneum* (L.) Kuntze	Rani Bhalayo	Anacardiaceae	T	Common
346	*Trema politoria* Plancon	Kuail	Ulmaceae	T	Common
347	*Trevisia palmata* (Roxb.ex Lindl.) Vis.	Phutta	Araliaceae	T	Common
348	*Trichosanthes wallichiana* (Ser.) Wight	Indreni	Cucurbitaceae	CL_S	Less common
349	*Tupistra nutans* Wall.ex Lind.	Nakima	Liliaceae	H	RARE
350	*Turpinia pomifera* (Roxb.)DC.	Thali	Staphyleaceae	T	Common
351	*Turpinia pomifera* (Roxb.)DC	Thali	Staphyleaceae	T	Common
352	*Urtica dioca* L.		Urticaceae	S	Common
353	*Urtica parviflora* Roxb.		Urticaceae	S	Common

Sl.	Scientific Name	Local Name	Family	Habit	Status
354	*Uvaria hamiltonii* Hook.f.&Thom.	Bandar Jhula	Anonaceae	CL_S	Less common
355	*Vaccinum nummularia* Hook.f.&T.		Ericaceae	S	Common
356	*Vaccinum retusum* (Grif.) Hook.f.ex C.B.Clarke		Ericaceae	S	Less common
357	*Vaccinum vacciniaceum* (Roxb.) Sleum.		Ericaceae	S	Less common
358	*Vernonia talaumifolia* Hook.f.&T.	Nundheki	Asteraceae/ Compositae	T	Common
359	*Vernonia volkameriifolia* DC.	Nundheki	Asteraceae/ Compositae	T	Common
360	*Viburnum erubescens* Wall. Ex DC.	Asarae	Adoxaceae/Caprif	S	Common
361	*Viola cerasifolia* Saint-Hiaire.	Ghatte jhar	Violaceae	H	Common
362	*Viola pilosa* Blume	Ghatte jhar	Violaceae	H	Common
363	*Viscum nepalense* Sprengel	Harchur	Loranthaceae	S	LC,CAMP,WB,2007
364	*Vitis heyeana* Roemer & Schultes	Jarila Lahara	Vitaceae	CL_ S	Less common
365	*Wallichia oblongifolia* Griff.	Thakal	Palmae	Palm/ CANES/S	RARE
366	*Wrightia arborea* (Dennst.)Mabb	Khirra	Apocynancea	T	Common
367	*Zanthoxylum acanthopodium* DC.	Bhale Timbur	Rutaceae	S	Common
368	*Zanthoxylum armatum* DC.	Bokey Timbur	Rutaceae	S	RARE
369	*Zanthoxylum oxyphyllum* Edgew.	Siltimbur	Rutaceae	CL _S	Common
T - Tree, S - Shrub, H - Herb, CL - Climber, CL_S : Climber shrub					

Phoenix rupicola | F - Arecaceae

Persicaria chinensis | F - Polygonaceae

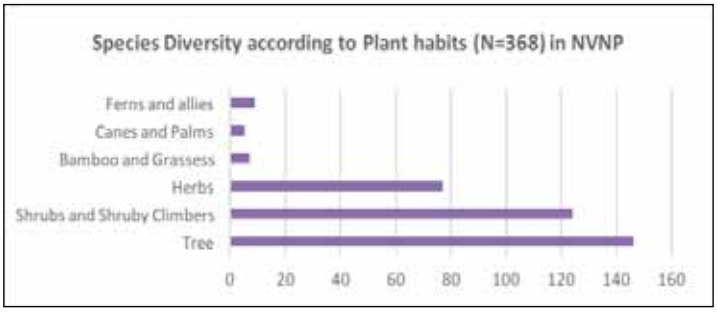
Edgeworthia gardneri | F - Thymelaceae

Taxonomic diversity of Plants documented in NVNP

Number of Families	108
Number of Genera	267
Number of Species	365
Number of subspecies	1
Number of Varieties	3

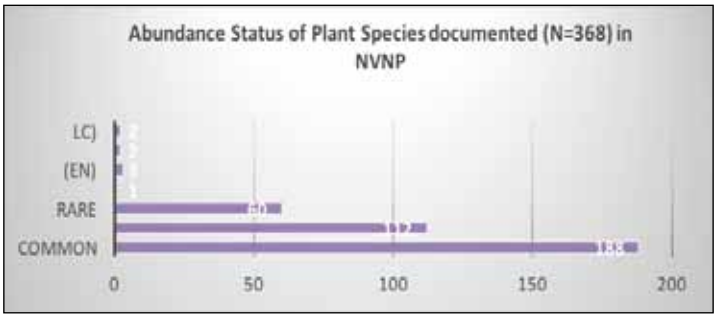
Species Diversity according to Plant habits (N=369) in NVNP

Tree	146
Shrubs and Shruby Climbers	124
Herbs	77
Bamboo and Grassess	7
Canes and Palms	6
Ferns and allies	9



Abundance Status of Plant Species documented (N=369) in NVNP

Common	188
Less Common	112
Rare	61
Critically Endangered (CR))	1
Endangered (EN)	3
Vulnerable (VU)	2
Least Concerned (LC)	2



Agapetes serpense | F - Ericaceae

ORCHIDACEAE

Orchids comprise of 25000 – 30000 species distributed throughout the world and are used as ornamentals, foods, and aphrodisiac, in religious beliefs and as medicines. Orchids are interesting group of flowering plants belong to the family Orchidaceae which is highly evolved among the monocotyledons. They exhibit incredible diversity in colour, shape, size, structure and fragrance of flowers and four different life forms *viz.*, sub-terranean, saprophytic, terrestrial and epiphytic and are pretty admired among the professional and amateur Orchid lovers of the world and are important both botanically and commercially. In India, the Eastern Himalaya is the centre of Orchids, followed by Western Himalaya and the South Indian hills. The Khasia hills in Assam, Arunachal Pradesh and the Sikkim and Darjeeling Himalayas are richest region in Orchid flora in India. North East India constitutes an Orchid hotspot and show maximum diversity in the Eastern Himalaya. Of the total Orchid species found in India, nearly 70% found in North East India.

Total 53 Orchid species are recorded during the 10 days field survey (3rd to 13th March 2018) at three locations at different altitudinal levels in NVNP. Out of these, 45 are epiphytic and the rest 8 species are terrestrial. Field availability status of these species are also documented that suggests 18 as rare, 2 as common, 15 as sparse, 4 being frequent and 6 are threatened among the epiphytic species. Among the 8 terrestrial Orchids, 1 is sparse, 4 are rare and 3 are threatened.

Otochilus fuscus | Epiphytic orchid

Eria paniculata | Epiphytic orchid

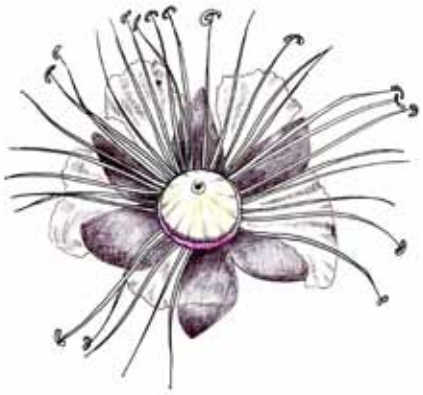
Table No. 14: Species of Orchids recorded

Sl.	Name of the species	Habitat	Status
	Epiphytic species		
1.	*Aerides odoratum* Lour.	Epiphytic	Rare
2.	*Agrostophyllum planicaule*. (Wall. *ex* Lindl.) Rchb. f	Epiphytic	Sparse
3.	*Agrostophyllum callosum* Rchb.f.	Epiphytic	Frequent
4.	*Bulbophyllum careyanum* (Hook.) Spreng.	Epiphytic	Frequent
5.	*Bulbophyllum leopardianum* (Wall.) Lindl.	Epiphytic	Frequent
6.	*Bulphyllum cauliflorum* Pearce & Cribb	Epiphytic	Sparse
7.	*Bulbophyllum helenae* (Kuntze) J.J. Sm.	Epiphytic	Rare
8.	*Bulbophyllum reptans* (Lindl.) Lindl.	Epiphytic	Frequent
9.	*Chiloschista parishii* Seidenf.	Epiphytic	Rare
10.	*Coelogyne barbata* Lindl. *ex* Griff.	Epiphytic	Rare
11.	*Coelogyne flaccida* Lindl.	Epiphytic	Sparse
12.	*Coelogyne corymbosa* Lindl.	Epiphytic	Common
13.	*Coelogyne fimbriata* Lindl.	Epiphytic	Sparse
14.	*Coelogyne longipes* Lindl.	Epiphytic	Rare
15.	*Coelogyne occultata* Hook. f.	Epiphytic	Rare
16.	*Cymbidium eburneum* Lindl.	Epiphytic	Rare
17.	*Cymbidium hookerianum* Rchb. f.	Epiphytic	Threatened
18.	*Dendrobium chrysanthum* Wall. *ex* Lindl.	Epiphytic	Sparse
19.	*D. amoenum* Wall. *ex* Lindl.	Epiphytic	Sparse
20.	*Dendrobium aphyllum* (Roxb.) C.E.C. Fischer	Epiphytic	Sparse
21.	*D. densiflorum* Lindl.	Epiphytic	Rare
22.	*D. eriiflorum* Griff.	Epiphytic	Rare
23.	*Dendrobium longicornu* Lindl.	Epiphytic	Sparse
24.	*Dendrobium nobile* Lindl.	Epiphytic	Rare
25.	*Dendrobium porphyrochilum* Lindl.	Epiphytic	Threatened
26.	*Eria amica* Rchb. f.	Epiphytic	Rare
27.	*Eria paniculata* Lindl.	Epiphytic	Rare
28.	*Epigenium rotundatum* (Lindl.) Summer.	Epiphytic	Sparse
29.	*Eria spicata* (D. Don) Handel-Mazz.	Epiphytic	Sparse
30.	*Eria stricta* Lindl.	Epiphytic	Sparse
31.	*Gastrochilus acutifolius* (Lindl.) Kuntze	Epiphytic	Threatened
32.	*Ione bicolour* (Lindl.) Lindl.	Epiphytic	Rare
33.	*Liparis botanensis* Griff.	Epiphytic	Rare
34.	*Liparis cespitosa* (Lamk.) Lindl.	Epiphytic	Threatened
35.	*Otochilus fuscus* Lindl.	Epiphytic	Sparse
36.	*O. lancilabius* Seidenf.	Epiphytic	Common
37.	*Oberonia falcata* King & Pantl.	Epiphytic	Rare
38.	*Oberonia longilabris* King & Pantl.	Epiphytic	Rare
39.	*Pholidota articulata* Lindl.	Epiphytic	Sparse
40.	*Pleione humilis* (J.E. Sm.) D. Don	Epiphytic	Rare

Sl.	Name of the species	Habitat	Status
41.	*Pleione praecox* (J.E. Sm.) D. Don	Epiphytic	Rare
42.	*Podochilus cultratus* Lindl.	Epiphytic	Sparse
43.	*Porpax elsweii* (Rchb. f.) Rolfe	Epiphytic	Threatened
44.	*Trichotosia dasyphylla* (Parish & Rchb. f.) Kranz.	Epiphytic	Threatened
45.	*Vanda cristata* Lindl.	Epiphytic	Sparse
	Terrestrial Orchids		
1.	*Calanche brevicornu* Lindl.	Terrestrial	Rare
2.	*Cremastra appendiculata* (D. Don) Makino	Terrestrial	Threatened
3.	*Goodyera schlechtendaliana* Rchb. f.	Terrestrial	Rare
4.	*Odontochilus* elweii C.B. Clarke *ex* Hook. f.	Terrestrial	Threatened
5.	*Odontochilus grandiflorus* (Lindl.) Benth & Hook. f.	Terrestrial	Threatened
6.	*Rhomboda lanceolata* (Lindl.) Ormerod	Terrestrial	Rare
7.	*Tainia minor* Hook. f.	Terrestrial	Sparse
8.	*Zeuxine affinis* (Lindl.) Bentham *ex* Hook. f.	Terrestrial	Rare

Dendrobium nobile | Epiphytic orchid

SKETCHES FROM FIELD



Sketches By: Dr S K Sinha

Malabar Giant Squirrel

Horay-bellied Squirrel

Orange-bellied Squirrel

Barking Deer

Himalayan Goral

CONCLUSION

An attempt of its first kind in the region, the first biodiversity assessment camp at the NVNP has been restricted to three localities representing three altitudinal forest ecosystems in this region of a biodiversity hot spot, namely the Eastern Himalayas. The wild habitats in the region are supposedly best preserved owing to the tough terrains and stricter protection regime.

Despite the survey time duration at each of the three sites are far from being enough and weathers being hostile for field surveys, the different faunal and floral groups surveyed are quite indicative of biodiversity. They are, namely, Birds, Reptiles including snakes and lizards, Amphibians- frogs and toads, Butterflies, Odonates, Dipterans, other insects like Beetles, Bugs, etc., Plants including trees, shrubs and climbers, herbs. A special effort was given for Orchids, a precious biodiversity resource of the NVNP.

A total of 1024 species from 8 faunal groups, namely, Birds (177), Reptiles (7), Amphibians (7), Butterflies (72), Dipterans (75), Odonates (7), other Insects (77) and Spiders (90), have been sighted directly and recorded after preliminary identifications. Many of them, of course, remain as morpho-species awaiting lab based identifications with preserved specimens, type specimens and taxonomic manuals. Spiders (none could be identified except as different morpho-species, as they need genitalia dissections under microscope for the species level identification), Dipterans, other insects like beetles are affected mostly because of the permission constraint. Despite that, at preliminary visual examinations by the experts in the field, many morpho-species could be identified that looked to be new to West Bengal fauna, or Indian fauna, or even to science! And, of course, that's not unexpected for a least explored, best preserved biodiversity region of West Bengal. This strongly suggests that judicious collections of specimens by the field experts in different faunal groups, especially for those with smaller sizes and only those cannot be identified confidently or at all, in the field is most important.

The very low recording of Reptilian, Amphibian and Odonate diversity is of course due to the climatic and seasonal factors, both being hostile to them during the survey period. The interview and discussion based survey in the fringe villages for secondary information on snakes look promising and useful for sharing information and good gestures between the WBFD team and local people. This is corroborated by the snake bite case intervened by the field herpetologist Mr. Anirban Chowdhury sometimes after the completion of the present survey.

Mouchuki Camp

ANNEXURE

Intervention in a snake bite case in the fringe village by Mr. Anirban Choudhury

On 11th June 2018, around 8.30 pm, Mr. Kumar informed Anirban that a snake bite case has taken place in a house in his village Bhujel Gaon and the villagers had contacted him for help. As advised, Kumar ji advised them to move the victim to the nearest Govt health center. In this case, Chalsha Health Center. Anirban was constantly in touch with Mr. Kumar and requested the family to move the victim to Mal super speciality Hospital, where AVS is also available. The victim was a 14 year old female child, Name Bhumika Bhujel from Sunthelkhola Phari. The time and site of bite and local symptoms indicated a pit viper bite. Though it is completely unnecessary for the patient party to carry the culptit snake, still it was taken into a plastic container and taken to the Hospital. From photos of which it was identified to be a Mountain pit viper (*Ovophis monticola*). Our data from the interview also suggest that this is the most common species which causes most number of bites during the month of June to September.

In the mean time, Anirban had contacted an NGO based in Siliguri region (SPOAR, Society for protecting ophiofauna and animal rights), and asked their secretary to inform the doctors at Mal Hospital to be ready to attend a patient with bite history who is already on the way. Anirban was constantly in touch with the members of the organization SPOAR and their secretary Mr. Shyama Prasad Pandey throughout the ordeal. The snake which was brought by the family member's of the family was also identified as a juvenile *O. monticola* as expected.

It is also to be mentioned here that in India the AVS prepared doesn't contain venom of the species concerned in this case. But as a last resort it has been used in such cases to rely on cross specificity of AVS. Detailed study is not known that whether it is effective or not, if effective then to what extent. It is also important to mention that only 1 death have been reported from the bite of this species recently in Meghalaya. During our interview with Villagers we came across several bite stories from *O. monticola* bite but no death was reported. Villagers said generally local edema and sometimes tissue damage takes place. The swelling and pain generally subsides within 7-10 days.

Bhumika after admission at 10.30 pm same day, was kept under observation, but as the swelling on her leg increased the doctors administered 10 vials of AVS to be on the safe side. Bhumika responded well to the treatment and was released within a week.

Bite History

According to Bhumika's family the bite took place around 8.00 pm on 11th June 2018, She was bitten by the snake on her right feet just above thumb, while she was going to the kitchen. Detailed photographs provided.

We thank the villagers and the effort of the foresters that whatever small awareness could have been done during the given time during the survey period has reaped fruitful benefits. It was essential in the context of an area where people resort to faith healers and waste valuable time in case of a snake bite. Convincing them to break the age old practice and seek medical help was a great effort on part of the survey team.

We also thank Members of SPOAR for their assistance and updates on the patient provided during this time.

THE FIELD SURVEY TEAM

Miss Sarika Baidya

of **Nature Mates-Nature Club** is working on plant butterfly interdependence and life history of Butterflies, mostly from West Bengal and North-eastern States of India. She is doing her project under Dr. Krushnamegh Kunte she is also instrumental in setting up various Butterfly Gardens, in West Bengal.

Sri Ayan Mondal

of **Nature Mates-Nature Club** - a spider specialist, who loves to roam around the forest tirelessly in search of them. Presently perusing his PhD from Burdwan university. He also has a good understanding of reptiles.

Sri Soumya Sarkar

of **Nature Mates-Nature Club** - a naturalist by passion and a research fellow doing his PhD under Dr Silanjan Bhattacharyya, on various aspect of Birds in Rural and Urban settlement. Soumya also keeps a keen interest in indigenous fish fauna and had authored a very popular Bengali book on snakes of West Bengal. A teacher by profession, Soumya loves to understand the deep aspects of ecology of a habitat, in and out.

Sri Prosenjit Dawn

of **Nature Mates-Nature Club** - an assistant professor working with the Odonates is the leading face from West Bengal in his area of research. He is having collaborations with various national and international group, who are working on Indian Odonates. He is currently persuing his PhD under Dr. Kailash Chandra, Director ZSI on Odonates of Chattishgarh.

Sri Anirban Chaudhuri

of **Nature Mates-Nature Club**- a specialist of Harpetofauna, though a commerce graduate, Anirban has published a large number of scientific papers and short notes on various aspects of reptiles from West Bengal in the recent past. A self trained individual, working tirelessly to understand and document this very important group of fauna,

Sri Arjan Basu Roy

Secretary, Nature Mates-Nature Club - a nature lover since a toddler, has a keen interest on every life form that are moving around. Arjan has started working with Butterflies since 2004 and has managed to create an identity on this. He is also working on documentation of Urban Wildlife as a whole and has a keen interest in restoring water bodies.

Sri Animesh Bose

Programme Co-Ordinator, **HNAF**, Siliguri - a well-known naturalist of our state, has vast experience on Himalayan flora and fauna. His guidance and effort in organizing several nature camps across the state tremendously helped us arranging the 1st Annual Biodiversity Assessment Camp of NVNP.

Sri D B Basnet, WBFS

DFO, Darjeeling Social Forestry Division is probably the best working forest officer of our state having profound knowledge on Himalayan flora particularly the Angiosperms.

Dr Partha Sarathi Ghose

Associate Landscape Coordinator, WWF-India, Khangchendzonga Landscape Programme, Sikkim, India was involved in the camp as a specialist on Mammals and Avifauna.

Sri Deependra Sunar

Senior Programme Officer, **WWF-India**, Project **SERVE**, Darjeeling Field Office was actively involved in the camp as a resource person on Himalayan flora particularly the herbs, shrubs, climbers, grasses etc.

Dr Rajendra Yonzone

of Kalimpong is one of the leading expert on Himalayan Orchids. His knowledge on Orchids helped us immensely identifying the orchids of NVNP during the camp.

Dr Pranab Debnath

Asst. Professor of BCKV, Kalyani, Nadia is an entomologist attended the camp as a resource person to identify the insects particularly the Coleoptera. His specialization is in Eriophyoid mite taxonomy.

Sri Rakesh Pashi

PhD Research scholar at BCKV is an entomologist attended the camp as a resource person to identify the insects particularly the Coleoptera. Presently he is doing his PhD research works with specialization on Tephritid fruit fly.

Dr Suvra Kanti Sinha

Asst. Professor of Zoology, Sonamukhi College, Bankura is a renowned Dipterist preferably works on Calypyrate. He has published many books and science articles in the national and international level. He has successfully cpmpleted many research projects. He also visited Costarica and Germany for research purpose and was instrumental during the camp in identifying the rare and unknown flies of this PA.

Sri Apurba Chakraborty

of Prakriti Sansad is a well-known Avifauna specialist of our country. His profound knowledge on the subject helped us a lot in identifying the avifauna of NVNP and updating its checklist.

FOREST OFFICERS ATTENDED THE CAMP

Sl	Name	Designation	Present place of posting
1	**Sri Ujjal Ghosh**, IFS	CCF, Wildlife North	Jalpaiguri
2	**Sri Bidyut Sarkar**, IFS	DFO, Silviculture, North	Siliguri
3	**Miss Nisha Goswami**, IFS	DFO, Gorumara WL Division	Jalpaiguri
4	**Sri Badal Debnath**, WBFS	ADFO, Gorumara WL Division	Jalpaiguri
5	**Sri Raju Sarkar**, WBFS	ADFO, Gorumara WL Division	Jalpaiguri
6	**Sri S S Giri**, FR	Range Officer, Lower Neora Range	Samsing
7	**Smt Sujata Gurung**, FR	Range Officer, Upper Neora Range	Lava

FRONTLINE STAFF PARTICIPATED IN THE CAMP

Sl	Name	Designation	Present place of posting
1	**Sri Paitan Mahat**	CDL	Samsing HQ
2	**Sri Biru Subba**	FG	Bhotekharka camp
3	**Sri Boby Bhujel**	CDL	Gogune camp
4	**Sri Joseph Lepcha**	CDL	Lava HQ
5	**Sri Rupen Lepcha**	CDL	Samsing HQ
6	**Sri Amit Kr Tamang**	CDL	Lava HQ
7	**Sri Yak Tshering Lepcha**	FG	Lava HQ
8	**Sri Kumar Bhujel**	CDL	Ashaley camp
9	**Sri Dhankumar Gurung**	CDL	Lava HQ
10	**Sri Ajit Rai**	CDL	Choudaferi camp

Doley Camp

Exploring micro-fauna at Ashaley

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