

INVENTORY OF BIODIVERSITY

Rapid Biodiversity Survey Report - IV



Department of Forest, Environment and Wildlife Management
Government of Sikkim
2018



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MESSAGE

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Chief Minister of Sikkim

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Sikkim forms a part of Indo-Burmese Biodiversity hotspot and is well known in the world for its rich biodiversity, unique culture and environment conservation initiatives. Rapid Biodiversity Assessment approach is a tool developed by Conservation International for Systematic biodiversity data collection from the field and it has been well accepted throughout the world. The same tool has been able to become manifest with the fourth series of compilation of biodiversity surveys carried out in different forest areas of Sikkim titled “Inventory of Biodiversity-Rapid Biodiversity Survey – Report IV.

Inventory of Biodiversity- Rapid Biodiversity Survey Report-IV is one of the series of publication on Biodiversity of Sikkim showcasing the richness of biodiversity in the Reserved Forests of Sikkim. I feel happy to know that these publications have been providing better baseline data on biodiversity for management of Forest areas and Ecotourism activities.

We are grateful to JICA for facilitating the study on Biodiversity of Sikkim and compilation of such scientific data. I wish the Department of Forest Environment and Wildlife management all success in their future endeavors and await the publication of the series.

(Pawan Chamling)
Chief Minister of Sikkim



T.W. Lepcha

Foreword

I am immensely pleased to present the “Inventory of Biodiversity – Rapid Biodiversity Survey Report – IV” published under Sikkim Biodiversity Conservation and Forest Management Project (JICA).

This publication is a compilation of scientific data on biodiversity of Reserved Forest areas which would be very handy and immensely useful to the Forest Managers, students, researchers, policy planners, tourists and civil society. It is evident that this particular series of publication on Biodiversity of Sikkim is of great service to the Forest Managers in formulating Working Plans for these forest areas and planning ecotourism activities.

I wish the Sikkim Biodiversity Conservation and Forest Management Project (SBFP) team all success in its efforts to publish the series on Biodiversity of Sikkim.

(T. W. Lepcha)

Minister for Forests, Environment & Wildlife Management Department/
Mines, Minerals & Geology, Science and Technology Department
Government of Sikkim



Dr. Thomas Chandy

Preface

Sikkim is one of the biodiversity hotspot in Eastern Himalayas. Biodiversity is in short describe is the variety and variability of species in particular area. Biodiversity is measured by the Species Richness, Endemism, Taxonomic Uniqueness, Unusual Ecological or Evolutionary Phenomena and Global Rarity.

The inventory and monitoring of biodiversity represents a major component and high priority of the Sikkim Biodiversity Conservation and forest management project Assisted by Japan international cooperation Agency. Inventories of various species are frequently used as surrogates for estimating total biodiversity.

Hence, enumeration of various species in the state is one of the fundamentals to appreciate the enormous contribution of an ecosystem towards development and civilization.

It has been planned to conduct “Inventory of Biodiversity- Rapid Biodiversity Survey Report-IV” all over Sikkim in different forest ecosystem.

The present edition of the Inventory of Biodiversity Rapid Biodiversity Survey IV report, of selected Reserve Forest in (East, West and South) in different forest types of Sikkim Himalayas. We hope that through this survey the Department is able to utilize the data in better management of our natural resources.

(Dr. Thomas Chandy)

Principal Chief Conservator of Forest-cum-Principal Secretary,
Sikkim Biodiversity Conservation and Forest Management Project,
Forests, Environment and Wildlife Management Department

Acknowledgement

This book titled “Inventory of Biodiversity- Rapid Biodiversity Survey Report – IV” is an effort to inventories the biodiversity found in different Reserved Forest areas of Sikkim.

On behalf of Sikkim Biodiversity Conservation and Forest Management Project, Department of Forests, Environment and Wildlife Management, Government of Sikkim, I would like to acknowledge the significant contribution the support and necessary guidance extended by Japanese International Cooperation Agency. We are also grateful to Government of Sikkim for their continued support and encouragement in publishing such scientific reports.

Sincere appreciation to the Biodiversity Conservation Division and its dynamic and energetic SBFP Survey Team, Researcher and GIS team for going into the field, staying in forest for days laying out plots , data compilation and analysis.

This book would not have been possible with the support and encouragement from the Honorable Minister of Forests Shri T.W. Lepcha and PCCF – cum – Principal Secretary Dr. Thomas Chandy.

We would also like to extend our humble and sincere gratitude to Shri C.S. Rao, CCF – cum – Project Director, SBFP for his continuous guidance and encouragement in our endeavor.

Udai Gurung, IFS

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Introduction



Sikkim, the 2nd smallest state of India lying in the Eastern Himalayan foothills forms a part of the Indo-Burmese biodiversity hotspot. The altitudinal gradient of 220-8598m above sea level has a diverse topography providing a wide range of climate leading to a vast floral and faunal diversity right from the tropical forest to temperate forest to the alpine meadows. Covering a total geographical area of 7096 sq.km, the State covers 82.31 percent of the forest area harboring a rich floral and faunal diversity. The vegetation of Sikkim changes from tropical to subtropical upwards through middle hills with coniferous and oak forests of temperate character to the higher slopes with subalpine scrub and alpine meadows.

The vegetation of Sikkim habitats about 4500 species of flowering plants, with more than 450 tree species, 480 species of fern and its allies, 9 tree fern species, 11 oak species, 16 conifer species, 28 bamboo species, 60 Primula species and 150 species of wild edible plants forms the floral composition of the State.

The state harbours a wide variety of faunal diversity, which includes 150 species of mammal, 552 species of birds, 700 species of butterflies and 1500 species of moth, 29 species of reptiles, 10 amphibian species and over 48 fish species. Amongst the important and rare animals found in Sikkim are the Snow leopard (*Uncia uncia*), Red Panda (*Ailurus fulgens*), Musk deer (*Moschus*

sp.), Barking deer (*Muntiacus muntjak*), Himalayan Thar (*Hemitragus jemlahicus*), Goral (*Naemorhedus goral*), Blue sheep (*Pseudois nayaur*), Serow (*Capricornis milneedwardsii*), Tibetan Gazella (*Procapra picticaudata*), Tibetan wolf (*Canis lupus chanco*), Himalayan black bear (*Ursus thibetanus*), Clouded leopard (*Neofelis nebulosa*), Leopard cat (*Prionailurus bengalensis*), Jungle cat (*Felis chaus*), Himalayan marmot (*Marmota himalayana*). Some of these animals have also been included in Schedule I of the Wildlife (Protection) Act, 1972, including the Blue sheep, Clouded leopard, Himalayan Thar, Musk deer and Red Panda.

Sikkim also represents the highest bird richness in terms of total geographical area. About 50 percent of the bird species of the Indian sub-continent (1400 species) are present in Sikkim. The Blood Pheasant (*Ithaginis cruentus*), Crimson horned Pheasant (*Tragopan satyra*), Forest eagle owl (*Bubo nipalensis*), Himalayan golden eagle (*Aquila chrysaetos daphanea*), Monal Pheasant (*Lophophorus impejanus*), Lammergeyer (*Streptopelia orientalis*), Tibetan snowcock (*Tetraogallus tibetanus*) are listed in Schedule I of the Wildlife (Protection) Act, 1972. It has also been reported that species like the Black necked Crane (*Grus nigricollis*), the Himalayan Griffon Vulture (*Gyps himalayensis*), the Tibetan Snowcock (*Tetraogallus tibetanus*), Snow Partridge (*Lerwa lerwa*), Snow Pigeon (*Columba leuconota*), Snow Finch (*Montifringilla* sp.), Mountain Finch (*Leucosticte brandti*) have become endangered in Sikkim.

In order to protect the rich biodiversity of the state, 46.93% of the total geographical area has been brought under the Protected Area Network (PAN). This includes the Kanchendzonga Biosphere Reserve (the highest Biosphere Reserve in the country), FambongLho Wildlife Sanctuary, Kyongnosla Alpine Sanctuary, Barsey Rhododendron Sanctuary, Maenam Wildlife Sanctuary, Shingba Rhododendron Sanctuary, Kitam Bird Sanctuary and Pangolakha Wildlife Sanctuary. Khangchendzonga National Park (the core zone of KBR) with its Outstanding Universal Value in terms of both cultural and natural is declared as a UNESCO's World Heritage Site.

INVENTORY AND MONITORING OF BIODIVERSITY

Biodiversity Conservation which aims to enhance the global, social and economic value of biodiversity and improve livelihoods in and around protected areas (PAs), buffer zones and reserve forests. It seeks to achieve this objective through the establishment and implementation of sound management plans and the dissemination of biodiversity information for promoting public awareness on the significance of biodiversity.

It is one of the 05 different components of JICA assisted SBF Project, having different sub-components including **Inventory and Monitoring of Biodiversity**; the basic objectives of which are:

1. To develop baseline information on key biological elements in forest, alpine, freshwater and agro-ecosystem for monitoring and evaluation of the impacts of forest and biodiversity management.
2. To identify critical areas that requires immediate protection.

To achieve these objectives, Rapid Biodiversity Survey will be conducted by laying 1000 random plots in whole of the state of Sikkim covering all the four ecosystems. Simultaneously, 300 additional plots in the known biodiversity hotspot of the state will be laid covering all the four ecosystems. The output of the same will be

1. Generation of biodiversity information on four ecosystems to be used in the production of thematic maps for management so that key areas are protected;
2. Stored at the GIS/RS laboratory

Rapid biodiversity Survey (RBS) is being carried out in different parts of Sikkim. In the first phase, protected areas were targeted for carrying out the survey for which an inventory and monitoring for the same has been fulfilled and published in Rapid Biodiversity Survey - I and Rapid Biodiversity Survey - II. Rapid Biodiversity Survey - III highlights the inventory of biodiversity of the remaining Protected Areas of Sikkim including the published research papers and articles.

This book, i.e., Inventory of Biodiversity-Rapid Biodiversity Survey - IV, is a compilation of the biodiversity of forest areas surveyed in various Reserve Forests of Sikkim. Since the RBS aims at developing an inventory and monitoring of the biodiversity, this report highlights the detail of an inventory done based on the forest density and forest types covering the compartments.

Similar such reports will be compiled in the future as and when the Rapid Biodiversity Survey is undertaken in selected locations.

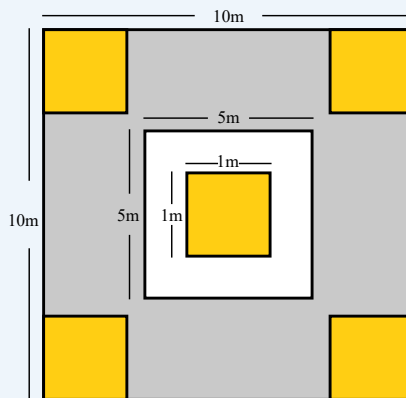
MATERIALS AND METHODS

Prior to field survey, the entire area (vegetation map) of the present study was prepared into 0.5 km X 0.5 km grids in GIS laboratory. Based on this, each vegetation/forest types and forest density on the total grids in the specific vegetation type was sampled for the rapid biodiversity assessment (flora and fauna) inventorization. The selection of grids was done by taking the following aspects of consideration.

1. Covering forest types, forest density (dense & moderate forest).
2. Based on compartment

FLORA

The sampling plot of 10 X 10 m was laid, depending upon the site feasibility. Within the main plot, all the standing tree species were enumerated & measured (cbh) at 1.37 m from the ground by using measuring tape. Circumference at breast height (1.37 m) was taken for the determination of tree basal area. Total basal area is the sum of basal area of all species present in the forest. Basal area (m² / ha) was used to determine the relative dominance of a tree species. Within the subplots, 5 m X 5m were laid for recording the sapling (no. of species & its height) & shrub for the percent cover was recorded. Within this, 1 m X 1m were laid in 4 corner and 1 point at centre for seedling species were enumerated, in the same plot was used for recording the herb percentage in the area. The location and altitude of the plots were recorded by calibrate the global positioning system (GPS; Garmin eTrex) and the humus depth was measured with the help of measuring scale. Plant species were identified through herbarium record and flora published (Hooker JD, 1888-1890, Hooker JD 1849, Pradhan & Lachungpa, 1990, Kholia, 2010). The unidentified plants species in the field were photographed, and later identified by consulting plant taxonomist), & BSI and web references (www.efloras.org; www.flowersofindia.net & www.floraofchina.org) were made and by referring to local people too. All the sampling plots were geo-tagged for reference under long-term monitoring.



Sampling Plot Design For Vegetation Survey

FAUNA

Presence and relative abundance of most of the small and large fauna species was evaluated using methods that rely on indirect evidence such as animal burrows/holes, dung, pellets, scats, feeding signs, tracks, nests, digging and antler thrashing. The birds and butterflies were inventoried along the sampling paths.

Assam Reserved Forest, East Sikkim

Sabita Dahal, Suraj Subba, Meena Tamang



Study Area

A field trip for conducting Rapid Biodiversity Survey to Assam Reserved Forest covering a sampling path from Latape Dara – Above Khedi –Thekabong in East Sikkim, were carried out w.e.f. 5th October to 18th October 2017 by the SBFPS survey team. The trip was aimed for inventory and monitoring of the biodiversity of the area. The present survey area along Latape Dara – Above Khedi –Thekabong sampling path, the forest type of which is represented by subtropical to subalpine forest. The elevation range covered during the survey was from 1700m (Latape Dara, above Assam Lingzey) to 3200m (Below Menla) which is represented by Figure. The slope angle of the area ranged between mild (30 degree) to stiff (80 degree) slope and is facing towards E, NE and SE aspect showed in table.



Showing the forest compartment, forest density & forest types along the survey plots of Latape Dara – Khedi –Thekabong sampling path, in Assam RF

Site characteristics of the survey area along Latape Dara - Khedi – Thekabong sampling path in Assam RF, East Sikkim

Site Code	Forest type	Elevation (M)	GPS co-ordinates		Slope Angle (degree)	Slope Aspect	Canopy cover / Forest Density	Dominate taxa	Disturbances	Location name
			Lat	Long						
ARF1	Wet Temperate	1774	27°17'10.6"	88°39'33.0"	55	E	95%, Very dense	Trees	Nil	Latape Dara
ARF2	Wet Temperate	1749	27°17'05.8"	88°39'34.1"	30	E	10%, Open	Herbs	Grazing	Parengtar
ARF3	Wet Temperate	1788	27°16'54.5"	88°39'33.9"	45	E	65%, Moderately dense	Tree	Grazing	
ARF4	Wet Temperate	1789	27°16'46.7"	88°39'29.7"	30	E	50%, Moderately dense	Tree	Nil	
ARF5	Wet Temperate	1859	27°16'34.8"	88°39'32.8"	40	E	50%, Moderately dense	Tree	Nil	Ghopay Kharka
ARF6	Wet Temperate	1911	27°16'25.3"	88°39'34.5"	55	E	55%, moderately dense	Tree	Grazing	(Above Goth)
ARF7	Wet Temperate	1974	27°16'15.9"	88°39'29.7"	45	NE	60%, Moderately dense	Tree	-	Thonuki Goth
ARF8	Wet Temperate	1840	27°16'11.4"	88°38'58.1"	75	NE	60%, Moderately dense	Tree	Nil	Beteni
ARF9	Wet Temperate	1838	27°16'09.2"	88°38'51.4"	60	NE	85%, very dense	Tree		
ARF10	Wet Temperate	1782	27°15'36.8"	88°38'58.4"	75	NE	80%, Very dense	Tree	Nil	Thekabong
ARF11	Wet Temperate	1867	27°15'39.3"	88°38'49.4"	30	NE	50%, Moderately dense	Tree	Nil	Thekabong
ARF12	Wet Temperate	1899	27°15'41.3"	88°38'44.8"	30	NE	40%, Moderately dense	Tree	Nil	Below Deorali
ARF13	Wet Temperate	1920	27°15'45.9"	88°38'51.2"	30	NE	70%, very dense	Tree	Nil	Deorali
ARF14	Wet Temperate	1994	27°15'52.3"	88°39'07.0"	30	E	50%, Moderately dense	Tree	Nil	Dhajay
ARF15	Wet Temperate	2083	27°15'51.5"	88°39'15.4"	45	E	85%, very dense	Tree	Nil	
ARF16	Wet Temperate	2093	27°15'50.7"	88°39'21.6"	60	E	60%, moderately dense	Tree	Nil	Homey Dara

ARF17	Wet Temperate	2172	27°16'02.0"	88°39'34.9"	60	E	50%, moderately dense	Tree	Nil	Nil
ARF18	Wet Temperate	2216	27°16'05.6"	88°39'42.1"	60	E	75%, moderately dense	Tree	Nil	Nil
ARF19	Wet Temperate	2283	27°16'08.9"	88°39'48.4"	70	E	75%, very dense	Tree	Nil	Below Goru-juray
ARF20	Wet Temperate	2368	27°16'13.7"	88°39'58.4"	70	E	80%, very dense	Tree	Nil	Nil
ARF21	Wet Temperate	2423	27°16'17.6"	88°40'03.3"	70	E	90%, very dense	Tree	Nil	Nil
ARF22	Wet Temperate	2490	27°16'22.1"	88°40'14.3"	70	E	90%, very dense	Tree	Nil	Nil
ARF23	Wet Temperate	2566	27°16'24.8"	88°40'23.7"	80	E	85%, very dense	Tree	Nil	Below Khedi
ARF24	Wet Temperate	2593	27°17'09.9"	88°41'06.7"	80	E	85%, very dense	Tree	Nil	Nil
ARF25	Wet Temperate	2600	27°17'19.5"	88°41'15.4"	80	E	90%, very dense	Tree	Nil	Nil
ARF26	Wet Temperate	2649	27°17'31.1"	88°41'27.8"	60	E	80%, very dense	Tree	Nil	Below Khedi
ARF27	Wet Temperate	2649	27°17'38.2"	88°41'38.2"	30	E	90%, very dense	Tree	Nil	Khedi area
ARF28	Wet Temperate	2645	27°17'45.4"	88°41'50.8"	35	E	90%, very dense	Tree	Grazing	Khedi
ARF29	Wet Temperate	2638	27°17'57.9"	88°41'57.2"	30	E	80%, very dense	Tree	Grazing	Khedi
ARF30	Wet Temperate	2645	27°17'45.4"	88°41'50.8"	30	E	80%, very dense	Tree	Grazing	Khedi
ARF31	Wet Temperate	2638	27°17'57.9"	88°41'57.2"	40	SE	75%, very dense	Tree	Grazing	Above Khedi Pokhari
ARF32	Wet Temperate	2627	27°17'58.1"	88°41'53.3"	30	SE	50%, moderately dense	Tree	Grazing	Above Khedi Pokhari
ARF33	Wet Temperate	2880	27°18'48.0"	88°42'09.7"	50	SE	80%, very dense	Tree & Bamboo	Grazing	Above Khedi
ARF34	Wet Temperate	2959	27°18'58.9"	88°42'12.5"	55	SE	30%, open	Tree & Bamboo	Grazing	Above Khedi
ARF35	Wet Temperate	3001	27°19'09.2"	88°42'12.4"	60	SE	30%, open	Tree & Bamboo	Grazing	Above Khedi

ARF36	Wet Temperate	3066	27°19'19.2"	88°42'14.2"	50	SE	30%, open	Tree & Bamboo	Grazing	Above Khedi
ARF37	Wet Temperate	3108	27°19'25.0"	88°42'16.3"	45	SE	45%, moderately dense	Rhododendrons	Nil	Above Khedi
ARF38	Wet Temperate	3170	27°19'37.8"	88°42'21.7"	50	SE	40%, moderately dense	Shrubs	Nil	Below Menla



Khedi Pokhari, East Sikkim

FINDINGS

FLORA

During the survey, a total of 38 plots were laid covering 0.38 ha area (Table & Figure). A general checklist of the floral species (Table) of the area (including the areas outside of the plots) were prepared of which, trees and small trees represented the highest number of species (62 species) followed by herbs (61 species). 31 species of climbers and epiphytes, 19 species of shrubs and shrublets, 26 numbers of ferns and fern allies, 8 numbers of bamboos and cane were recorded from the area during the present study. Location name, dominate taxa, elevation, GPS-co-ordinates, forest type, slope angle, Slope aspect, disturbances and forest density of the area in terms of canopy cover in and around the sample plots are provided in the Table.

List of floral species in Assam Reserved Forest, East Sikkim

Sl. No	Botanical Name	Family	Common name
	Tree and small tree species		
1	<i>Acer caudatum</i> Wallich.	Sapindaceae	Kapasey
2	<i>Acer pectinatum</i> Wall.	Sapindaceae	Lek Kapasay
3	<i>Actinodaphne sikkimensis</i> Meissn.	Lauraceae	Phurkey Sissi
4	<i>Alangium begoniaefolium</i> (Roxb.) Baill	Alangiaceae	Akhanay
5	<i>Alnus nepalensis</i> D. Don.	Betulaceae	Utis
6	<i>Antidesma acuminatum</i> Wight	Euphorbiaceae	Lekh bilaune
7	<i>Betula alnoides</i> Wall. ex Diels	Betulaceae	Saur
8	<i>Brassaiopsis mitis</i> C.B.Clarke	Araliaceae	Phutta
9	<i>Castanopsis hystrix</i> Hook. & Thomson ex. A. DC.	Fagaceae	Patley katush
10	<i>Castanopsis indica</i> (Roxb.ex Lindl.) A.DC.	Fagaceae	Dhalne kattus
11	<i>Castanopsis tribuloides</i> (Smith) A. DC.	Fagaceae	Musrey katus
12	<i>Cedrela febrifuga</i> Blume.	Meliaceae	Tuni
13	<i>Cinnamomum impressinervium</i> Meisn.	Lauraceae	Sinkoli
14	<i>Cryptomeria japonica</i> (Thunberg ex. Linn. F.) D. Don	Taxodiaceae	Dhuppi
15	<i>Daphniphyllum himalayense</i> (Benth.) Mull. Arg.	Euphorbiaceae	Lal Chandan
16	<i>Elaeocarpus lanceaefolius</i> Roxburgh.	Elaeocarpaceae	Bhadrasey
17	<i>Engelhardtia spicata</i> Blume	Juglandaceae	Mauwa
18	<i>Erythrina arborescens</i> Roxb	Leguminosae	Phaledo
19	<i>Eurya acuminata</i> DC.	Theaceae	Jhingni
20	<i>Exbucklandia populnea</i> R. Br. Ex Griff	Hamamelidaceae	Piplee
21	<i>Ficus hookeri</i> Miq.	Moraceae	Nebharo
22	<i>Ficus nemoralis</i> Wall.	Moraceae	Dudilo
23	<i>Garuga pinnata</i> Roxb.	Bursaceae	Dabdabay
24	<i>Glochidion acuminatum</i> Muell.	Euphorbiaceae	Latikaath
25	<i>Gynocardia odorata</i> Roxburgh	Flacourtiaceae	Bandre/Gante
26	<i>Hovenia dulcis</i> Thunb.	Thymelaeaceae	Bangi
27	<i>Juglans regia</i> Linn.	Juglandaceae	Okhar
28	<i>Leucosceptrum cannum</i> Smith	Lamiaceae	Ghurpis
29	<i>Lithocarpus fenestrata</i> Roxb.	Fagaceae	Arkaulo
30	<i>Litsea kingii</i> Hook.	Lauraceae	Siltimmur
31	<i>Macaranga pustulata</i> King.	Euphorbiaceae	Malato
32	<i>Machilus edulis</i> King.	Lauraceae	Pumsee / Funchey
33	<i>Machilus gamblei</i> King ex J. D. Hooker	Lauraceae	Ghew Kaulo / Lapche Kaulo / Chiplay Kaulo
34	<i>Machilus gammieana</i> King ex. Hook. f.	Lauraceae	Kawla
35	<i>Machilus odoratissimus</i> Nees		Ghew funchey
36	<i>Maesa chisia</i> Buch.-Ham. ex D. Don	Myrsinaceae	Bilaune
37	<i>Magnolia cathcartii</i> (Hook.f. & Thomson) Noot.	Magnoliaceae	Tite champ
38	<i>Magnolia doltsopa</i> (Buch.-Ham. ex DC.) Figlar	Magnoliaceae	Rani champ
39	<i>Myrica esculenta</i> Buch. Ham.	Myricaceae	Kafal
40	<i>Myrsine semiserrata</i> Wall.	Myrsinaceae	Phalame
41	<i>Nyssa sessiliflora</i> Hook. f. & Thomson ex Benth	Cornaceae	Lek chilauney

42	<i>Ostedes paniculatus</i> Blume.	Euphorbiaceae	Bepari
43	<i>Pieris ovalifolia</i> D. Don	Ericaceae	Angari
44	<i>Prunus cerasoides</i> Don.	Rosaceae	Paiyun
45	<i>Prunus nepalensis</i> (Ser) Stendel	Rosaceae	Arupatey
46	<i>Pyralia edulis</i> (Wallich) A.	Santalaceae	Amphi
47	<i>Quercus lamellosa</i> Smith.	Fagaceae	Buk/ Bajranth
48	<i>Quercus pachyphylla</i> Kurz.	Fagaceae	Sungure Katus/ Bantay/ Oitay.
49	<i>Rhododendron arboreum</i> ssp. <i>arboreum</i> (CB Clarke) Ridley.	Ericaceae	Lali gurans
50	<i>Rhododendron barbatum</i> Wall ex. G.Don	Ericaceae	Lal Chimal
51	<i>Rhododendron falconeri</i> Hook.f.	Ericaceae	Korlinga
52	<i>Rhododendron grande</i> Wright.	Ericaceae	Patle korlinga
53	<i>Rhus succedanea</i> Linn.	Anacardiaceae	Bhalayo
54	<i>Rhus succedanea</i> Linn.var. <i>acuminata</i>	Anacardiaceae	Rani bhalayo
55	<i>Schima wallichii</i> (DC) Korth.	Theaceae	Chilaune
56	<i>Spondias axillaris</i> Roxb.	Anacardiaceae	Lapsi
57	<i>Symingtonia populnea</i> (R. Br. Ex Griff.)	Hamamelidaceae	Piple
58	<i>Symplocos glomerata</i> King, ex. C.B. Clarke	Symplocaceae	Kholme
59	<i>Symplocos lucida</i> Don.	Symplocaceae	Kharanay
60	<i>Tetradium fraxinifolium</i> (Hook.) Hartley	Rutaceae	Khanakpa
61	<i>Tetrameles nudiflora</i> R.Br.	Tetramelaceae	Mayna
62	<i>Calicarpa arborea</i> Roxb.	Lamiaceae	Guenlo
Shrubs and shrub-lets			
	<i>Ardisia macrocarpa</i> Wall.	Myrsinaceae	Damai phal
	<i>Daphne cannabina</i> Wall.	Thymeleaceae	Kalo Argeli/Kagate
	<i>Dichroa febrifuga</i> Lour	Hydrangeaceae	Basak
	<i>Edgeworthia gardenieri</i> Meissn.	Thymeliaceae	Argali
	<i>Eupatorium adenophorum</i> Sprengel	Asteraceae	Kalijhar
	<i>Hypericum oblongifolium</i> Choisy	Hypericaceae	Urilo
	<i>Maesa chisia</i> Don	Myrsinaceae	Bilauney
	<i>Mahonia napaulensis</i> DC	Berberidaceae	Chutro
	<i>Neillia rubiflora</i> D.Don	Rosaceae	Khareto jhar
	<i>Oxyspora paniculata</i> (D.Don) DC	Melastomataceae	Chulesi
	<i>Polygala arillata</i> Buch.- Ham ex D.Don.	Polygalaceae	Marcha jhar
	<i>Rubus ellipticus</i> Smith.	Rosaceae	Aiselu
	<i>Rubus niveus</i> Thunb	Rosaceae	Aiselu / Biralu kanra
	<i>Rubus paniculatus</i> (Smith) Rees.	Rosaceae	Kalo Aiselu
	<i>Viburnum erubescens</i> Wallich ex DC	Sambucaceae	Asaray
	<i>Gaultheria fragrantissima</i> Wall.	Ericaceae	Dhasingarey
	<i>Gaultheria nummularioides</i> D.Don	Ericaceae	Kaligedi
	Unidentified		Patpatay (Yellow flower)
	Unidentified		Seti kath
Herbs			
	<i>Aconogonum campanulatum</i> (Hook.f.) Hara	Polygonaceae	Kukur thotnay

<i>Aconogonum molle</i> D. Don	Polygonaceae	Thotnay
<i>Acorus calamus</i> Linn.	Acoraceae	Bojo
<i>Aeschynanthus parviflorus</i> (D.Don) Spreng.	Gesneriaceae	Baklay patay
<i>Aeschynanthus hookeri</i> C.B.Clarke	Gesneriaceae	Baklay patay
<i>Ampelocissus latifolia</i> (Roxb.) Planch	Vitaceae	Pani lahara
<i>Anaphalis triplinervis</i> C.B. Clarke	Asteraceae	Bukey Phool
<i>Arisaema intermedium</i> Blume	Araceae	Larua/Banko
<i>Arisaema flavum</i> (Forsskal) Schott	Araceae	Sap ko makai
<i>Arisaema speciosum</i> (Wall.) Mart.	Araceae	Sap ko Makai
<i>Artemisia vulgaris</i> Linn.	Asteraceae	Titaypati
<i>Astilbe rivularis</i> Ham	Saxifragaceae	Burokhathi
<i>Begoniapicta</i> Sm.	Asteraceae	Magar kanje
<i>Boehmaria platyphylla</i> D.Don	Urticaceae	Kamley
<i>Campylandra aurantiaca</i> Baker	Asparagaceae	Jangali nakima
<i>Carex</i> sp.	Cyperaceae	Harkatto
<i>Cautleya spicata</i> – (J. M. Sm.) Bak	Zingiberaceae	Sara
<i>Centella asiatica</i> (L.) Urban	Umbelliferae	Golpatta
<i>Commelina benghalensis</i> L.	Commelinaceae	Kanay
<i>Crawfordia</i> sp.	Gentianaceae	
<i>Cyanotis vaga</i> (Loour.) Roem & Schult.	Commelinaceae	Kanay
<i>Cynodon dactylon</i> Linn	Poaceae	Dubo
<i>Digitaria sanguinalis</i> (Linn.) Scopoli.	Poaceae	Banso
<i>Drymaria cordata</i> Wild. ex. Roem & Schult.	Caryophyllaceae	Abhijalo
<i>Elatostema platyphyllum</i> Weddell.	Urticaceae	Gagleto
<i>Elatostema sessile</i> J.R.Forst. & G.Forst.	Urticaceae	Gagleto
<i>Eragrostis cilianensis</i> (All.) Lut. ex	Poaceae	Banso
<i>Eupatorium adenophorum</i> Spreng.	Asteraceae	Kali jhar
<i>Fragaria nubicola</i> Lindley ex. Lacaita	Rosaceae	Bhui-aiselu
<i>Gerardiana diversifolia</i> (Link) Friis	Urticaceae	Bhangre sisnu
<i>Globba clarkei</i> Baker	Zingiberaceae	
<i>Hedychium spicatum</i>	Zingiberaceae	Gai sara
<i>Hedychium gracile</i> Roxb.	Zingiberaceae	Sara
<i>Hemiphragma heterophyllum</i> Wall.	Plantaginaceae	Nash jhar
<i>Houttuynia cordata</i> Thunb	Saururaceae	Raktha-jhar
<i>Impatiens stenantha</i> Hook. f.	Balsaminaceae	Mujuro
<i>Impatiens urticifolia</i> Wallich	Balsaminaceae	Mujuro
<i>Lecanthus peduncularis</i> (Wall. ex Royle) Wedd.	Urticaceae	Gagleto
<i>Osbeckia stellata</i> Hook.f	Melastomataceae	Arbal
<i>Oxalis corniculata</i> Linn.		Chariamilo
<i>Persicaria capitata</i> (Buch.- Ham. ex D.Don) H. Gross	Polygonaceae	Ratnaulo
<i>Pilea stricta</i> (Buchanan-Hamilton ex D. Don) Weddell	Urticaceae	Chiple
<i>Pilea umbrosa</i> Blume.	Urticaceae	Chiple
<i>Pouzolzia sanguine</i> (Blume) Merrill	Urticaceae	Chiple
<i>Rumex nepalensis</i> Spreng.	Polygonaceae	Halhalley
<i>Selaginella biformis</i> A. Br. ex Kuhn	Selaginellaceae	Jhew

	<i>Selaginella chrysocaulos</i> (Hook. & Grev.) Spring.	Selaginellaceae	Jhew
	<i>Selaginella monospora</i> Spring.	Selaginellaceae	Jhew
	<i>Smilax</i> sp.	Smilacaceae	Madaney kara / Kirmey ghans
	<i>Strobilanthes</i> sp.	Acanthaceae	Kibu ghans
	<i>Swertia bimaculata</i> (Roxb. ex Flem.) Karsten	Gentianaceae	Bhaley chiraito
	<i>Swertia chirayita</i> H. Karsten	Gentianaceae	Chiraito
	<i>Urtica dioica</i> Linn.	Urticaceae	Patley sisnu
	<i>Urtica parviflora</i> Roxburgh	Urticaceae	Gharia sisnu
	<i>Villebrunea frutescens</i> (Thunb.) Blume	Urticaceae	Chiple
	<i>Viola sikkimensis</i> W. Becker	Violaceae	Silamey jhar
	<i>Hedychium</i> sp.	Zingiberaceae	Qiura
	<i>Heracleum wallichii</i> DC.	Umbelliferae	Chimphing
	<i>Digitaria ciliaris</i> (Retzius) Koeler	Poaceae	Chitray Banso
	<i>Holboellia angustifolia</i> Diels.	Lardizabalaceae	Gulfa
	<i>Stephania glabra</i> (Roxb.) Mier	Menispermaceae	Tambarkay
	Epiphytes / Climbers		
	<i>Aconogonum molle</i> (D. Don) H. Hara	Polygonaceae	Thotne
	<i>Arisaema intermedium</i> Blume	Araceae	Larua/Banko
	<i>Boehmeria</i> sp.	Urticaceae	Kamley
	<i>Cardamine hirsuta</i> L.	Brassicaceae	Titey
	<i>Carex</i> sp.	Cyperaceae	Harkatto
	<i>Clematis acuminata</i> DC	Rununculaceae	Pinasay lahara
	<i>Clematis buchananiana</i> DC.	Ranunculaceae	Pinasey lahara
	<i>Codonopsis viridis</i> Wallich.	Campanulaceae	Padey lahara
	<i>Coelogyne flaccida</i> (Lindl.) Kuntz.	Orchidaceae	Sunakhari
	<i>Davallodes membranulosa</i> (Hook.) Copel.	Davalliaceae	Uniu
	<i>Digitaria sanguinalis</i> (Linn.) Scopoli.	Poaceae	Banso
	<i>Diplazium dilatatum</i> Blume Lek	Woodsiaceae	Chipley Ningro
	<i>Diplazium stoliczkae</i> Beddome	Woodsiaceae	Lek kalo ningro
	<i>Elatostema platyphyllum</i> Weddell.	Urticaceae	Gagletto
	<i>Eragrostis cilianensis</i> (All.) Lut. ex Janchen	Poaceae	Banso
	<i>Galium</i> sp.	Rubiaceae	-
	<i>Machilus gamblei</i> King ex J. D. Hooker		Seti kaulo / Ghew kaulo
	<i>Mucuna macrocarpa</i> Wall.	Leguminosae	Baldengra
	<i>Pleione praecox</i> (Lindl.)	Orchidaceae	-
	<i>Piper</i> sp.	Piperaceae	
	<i>Piper boehmeriaefolia</i> (Miq.) DC.	Piperaceae	Chabo / Jungali pan
	<i>Rhapidiphora decursiva</i> (Roxb.) Schott.	Araceae	Kanchirno
	<i>Rubia cordifolia</i> Linn.	Rubiaceae	Majito
	<i>Smilax zeylanica</i> Linn.	Liliaceae	Kukur dainey
	<i>Smilax aspara</i> L.	Liliaceae	Kukur daina
	<i>Tetrastigma serrulatum</i> (Roxb.) Planchon	Vitaceae	Charcharey lahara
	<i>Trichosanthes lepiniana</i> (Naud.) Cogn.	Cucurbitaceae	Indreni
	<i>Viscum articulatum</i> Burm. f.	Lorantahceae	Harchur

	<i>Wrightia gigantea</i>		Bauni Kath
	Ferns and fern- allies		
	<i>Asplenium laciniatum</i> D. Don.	Aspleniaceae	Uniu
	<i>Blechnum orientale</i> L.	Blechnaceae	Deer Fern
	<i>Coniogramme intermedia</i> Heiron.	Pteridaceae	Uniu
	<i>Coniogramme fraxinea</i> (D.Don) Fee ex Diels	Pteridaceae	Bamboo leaf fern
	<i>Cyathea spinulosa</i> Wall.ex Hook	Cyatheaceae	Rukh uniu
	<i>Dennstaedtia appendiculata</i> (Wall.ex Hook.) J.Sm	Dennstaedtiaceae	Piray uniu
	<i>Diplazium dilatatum</i> Blume	Woodsiaceae	Lek Chipley Ningro
	<i>Diplazium esculentum</i> (Retz.) Sw	Woodsiaceae	Chiplay ningro
	<i>Diplazium stoliczkae</i> Beddome	Woodsiaceae	Lek Kalo Ningro
	<i>Drynaria</i> sp.	Polypodiaceae	Basket fern
	<i>Equisetum diffusum</i> D.Don.	Equiaetaceae	Salli bisalli
	<i>Gleichenia gigantean</i> Wall. ex Hook	Dryopteridaceae	Kalamey Uniu
	<i>Gleichenia longissima</i> Blume	Dryopteridaceae	Sottarey uniu
	<i>Lepisorus</i> sp.	Polypodiaceae	Polypods
	<i>Leucostegia truncata</i> (D.Don) Fras.-Jenk.	Davalliaceae	Deer fern
	<i>Lycopodium japonicum</i> Thunb	Lycopodiaceae	Nagbelli
	<i>Monachosoram henryi</i> Christ.	Monachosoraceae	Uniu
	<i>Microsorium membranaceum</i> (D.Don) Cing	Polypodiaceae	Uniu
	<i>Nephrolepis cordifolia</i> (Linn.) C. Presl.	Davalliaceae	Pani amala
	<i>Odontosoria chinensis</i> (L.) J.Smith	Lindsaeaceae	Uneu
	<i>Plagiogyria pycnophylla</i> (Kunze.) Mett.	Plagiogyriaceae	Uniu
	<i>Pseudodrynaria coronans</i> (Wall.ex Mett.) T.Moore	Polypodiaceae	Kamray lahara
	<i>Pteridium revolutum</i> (Blume) Nakai	Pteridaceae	Uniu
	<i>Pteris biaurita</i> L.	Pteridaceae	Uniu
	<i>Pteris wallichiana</i> J. Agardh	Pteridaceae	Uneu
	<i>Vittaria elongata</i> Sw	Vittariaceae	Uniu
	BAMBOO / CANE		
	<i>Costus speciosus</i> Koenig Sm.	Costaceae	Bethlauri
	<i>Himalayacalamus hookerianus</i> (Munro) Stapleton	Poaceae	Pareng
	<i>Phyllostachys aurea</i> Riviere & C.Riviere	Poaceae	Katha Bans
	<i>Plectocomia himalayana</i> Giff.	Arecaceae	Fyakray bet
	<i>Schizostachyum capitatum</i> (Munro) R.B.Majumdar	Poaceae	Gope Bans
	<i>Sinarundinaria intermedia</i> (Munro) C.S.Chao & Renvoize	Poaceae	Nigalo/Tite Nigalo
	<i>Themnocalamus falconeri</i> Hook.f. ex. Munro.	Poaceae	Singanay Bans
	<i>Yushania maling</i> (Gamble) R.B.Majumdar & Karthik.	Poaceae	Malingo

FAUNA

During the biodiversity survey in Assam Reserve forest, the existence of a total of 12 mammalian species, 52 bird species and 62 butterflies' species were recorded through direct sightings and indirect evidences, which are listed in table.

Checklist of Faunal species, including Mammals, Avi-fauna and butterflies of Assam RF and surrounding area in East Sikkim

Sl.No	Common name	Scientific name	Family
MAMMALIAN SPECIES			
	Jackel	<i>Cannis aurens</i>	Canidae
	Himalayan Serow	<i>Capricornis thar</i>	Bovidae
	Parti-colored flying squirrel	<i>Hylopetes alboniger</i>	Sciuridae
	Yellow-Throated marten	<i>Martes flavigula</i>	Mustelids
	Barking Deer	<i>Muntiacus muntjak</i>	Cervidae
	Goral	<i>Naemorhedus goral</i>	Bovidae
	Himalayan palm civet	<i>Paguma larvata</i>	Viverridae
	Wild Boar	<i>Sus scrofa</i>	Suidae
	Himalayan black Bear	<i>Ursus thibetanus</i>	Ursidae
	Himalayan Crestless Porcupine	<i>Hystrix brachyura</i>	Hystricidae
	Hoary Bellied Himalayan Squirrel	<i>Callosciurus pygarythrus</i>	Sciuridae
	Himalayan Thar	<i>Hemitragus jemlahicus</i>	Bovidae
AVI - FAUNA			
	Ashy Drongo	<i>Dicrurus leucophaeus</i>	Dicruridae
	Barred Cuckoo Dove	<i>Macropygia unchall</i>	Columbidae
	Blue Whistling Thrush	<i>Myophonus caeruleus</i>	Turdidae
	Blue-fronted Redstart	<i>Phoenicurus frontalis</i>	Muscicapidae
	Blue-winged Siva	<i>Siva cyanouroptera</i>	Timaliidae
	Black bulbul	<i>Hypsipetes leucocephalus</i>	Pycnonotidae
	Common Green Magpie	<i>Cissa chinensis</i>	Corvidae
	Common Hoopoe	<i>Upupa epops</i>	Upupidae
	Common Myna	<i>Acridotheres tristis</i>	Sturnidae
	Common pigeon	<i>Columba lobia</i>	Columbidae
	Common Tailored Bird	<i>Orthotomus sutorius</i>	Cisticolidae
	Golden-breasted Fulvetta	<i>Lioparus chrysotis</i>	Sylviidae
	Great Barbet	<i>Megalaima virens</i>	Ramphastidae
	Greater Yellownappe	<i>Picus flavinucha</i>	Picidae
	Green-backed Tit	<i>Parus monticolus</i>	Paridae

	Green-tailed Sunbird	<i>Aethopyga nipalensis</i>	Nectariniidae
	Grey-backed Shrike	<i>Lanius tephronotus</i>	Laniidae
	Grey-headed Canary Flycatcher	<i>Culicicapa ceylonensis</i>	Stenostiridae
	Grey-headed Parakeet	<i>Psittacula finschii</i>	Psittacidae
	Himalayan Bluetail	<i>Tarsiger rufilatus</i>	Muscicapidae
	Himalayan Bulbul	<i>Pycnonotus leucogenys</i>	Pycnonotidae
	Hodgson's Redstart	<i>Phoenicurus hodgsoni</i>	Muscicapidae
	House Crow	<i>Corvus splendens</i>	Corvidae
	House Sparrow	<i>Passer domesticus</i>	Passeridae
	Kalij Pheasant	<i>Lophura leucomelanos</i>	Phasianidae
	Large-billed Crow	<i>Corvus macrorhynchos</i>	Corvidae
	Lesser Yellownape	<i>Picus chlorolophus</i>	Picidae
	Little Spiderhunter	<i>Aracanothra longirostra</i>	Nectariniidae
	Nepal Fulvetta	<i>Alcippe nipalensis</i>	Sylviidae
	Oriental Magpie Robin	<i>Copsychus saularis</i>	Muscicapidae
	Oriental Turtle Dove	<i>Streptopelia orientalis</i>	Columbidae
	Oriental White-eye	<i>Zosterops palpebrosus</i>	Zosteropidae
	Red-billed Leiothrix	<i>Leiothrix lutea</i>	Timaliidae
	Red-tailed Minla	<i>Minla ignotincta</i>	Leiothrichidae
	Red-vented Bulbul	<i>Pycnonotus cafer</i>	Pycnonotidae
	Rufous sibia	<i>Malacias capistratus</i>	Timaliidae
	Rufous-bellied Niltava	<i>Niltava sundara</i>	Muscicapidae
	Rufous-gorgeted Flycatcher	<i>Ficedula strophiat</i>	Muscicapidae
	Scaly Laughingthrush	<i>Garrulax austeni</i>	Turdidae
	Scarlet Minivet	<i>Pericrocotus cinnamomeus</i>	Campephagidae
	Silver-eared Mesia	<i>Mesia argentauris</i>	Leiothrichidae
	Slender-billed Scimitar Babbler	<i>Xiphirhynchus superciljaris</i>	Timaliidae
	Spangled Drongo	<i>Dicrurus hottentottus</i>	Dicruridae
	Stripe-throated Yuhina	<i>Yuhina gularis</i>	Zosteropidae
	Velvet-fronted Nuthatch	<i>Sitta frontalis</i>	Sittidae
	Verditer flycatcher	<i>Eumyias thalassinus</i>	Muscicapidae
	Whiskered Yuhina	<i>Yuhina flavicollis</i>	Zosteropidae
	White-browed Fulvetta	<i>Fulvetta vinipectus</i>	Sylviidae
	White-browed Piculat	<i>Sasia ochracea</i>	Picidae
	White-capped Redstart	<i>Chaimarrornis leucocephalus</i>	Muscicapidae
	White-crested Laughingthrush	<i>Garrulax leucolophus</i>	Turdidae
	Yellow-bellied Fantail	<i>Chelidorhynch hypoxantha</i>	Rhipiduridae

Butterflies

Autumn leaf	<i>Doleschallia bisaltidae</i>	Nymphalidae
Banded Treebrown	<i>Lethe confuse</i>	Nymphalidae
Blue Peacock	<i>Papilio acturus</i>	Papilionidae
Chocolate Pansy	<i>Junonia iphita</i>	Nymphalidae
Common Bushbrown	<i>Mycalesis perseus</i>	Nymphalidae
Common cerculean	<i>Jamides celeno</i>	Lycaenidae
Common Crow	<i>Euploea core</i>	Nymphalidae
Common Earl	<i>Tanaecia julii</i>	Nymphalidae
Common Evening Brown	<i>Melanitis leda</i>	Nymphalidae
Common Five Ring	<i>Ypthima baldus</i>	Nymphalidae
Common Grass Yellow	<i>Eurema hecabe</i>	Pieridae
Common Jester	<i>Symbrenthia hippoclus</i>	Nymphalidae
Common Line Blue	<i>Posotas nora</i>	Lycaenidae
Common Map	<i>Cyrestis thyodamas</i>	Nymphalidae
Common Maplet	<i>Chersonesia risa</i>	Nymphalidae
Common Mormon	<i>Papilio polytes</i>	Papilionidae
Common Nawab	<i>Polyuria athamas</i>	Nymphalidae
Common Palmfly	<i>Elymnias hypermnestra</i>	Nymphalidae
Common Peacock	<i>Papilio polyctor</i>	Papilionidae
Common Pierrot	<i>Castalius rosimon</i>	Lycaenidae
Common Red Eye	<i>Matapa aria</i>	Hesperiidae
Common Red Forester	<i>Lethe mekara</i>	Nymphalidae
Common Sergeant	<i>Athyma perius</i>	Nymphalidae
Common Silverline	<i>Spindasis vulcans</i>	Lycaenidae
Common Small Flat	<i>Sarangesa dasahara</i>	Hasperiidae
Common Windmill	<i>Atrophaneura polyeuctes</i>	Papilionidae
Dark Judy	<i>Abisara fylla</i>	Riodinidae
Fluffy tit	<i>Zeltus amasa</i>	Lycaenidae
Fulvous pied Flat	<i>Pseudocoladenia dan</i>	Hesperiidae
Glassy Bluebottle	<i>Graphium sarpedon</i>	Papilionidae
Golden Sapphire	<i>Heliophorus brahma</i>	Lycaenidae
Grass Demon	<i>Udaspes folus</i>	Hesperiidae
Green Commodore	<i>Sumalia daraxa</i>	Nymphalidae
Indian Cabbage White	<i>Pieris canidia</i>	Pieridae
Indian Fritillary	<i>Argynnis hyperbius</i>	Nymphalidae
Indian Red Admiral	<i>Venessa indica</i>	Nymphalidae
Indian Skipper	<i>Spialian galba</i>	Hesperiidae
Indian Tortoiseshell	<i>Aglais cashmiriensis</i>	Nymphalidae

Large Yeoman	<i>Cirrochroa aoris</i>	Nymphalidae
Lemon Pansy	<i>Junonia lemonias</i>	Nymphalidae
Mixed Punch	<i>Dodona ouida</i>	Riodinidae
Nigger	<i>Orsotrioena medus</i>	Nymphalidae
Orange Oakleaf	<i>Kallima inachus</i>	Nymphalidae
Orange Punch	<i>Dodona egeon</i>	Riodinidae
Painted Lady	<i>Venessa cardui</i>	Nymphalidae
Plain Tiger	<i>Danaus chrysippus</i>	Nymphalidae
Punchinello	<i>Zemerus flegyas</i>	Riodinidae
Purple Sapphire	<i>Heliophorus epicles</i>	Lycaenidae
Red Helen	<i>Papilio helenus</i>	Papilionidae
Red Lacewing	<i>Cethosia biblustisamena</i>	Nymphalidae
Redbreast	<i>Papilio alcmenor</i>	Papilionidae
Rice Swift	<i>Borbo cinnara</i>	Hesperiidae
Spotted sawtooth	<i>Prioneris thestylis</i>	Pieridae
Spotted Snow Flat	<i>Tagiades menaka</i>	Hesperiidae
Striped Tiger	<i>Danaus genutia</i>	Nymphalidae
Tailed Jay	<i>Graphium agamemnon</i>	Papilionidae
Tailed Judy	<i>Abisara fylla</i>	Riodinidae
Tiger Hooper	<i>Ochus subvittatus</i>	Hasperiidae
Water Snow Flat	<i>Tagiades litigiosa</i>	Hesperiidae
Yamfly	<i>Loxura atymnus</i>	Lycaenidae
Yellow Helen	<i>Papilio nephelus</i>	Papilionidae
Yellow Orange Tip	<i>Ixias pyrene</i>	Peiridae



Dicrurus leucophaeus (Ashy Drongo)

DISCUSSION

The Assam Reserved Forest and adjacent area remain unexplored till date, which, during the present study, found to be rich in terms of the diversity of the species. Forest density also observed very high in most of the areas, followed by moderately dense (Table). Forest being subtropical to temperate type, trees is the most predominant taxa in the area, followed by herbs, shrubs and shrublets, ferns, climbers and epiphytes. The area constitutes a diverse habitat for both flora and fauna of the subtropical to subalpine belt. The area is highly dominated with the trees and small trees species namely *Machilus odoratissimus*, *Machilus gammieana*, *Machilus gamblei*, *Machilus edulis*, *Quercus pachyphylla*, *Quercus lamellosa*, *Michelia excelsa*, *Michelia cathcartii*, *Gynocardia odorata*, *laeocarpus lanceaefolius*, *Symplocos theifolia* etc. followed by *Lithocarpus fenestrata*, *Castanopsis tribuloides*, *Castanopsis hystrix*, *Brassaiopsis mitis*, *Pyrularia edulis*, *Pieris ovalifolia*, *Michelia cathcartii*, *Maesa chisia*, *Antidesma acuminatum*, *Acer caudatum* etc. In the higher altitudes areas, above Khedi, *Rhododendron falconeri*, *Rhododendron barbatum*, *Betula utilis* and *Yushania Maling* were observed as the highly dominating species. Common shrub species recorded from the area are *Rubus ellipticus*, *Rubus niveus*, *Rubus paniculatus*, *Viburnum erubescens*, *Dichroa febrifuga*, *Maesa chisia*, *Oxyspora paniculata*, *Polygala arillata* etc. Diversity of the ground covering herbs species in the area recorded high, but in terms of density, in term of the percentage of ground cover, was comparatively less. In addition, the area also provide diverse habitat for the faunal species.

Assam Reserve Forest is divided into five compartments. Compartment 1 is located in the area above Thekabong, Deorali area, Dhajay, Hoday Dara and surrounding area (showed in Figure & Table): Plots 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18). Compartment 2 is located in the area below Gorujuray, towards Latape Dara above Assam Lingzey village, covering Parang Tar, Thonuki Goth area etc. (Figure & Table) : Plots 1, 2, 3, 4, 5, 6, 19, 20, 21, 22). Compartment 3 is located in the area below Khedi (Figure & Table): Plots 23, 24, 25, 26). Copmpartment 4 is located in the Khedi area, which also includes the area adjacent to the Khedi pokhari (Figure &

Table): Plots 27, 28, 29, 30, 31, 32). Compartment 5 is located above Khedi upto the area below Menla (Figure & Table): Plots 33, 34, 35, 36, 37, 38).

Lower part of the survey area, in and around Latape Dara, Pareng Taar, Thekabong and above, Deorali, upto Homay Dara and surrounding area (1700-2400) meter elevation are highly covered with species namely *Machilus odoratissimus*, *Machilus gammieana*, *Machilus gamblei*, *Machilus edulis*, *Quercus pachyphylla*, *Quercus lamellose*, *Michelia excels*, *Michelia cathcartii*, *Gynocardia odorata*, *laeocarpus lanceaefolius*, *Symplocos theifolia*, *Lithocarpus fenestrata*, *Castanopsis tribuloides*, *Castanopsis hystrix*, *Brassaiopsis mitis*, *Pyrrularia edulis*, *Pieris ovalifolia*, *Michelia cathcartii*, *Maesa chisia*, *Antidesma acuminatum*, *Acer caudatum*, *Antidesma acuminatum*, *Castanopsis hystrix*, *Castanopsis indica*, *Castanopsis tribuloides*, *Engelhardtia spicata*, *Eurya acuminata*, *Pieris ovalifolia*, *Symplocos theifolia*, *Symplocos glomerata*, *Dichroa febrifuga*, *Edgeworthia gardenierii*, *Rubus niveus*, *Rubus ellipticus*, *Viburnum erubescens*, *Rubus paniculatus* etc. The areasurrounding the Gorujuray, and the area below Khedi (2400-2700) meter elevation are highly covered with *laeocarpus lanceaefolius*, *Symplocos theifolia*, *Quercus pachyphylla*, *Rhododendron Falconeri*, *Rhododendron Grandii*, *Yushania maling*, *Themnocalamus falconeri* with scattered *Acer pectinatum*, *Quercus lamellosa* etc. In the upper belt of the forest, above 2800m, which is the area above Khedi, the forest is quite open somewhere, but in some area, is highly dominated with *Betula utilis*, *Rhododendron barbatum*, *Rhododendron falconeri*, *Yushania maling* etc.

CONCLUSION AND RECOMMENDATIONS

The Assam Reserved Forest is not much impacted by the natural as well as anthropogenic disturbance. Intensity of threats to the biodiversity of the area due to grazing pressure by cow (in lower and upper belt) and Yak (in the upper belt at Khedi and above) observed high for which action should be taken. The unsustainable extraction of plants especially for firewood and livestock feed by the local inhabitants are the general disturbances resulted in the building up considerable pressure on the survival of the species. Other major threats are obviously, the effect of drastic changes in climate, hence studies on the impact of climate change on the biodiversity of the area is recommended, which will be helpful in framing conservation and management strategies.



Amomum dealbatum (Churumpha) habit (left), fruit (right)



Elaeocarpus lanceaeifolius fruits (left), seeds (Right)

Field Activities of Survey Team at Assam Reserve Forest, East Sikkim



Measuring Girth (CBH) of the tree



Taking field observation and recording data



Hedychium gracile



Momordica cochinchinensis

Barapathing Reserve Forest, East Sikkim

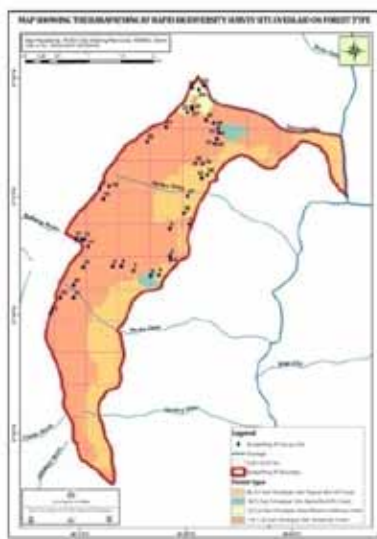
Sabita Dahal, Suraj Subba & Meena Tamang



STUDY AREA

A field trip for conducting Rapid Biodiversity Survey to Barapathing Reserve Forest covering a sampling path from Latuk – Khedi –Thek in East Sikkim, were carried out w.e.f. 20th October to 31st October 2017 by the SBFP survey team. The trip was aimed for inventory and monitoring of the biodiversity of the area.

The present survey area along Latuk – Khedi –Thek sampling path, the forest type of which is represented by sub tropical to temperate forest. The elevation range covered during the survey was from 1828m (Salalay Dara, above Latuk) to 2723m (Below Khedi) which is represented by Figure 1. The slope angle of the area ranged between mild (5 degree) to steep (85 degree) slope and is facing towards E, NE, S and SE aspect (Table)



Survey plots along Latuk – Khedi – Thek sampling path, of forest compartment boundary, forest density & forest types.

Site characteristics of the survey area along Latuk - Khedi – Thek sampling path in Barapathing RF, East Sikkim

Site Code	Forest type	Elevation (M)	GPS co-ordinates		Slope Angle (Degree)	Slope Aspect	Canopy cover/ Forest density	Dominate taxa	Disturbances	Location name
			Lat	Long						
Plot1	Wet Temperate Forest	1828	27°16'49.1"	88°41'50.8"	30	E	90%, Very dense	Trees	Nil	Above Latuk
Plot2	Wet Temperate Forest	1951	27°16'47.1"	88°41'40.0"	30	E	60%, Moderately dense	Trees	Grazing	Taal Kharka
Plot3	Wet Temperate Forest	2007	27°16'33.0"	88°41'39.9"	45	E	60%, Moderately dense	Trees	Grazing	Taal Kharka
Plot4	Wet Temperate Forest	2038	27°16'31.3"	88°41'40.2"	30	E	50%, Moderately dense	Trees	Nil	Harkattay Dara
Plot5	Wet Temperate Forest	2105	27°16'23.6"	88°41'33.3"	40	E	50%, Moderately dense	Trees	Nil	
Plot6	Wet Temperate Forest	2109	27°16'23.2"	88°41'28.8"	45	E	75%, very dense	Trees	Nil	Kattike Dara
Plot7	Wet Temperate Forest	2207	27°16'25.9"	88°41'18.9"	45	E	40%, Moderately dense	Trees	Nil	
Plot8	Wet Temperate Forest	2248	27°16'28.4"	88°41'12.2"	45	E	45%, Moderately dense	Trees	Nil	
Plot9	Wet Temperate Forest	2287	27°16'28.3"	88°41'07.2"	30	E	55%, Moderately dense	Trees	Nil	
Plot10	Wet Temperate Forest	2347	27°16'28.2"	88°40'50.5"	5	NW	0%, open	Herbs	Grazing	Dareli
Plot11	Wet Temperate Forest	2446	27°16'38.5"	88°40'53.5"	30	NE	50%, Moderately dense	Trees	Nil	Above Dareli
Plot12	Wet Temperate Forest	2494	27°16'40.2"	88°40'47.8"	30	NE	40%, Moderately dense	Trees	Nil	Above Dareli
Plot13	Wet Temperate Forest	2537	27°16'40.7"	88°40'43.5"	35	NE	90%, very dense	Trees	Nil	Above Dareli
Plot14	Wet Temperate Forest	2540	27°16'40.2"	88°40'46.7"	30	NE	50%, Moderately dense	Trees	Nil	Above Dareli
Plot15	Wet Temperate Forest	2551	27°16'12.8"	88°40'44.8"	45	NE	90%, very dense	Trees	Nil	Above Dareli
Plot16	Wet Temperate Forest	2565	27°17'02.6"	88°41'02.4"	60	NE	90%, very dense	Trees	Nil	Above Dareli

Plot17	Wet Temperate Forest	2577	271730.2	884050.5	50	NE	80%, very dense	Trees	Nil	
Plot18	Wet Temperate Forest	2593	271708.9	884105.7	60	E	75%, very dense	Trees	Nil	
Plot19	Wet Temperate Forest	2600	271719.7	884154.6	70	E	70%, very dense	Bamboo (Malingo)	Nil	Below Khedi
Plot20	Wet Temperate Forest	2648	271731.3	884127.6	70	E	50%, Moderately dense	Bamboo (Malingo)	Nil	Below Khedi
Plot21	Wet Temperate Forest	2649	271738.5	884138.6	70	E	90%, very dense	Trees	Nil	Below Khedi
Plot22	Wet Temperate Forest	2695	271745.9	884150.6	70	E	90%, very dense	Trees	Nil	Below Khedi
Plot23	Wet Temperate Forest	2639	271757.3	884157.2	70	E	90%, very dense	Trees	Nil	Below Khedi
Plot24	Wet Temperate Forest	2629	271758.3	884153.6	70	E	70%, very dense	Trees	Nil	Below Khedi
Plot25	Wet Temperate Forest	2723	271759.2	884200.2	70	E	70%, very dense	Trees	Nil	Below Khedi
Plot26	Wet Temperate Forest	2655	271748.5	884153.3	60	E	80%, very dense	Trees	Nil	Malingay Kharka (Top)
Plot27	Wet Temperate Forest	2631	271747.5	884158.1	70	E	50%, Moderately dense	Bamboo (Malingo)	Nil	Malingay Kharka
Plot28	Wet Temperate Forest	2586	271741.9	884201.1	70	S	90%, very dense	Trees	Nil	Malingay Kharka
Plot29	Wet Temperate Forest	2535	271740.3	884205.4	70	SE	90%, very dense	Trees	Nil	Malingay Kharka
Plot30	Wet Temperate Forest	2477	271737.6	884208.0	50	S	90%, very dense	Trees	Nil	Malingay Kharka
Plot31	Wet Temperate Forest	2429	271735.3	884212.4	70	S	90%, very dense	Trees	Nil	Malingay Kharka
Plot32	Wet Temperate Forest	2354	271732.2	884207.2	30	SE	50%, moderately dense	Bamboo (Malingo)	Nil	Malingay Kharka
Plot33	Wet Temperate Forest	2318	271729.7	884205.9	50	SE	70%, very dense	Bamboo (Malingo)	Nil	Malingay Kharka
Plot34	Wet Temperate Forest	2215	271724.0	884201.6	45	S	80%, very dense	Trees	Nil	

Plot35	Wet Temperate Forest	2119	271719.8	884158.9	40	SE	90%, very dense	Trees	Nil	Dumphren Dara
Plot36	Wet Temperate Forest	2054	271712.5	884158.4	70	SE	50%, moderately dense	Trees	Nil	
Plot37	Wet Temperate Forest	1919	271703.3	884150.2	30	SE	45%, moderately dense	Trees	Nil	
Plot38	Wet Temperate Forest	1859	271654.8	884148.0	50	SE	40%, moderately dense	Trees	Nil	Above Thek
Plot 39	Wet Temperate Forest	2371	271588.6	884025.0	30	W	85%, very dense	Trees	Nil	Near Dareli
Plot 40	Wet Temperate Forest	2357	271619.5	884044.3	30	W	90%, very dense	Trees	Nil	Boundary to private land
Plot 41	Wet Temperate Forest	2315	271604.3	884032.8	45	NW	85%, very dense	Trees	Nil	



FINDINGS

FLORA

During the survey in Barapathing Reserved Forest, a total of 41 plots were laid covering 0.41 ha area (Table& figure). A general checklist of the floral species showed in (Table) of the area (including the areas outside of the plots) were prepared of which, trees and small trees represented the highest number of species (61 species) followed by herbs (59 species). 31 species of climbers and epiphytes, 19 species of shrubs and shrublets, 26 numbers of ferns and fern allies, 8 numbers of bamboos and cane were recorded from the area during the present study. Location name, dominate taxa, elevation, GPS-co-ordinates, forest type, slope angle, Slope aspect, disturbances and forest density of the area in terms of canopy cover in and around the sample plots are provided in the Table.

Checklist of floral species in Barapathing Reserve Forest

Sl. No.	Botanical Name	Family	Common name
	Tree and small tree species		
1.	<i>Acer caudatum</i> Wallich.	Sapindaceae	Kapasey
2.	<i>Acer pectinatum</i> Wall.	Sapindaceae	Lek Kapasay
3.	<i>Actinodaphne sikkimensis</i> Meissn.	Lauraceae	Phurkey Sissi
4.	<i>Alangium begoniaefolium</i> (Roxb.) Baill	Alangiaceae	Akhanay
5.	<i>Alnus nepalensis</i> D. Don.	Betulaceae	Utis
6.	<i>Antidesma acuminatum</i> Wight	Euphorbiaceae	Lekh bilaune
7.	<i>Betula alnoides</i> Wall. ex Diels	Betulaceae	Saur
8.	<i>Brassaiopsis mitis</i> C.B.Clarke	Araliaceae	Phutta
9.	<i>Castanopsis hystrix</i> Hook. & Thomson ex. A. DC.	Fagaceae	Patley katush
10.	<i>Castanopsis indica</i> (Roxb.ex Lindl.) A.DC.	Fagaceae	Dhalne kattus
11.	<i>Castanopsis tribuloides</i> (Smith) A. DC.	Fagaceae	Musrey katus
12.	<i>Cedrela febrifuga</i> Blume.	Meliaceae	Tuni
13.	<i>Cinnamomum impressinervium</i> Meisn.	Lauraceae	Sinkoli
14.	<i>Cryptomeria japonica</i> (Thunberg ex. Linn. F.) D. Don	Taxodiaceae	Dhuppi
15.	<i>Daphniphyllum himalayense</i> (Benth.) Mull. Arg.	Euphorbiaceae	Lal Chandan
16.	<i>Elaeocarpus lanceaefolius</i> Roxburgh.	Elaeocarpaceae	Bhadrasey
17.	<i>Engelhardtia spicata</i> Blume	Juglandaceae	Mauwa
18.	<i>Erythrina arborescens</i> Roxb	Leguminosae	Phaledo
19.	<i>Eurya acuminata</i> DC.	Theaceae	Jhingni
20.	<i>Exbucklandia populnea</i> R. Br. Ex Griff	Hamamelidaceae	Piplee
21.	<i>Ficus hookeri</i> Miq.	Moraceae	Nebharo
22.	<i>Ficus nemoralis</i> Wall.	Moraceae	Dudilo
23.	<i>Garuga pinnata</i> Roxb.	Burseraceae	Dabdabay
24.	<i>Glochidion acuminatum</i> Muell.	Euphorbiaceae	Latikaath
25.	<i>Gynocardia odorata</i> Roxburgh	Flacourtiaceae	Bandre/Gante
26.	<i>Hovenia dulcis</i> Thunb.	Thymelaeaceae	Bangi
27.	<i>Juglans regia</i> Linn.	Juglandaceae	Okhar
28.	<i>Leucosceptrum cannum</i> Smith	Lamiaceae	Ghurpis
29.	<i>Lithocarpus fenestrata</i> Roxb.	Fagaceae	Arkaulo
30.	<i>Litsea kingii</i> Hook.	Lauraceae	Siltimmur
31.	<i>Macaranga pustulata</i> King.	Euphorbiaceae	Malato
32.	<i>Machilus edulis</i> King.	Lauraceae	Pumsee / Funchey
33.	<i>Machilus gamblei</i> King ex J. D. Hooker	Lauraceae	Ghew Kaulo / Lapche Kaulo / Chiplay Kaulo
34.	<i>Machilus gammieana</i> King ex. Hook. f.	Lauraceae	Kawla
35.	<i>Machilus odoratissimus</i> Nees		Ghew funchey
36.	<i>Maesa chisia</i> Buch.-Ham. ex D. Don	Myrsinaceae	Bilaune
37.	<i>Magnolia cathcartii</i> (Hook.f. & Thomson) Noot.	Magnoliaceae	Tite champ
38.	<i>Magnolia doltsopa</i> (Buch.-Ham. ex DC.) Figlar	Magnoliaceae	Rani champ
39.	<i>Myrica esculenta</i> Buch. Ham.	Myricaceae	Kafal
40.	<i>Myrsine semiserrata</i> Wall.	Myrsinaceae	Phalame

41.	<i>Nyssa sessiliflora</i> Hook. f. & Thomson ex Benth	Cornaceae	Lek chilauney
42.	<i>Ostedes paniculatus</i> Blume.	Euphorbiaceae	Bepari
43.	<i>Pieris ovalifolia</i> D. Don	Ericaceae	Angari
44.	<i>Prunus cerasoides</i> Don.	Rosaceae	Paipun
45.	<i>Prunus nepalensis</i> (Ser) Stendel	Rosaceae	Arupatey
46.	<i>Pyrularia edulis</i> (Wallich) A.	Santalaceae	Amphi
47.	<i>Quercus lamellosa</i> Smith.	Fagaceae	Buk/ Bajranth
48.	<i>Quercus pachyphylla</i> Kurz.	Fagaceae	Sungure Katus/ Bantay/ Oitay.
49.	<i>Rhododendron arboreum</i> ssp. <i>arboreum</i> (CB Clarke) Ridley.	Ericaceae	Lali gurans
50.	<i>Rhododendron falconeri</i> Hook.f.	Ericaceae	Korlinga
51.	<i>Rhododendron grande</i> Wright.	Ericaceae	Patle korlinga
52.	<i>Rhus succedanea</i> Linn.	Anacardiaceae	Bhalayo
53.	<i>Rhus succedanea</i> Linn.var. <i>acuminata</i>	Anacardiaceae	Rani bhalayo
54.	<i>Schima wallichii</i> (DC) Korth.	Theaceae	Chilaune
55.	<i>Spondias axillaris</i> Roxb.	Anacardiaceae	Lapsi
56.	<i>Symingtonia populnea</i> (R. Br. Ex Griff.)	Hamamelidaceae	Piple
57.	<i>Symplocos glomerata</i> King, ex. C.B. Clarke	Symplocaceae	Kholme
58.	<i>Symplocos theifolia</i> Don.	Symplocaceae	Kharanay
59.	<i>Tetradium fraxinifolium</i> (Hook.) Hartley	Rutaceae	Khanakpa
60.	<i>Tetrameles nudiflora</i> R.Br.	Tetramelaceae	Mayna
61.	<i>Calicarpa arborea</i> Roxb.	Lamiaceae	Guenlo
Shrubs and shrublets			
1.	<i>Ardisia macrocarpa</i> Wall.	Myrsinaceae	Damai phal
2.	<i>Daphne cannabina</i> Wall.	Thymeleaceae	Kalo Argeli/Kagate
3.	<i>Dichroa febrifuga</i> Lour	Hydrangeaceae	Basak
4.	<i>Edgeworthia gardenierii</i> Meissn.	Thymeliaceae	Argali
5.	<i>Eupatorium adenophorum</i> Sprengel	Asteraceae	Kalijhar
6.	<i>Hypericum oblongifolium</i> Choisy	Hypericaceae	Urilo
7.	<i>Maesa chisia</i> Don	Myrsinaceae	Bilauney
8.	<i>Mahonia napaulensis</i> DC	Berberidaceae	Chutro
9.	<i>Neillia rubiflora</i> D.Don	Rosaceae	Khareto jhar
10.	<i>Oxyspora paniculata</i> (D.Don) DC	Melastomataceae	Chulesi
11.	<i>Polygala arillata</i> Buch.- Ham ex D.Don.	Polygalaceae	Marcha jhar
12.	<i>Rubus ellipticus</i> Smith.	Rosaceae	Aiselu
13.	<i>Rubus niveus</i> Thunb	Rosaceae	Aiselu / Biralu kanra
14.	<i>Rubus paniculatus</i> (Smith) Rees.	Rosaceae	Kalo Aiselu
15.	<i>Viburnum erubescens</i> Wallich ex DC	Sambucaceae	Asaray
16.	<i>Gaultheria fragrantissima</i> Wall.	Ericaceae	Dhasingarey
17.	<i>Gaultheria nummularioides</i> D.Don	Ericaceae	Kaligedi
18.	Unidentified		Patpatay (Yellow flower)
19.	Unidentified		Seti kath
Herbs			
1.	<i>Aconogonum campanulatum</i> (Hook.f.) Hara	Polygonaceae	Kukur thotnay
2.	<i>Aconogonum molle</i> D. Don	Polygonaceae	Thotnay

3.	<i>Acorus calamus</i> Linn.	Acoraceae	Bojo
4.	<i>Aeschynanthus parviflorus</i> (D.Don) Spreng.	Gesneriaceae	Baklay patay
5.	<i>Aeschynanthus hookeri</i> C.B.Clarke	Gesneriaceae	Baklay patay
6.	<i>Ampelocissus latifolia</i> (Roxb.) Planch	Vitaceae	Pani lahara
7.	<i>Anaphalis triplinervis</i> C.B. Clarke	Asteraceae	Bukey Phool
8.	<i>Arisaema intermedium</i> Blume	Araceae	Larua/Banko
9.	<i>Arisaema flavum</i> (Forsskal) Schott	Araceae	Sap ko makai
10.	<i>Arisaema speciosum</i> (Wall.) Mart.	Araceae	Sap ko Makai
11.	<i>Artemisia vulgaris</i> Linn.	Asteraceae	Titaypati
12.	<i>Astilbe rivularis</i> Ham	Saxifragaceae	Burokhati
13.	<i>Begoniapicta</i> Sm.	Asteraceae	Magar kanje
14.	<i>Boehmeria platyphylla</i> D.Don	Urticaceae	Kamley
15.	<i>Campylandra aurantiaca</i> Baker	Asparagaceae	Jangali nakima
16.	<i>Carex</i> sp.	Cyperaceae	Harkatto
17.	<i>Cautleya spicata</i> – (J. M. Sm.) Bak	Zingiberaceae	Sara
18.	<i>Centellaasiatica</i> (L.) Urban	Umbelliferae	Golpatta
19.	<i>Commelina benghalensis</i> L.	Commelinaceae	Kanay
20.	<i>Cyanotis vaga</i> (Loour.) Roem & Schult.	Commelinaceae	Kanay
21.	<i>Cynodon dactylon</i> Linn	Poaceae	Dubo
22.	<i>Digitaria sanguinalis</i> (Linn.) Scopoli.	Poaceae	Banso
23.	<i>Drymaria cordata</i> Wild. ex. Roem & Schult.	Caryophyllaceae	Abhijalo
24.	<i>Elatostema platyphyllum</i> Weddell.	Urticaceae	Gagletto
25.	<i>Elatostema sessile</i> J.R.Forst. & G.Forst.	Urticaceae	Gagletto
26.	<i>Eragrostis cilianensis</i> (All.) Lut. ex	Poaceae	Banso
27.	<i>Eupatorium adenophorum</i> Spreng.	Asteraceae	Kali jhar
28.	<i>Fragaria nubicola</i> Lindley ex. Lacaíta	Rosaceae	Bhui-aiselu
29.	<i>Gerardiana diversifolia</i> (Link) Friis	Urticaceae	Bhangre sisnu
30.	<i>Hedychiumspicatum</i> Sm.	Zingiberaceae	Gai sara
31.	<i>Hedychium gardnerianum</i> Roscoe	Zingiberaceae	
32.	<i>Hemiphragma heterophyllum</i> Wall.	Plantaginaceae	Nash jhar
33.	<i>Houttuynia cordata</i> Thunb	Saururaceae	Raktha-jhar
34.	<i>Impatiens stenantha</i> Hook. f.	Balsaminaceae	Mujuro
35.	<i>Impatiens urticifolia</i> Wallich	Balsaminaceae	Mujuro
36.	<i>Lecanthus peduncularis</i> (Wall. ex Royle) Wedd.	Urticaceae	Gagletto
37.	<i>Osbeckia stellata</i> Hook.f	Melastomataceae	Arbal
38.	<i>Oxalis corniculata</i> Linn.		Chariamilo
39.	<i>Persicaria capitata</i> (Buch.- Ham. ex D.Don) H. Gross	Polygonaceae	Ratnaulo
40.	<i>Pilea stricta</i> (Buchanan-Hamilton ex D. Don) Weddell	Urticaceae	Chiple
41.	<i>Pilea umbrosa</i> Blume.	Urticaceae	Chiple
42.	<i>Pouzolzia sanguine</i> (Blume) Merrill	Urticaceae	Chiple
43.	<i>Rumex nepalensis</i> Spreng.	Polygonaceae	Halhalley
44.	<i>Selaginella biformis</i> A. Br. ex Kuhn	Selaginellaceae	Jhew
45.	<i>Selaginella chrysocaulos</i> (Hook. & Grev.) Spring.	Selaginellaceae	Jhew
46.	<i>Selaginella monospora</i> Spring.	Selaginellaceae	Jhew

47.	<i>Smilax sp.</i>	Smilacaceae	Madaney kara / Kirney ghans
48.	<i>Strobilanthes sp.</i>	Acanthaceae	Kibu ghans
49.	<i>Swertia bimaculata</i> (Roxb. ex Flem.) Karsten	Gentianaceae	Bhaley chiraito
50.	<i>Swertia chirayita</i> H. Karsten	Gentianaceae	Chiraito
51.	<i>Urtica dioica</i> Linn.	Urticaceae	Patley sisnu
52.	<i>Urtica parviflora</i> Roxburgh	Urticaceae	Gharia sisnu
53.	<i>Villebrunea frutescens</i> (Thunb.) Blume	Urticaceae	Chiple
54.	<i>Viola sikkimensis</i> W. Becker	Violaceae	Silamey jhar
55.	<i>Hedychium sp.</i>	Zingiberaceae	Qiura
56.	<i>Heracleum wallichii</i> DC.	Umbelliferae	Chimphing
57.	<i>Digitaria ciliaris</i> (Retzius) Koeler	Poaceae	Chitray Banso
58.	<i>Holboellia angustifolia</i> Diels.	Lardizabalaceae	Gulfa
59.	<i>Stephania glabra</i> (Roxb.) Miers	Menispermaceae	Tambarkay
Epiphytes / Climbers			
1.	<i>Aconogonum molle</i> (D. Don) H. Hara	Polygonaceae	Thotne
2.	<i>Arisaema intermedium</i> Blume	Araceae	Larua/Banko
3.	<i>Boehmeria sp.</i>	Urticaceae	Kamley
4.	<i>Cardamine hirsuta</i> L.	Brassicaceae	Titey
5.	<i>Carex sp.</i>	Cyperaceae	Harkatto
6.	<i>Clematis acuminata</i> DC	Rununculaceae	Pinasay lahara
7.	<i>Clematis buchananiana</i> DC.	Ranunculaceae	Pinasey lahara
8.	<i>Codonopsis viridis</i> Wallich.	Campanulaceae	Padey lahara
9.	<i>Coelogyne flaccida</i> (Lindl.) Kuntz.	Orchidaceae	Sunakhari
10.	<i>Davallodes membranulosa</i> (Hook.) Copel.	Davalliaceae	Uniu
11.	<i>Digitaria sanguinalis</i> (Linn.) Scopoli.	Poaceae	Banso
12.	<i>Diplazium dilatatum</i> Blume Lek	Woodsiaceae	Chipley Ningro
13.	<i>Diplazium stoliczkae</i> Beddome	Woodsiaceae	Lek kalo ningro
14.	<i>Elatostema platyphyllum</i> Weddell.	Urticaceae	Gagleto
15.	<i>Eragrostis cilianensis</i> (All.) Lut. ex Janchen	Poaceae	Banso
16.	<i>Galium sp.</i>	Rubiaceae	-
17.	<i>Machilus gamblei</i> King ex J. D. Hooker		Seti kaulo / Ghew kaulo
18.	<i>Mucuna macrocarpa</i> Wall.	Leguminosae	Baldengra
19.	<i>Pleione praecox</i> (Lindl.)	Orchidaceae	-
20.	<i>Piper sp.</i>	Piperaceae	
21.	<i>Piper boehmeriaefolia</i> (Miq.) DC.	Piperaceae	Chabo / Jungali pan
22.	<i>Rhapidiphora decursiva</i> (Roxb.) Schott.	Araceae	Kanchirno
23.	<i>Rubia cordifolia</i> Linn.	Rubiaceae	Majito
24.	<i>Smilax zeylanica</i> Linn.	Liliaceae	Kukur dainey
25.	<i>Smilax aspara</i> L.	Liliaceae	Kukurdaina
26.	<i>Tetrastigma serrulatum</i> (Roxb.) Planchon	Vitaceae	Charcharey lahara
27.	<i>Trichosanthes lepiniana</i> (Naud.) Cogn.	Cucurbitaceae	Indreni
28.	<i>Viscum articulatum</i> Burm. f.	Lorantahceae	Harchur
29.	<i>Wrightia gigantea</i>		Bauni Kath
Ferns and fern- allies			

1.	<i>Asplenium laciniatum</i> D. Don.	Aspleniaceae	Uniu
2.	<i>Blechnum orientale</i> L.	Blechnaceae	Deer Fern
3.	<i>Coniogramme intermedia</i> Heiron.	Pteridaceae	Uniu
4.	<i>Coniogramme fraxinea</i> (D.Don) Fee ex Diels	Pteridaceae	Bamboo leaf fern
5.	<i>Cyathea spinulosa</i> Wall.ex Hook	Cyatheaceae	Rukh uniu
6.	<i>Dennstaedtia appendiculata</i> (Wall.ex Hook.) J.Sm	Dennstaedtiaceae	Piray uniu
7.	<i>Diplazium dilatatum</i> Blume	Woodsiaceae	Lek Chipley Ningro
8.	<i>Diplazium esculentum</i> (Retz.) Sw	Woodsiaceae	Chiplay ningro
9.	<i>Diplazium stoliczkae</i> Beddome	Woodsiaceae	Lek Kalo Ningro
10.	<i>Drynaria</i> sp.	Polypodiaceae	Basket fern
11.	<i>Equisetum diffusum</i> D.Don.	Equiaetaceae	Salli bisalli
12.	<i>Gleichenia gigantean</i> Wall. ex Hook	Dryopteridaceae	Kalamey Uniu
13.	<i>Gleichenia longissima</i> Blume	Dryopteridaceae	Sottarey uniu
14.	<i>Lepisorus</i> sp.	Polypodiaceae	Polypods
15.	<i>Leucostegia truncata</i> (D.Don) Fras.-Jenk.	Davalliaceae	Deer fern
16.	<i>Lycopodium japonicum</i> Thunb	Lycopodiaceae	Nagbelli
17.	<i>Monachosorum henryi</i> Christ.	Monachosoraceae	Uniu
18.	<i>Microsorium membranaceum</i> (D.Don) Cing	Polypodiaceae	Uniu
19.	<i>Nephrolepis cordifolia</i> (Linn.) C. Presl.	Davalliaceae	Pani amala
20.	<i>Odontosoria chinensis</i> (L.) J.Smith	Lindsaeaceae	Uneu
21.	<i>Plagiogyria pycnophylla</i> (Kunze.) Mett.	Plagiogyriaceae	Uniu
22.	<i>Pseudodrynaria coronans</i> (Wall.ex Mett.) T.Moore	Polypodiaceae	Kamray lahara
23.	<i>Pteridium revolutum</i> (Blume) Nakai	Pteridaceae	Uniu
24.	<i>Pteris biaurita</i> L.	Pteridaceae	Uniu
25.	<i>Pteris wallichiana</i> J. Agardh	Pteridaceae	Uneu
26.	<i>Vittaria elongata</i> Sw	Vittariaceae	Uniu
Bamboo / Cane			
1	<i>Costus speciosus</i> Koenig Sm.	Costaceae	Bethlauri
2	<i>Himalayacalamus hookerianus</i> (Munro) Stapleton	Poaceae	Pareng
3	<i>Phylostachys aurea</i> Riviere & C.Rivire	Poaceae	Katha Bans
4	<i>Plectocomia himalayana</i> Giff.	Arecaceae	Fyakray bet
5	<i>Schizostachyum capitatum</i> (Munro) R.B.Majumdar	Poaceae	Gope Bans
6	<i>Sinarundinaria intermedia</i> (Munro) C.S.Chao & Renvoize	Poaceae	Nigalo/Tite Nigalo
7	<i>Themnocalamus falconeri</i> Hook.f. ex. Munro.	Poaceae	Singanay Bans
8	<i>Yushania maling</i> (Gamble) R.B.Majumdar & Karthik.	Poaceae	Malingo

FAUNA

During the biodiversity survey in Barapathing Reserve forest, the existence of a total of 12 mammalian species, 52 birds species and 62 butterflies species were recorded through direct sightings and indirect evidences, which are listed in table.

Checklist of Faunal species, including Mammals, Avi-fauna and butterflies of Barapathing RF and surrounding area in East Sikkim.

Sl. No	Common name	Scientific name	Family
Mammalian Species			
1	Jackel	<i>Cannis aurens</i>	Canidae
2	Himalayan Serow	<i>Capricornis thar</i>	Bovidae
3	Parti-colored flying squirrel	<i>Hylopetes alboniger</i>	Sciuridae
5	Yellow-Throated marten	<i>Martes flavigula</i>	Mustelids
6	Barking Deer	<i>Muntiacus muntjak</i>	Cervidae
7	Goral	<i>Naemoredus goral</i>	Bovidae
8	Himalayan palm civet	<i>Paguma larvata</i>	Viverridae
9	Wild Boar	<i>Sus scrofa</i>	Suidae
11	Himalayan black Bear	<i>Ursus thibetanus</i>	Ursidae
12	Himalayan Crestless Porcupine	<i>Hystrix brachyura</i>	Hystricidae
13	Hoary Bellied Himalayan Squirrel	<i>Callosciurus pygarythrus</i>	Sciuridae
14	Himalayan Thar	<i>Hemitragus jemlahicus</i>	Bovidae
Avi - Fauna			
1	Ashy Drongo	<i>Dicrurus leucophaeus</i>	Dicruridae
2	Barred Cuckoo Dove	<i>Macropygia unchall</i>	Columbidae
3	Blue Whistling Thrush	<i>Myophonus caeruleus</i>	Turdidae
4	Blue-fronted Redstart	<i>Phoenicurus frontalis</i>	Muscicapidae
5	Blue-winged Siva	<i>Siva cyanouroptera</i>	Timaliidae
6	Black bulbul	<i>Hypsipetes leucocephalus</i>	Pycnonotidae
7	Common Green Magpie	<i>Cissa chinensis</i>	Corvidae
8	Common Hoopoe	<i>Upupa epops</i>	Upupidae
9	Common Myna	<i>Acridotheres tristis</i>	Sturnidae
10	Common pigeon	<i>Columba lobia</i>	Columbidae
11	Common Tailored Bird	<i>Orthotomus sutorius</i>	Cisticolidae
12	Golden-breasted Fulvetta	<i>Lioparus chrysotis</i>	Sylviidae
13	Great Barbet	<i>Megalaima virens</i>	Ramphastidae
14	Greater Yellownape	<i>Picus flavinucha</i>	Picidae
15	Green-backed Tit	<i>Parus monticolus</i>	Paridae
16	Green-tailed Sunbird	<i>Aethopyga nipalensis</i>	Nectariniidae
17	Grey-backed Shrike	<i>Lanius tephronotus</i>	Laniidae
18	Grey-headed Canary Flycatcher	<i>Culicicapa ceylonensis</i>	Stenostiridae
19	Grey-headed Parakeet	<i>Psittacula finschii</i>	Psittacidae
20	Himalayan Bluetail	<i>Tarsiger rufilatus</i>	Muscicapidae
21	Himalayan Bulbul	<i>Pycnonotus leucogenys</i>	Pycnonotidae
22	Hodgson's Redstart	<i>Phoenicurus hodgsoni</i>	Muscicapidae
23	House Crow	<i>Corvus splendens</i>	Corvidae
24	House Sparrow	<i>Passer domesticus</i>	Passeridae
25	Kalij Pheasant	<i>Lophura leucomelanos</i>	Phasianidae
26	Large-billed Crow	<i>Corvus macrorhynchus</i>	Corvidae
27	Lesser Yellownape	<i>Picus chlorolophus</i>	Picidae

28	Little Spiderhunter	<i>Aracanothra longirostra</i>	Nectariniidae
29	Nepal Fulvetta	<i>Alcippe nipalensis</i>	Sylviidae
30	Oriental Magpie Robin	<i>Copsychus saularis</i>	Muscicapidae
31	Oriental Turtle Dove	<i>Streptopelia orientalis</i>	Columbidae
32	Oriental White-eye	<i>Zosterops palpebrosus</i>	Zosteropidae
33	Red-billed Leiothrix	<i>Leiothrix lutea</i>	Timaliidae
34	Red-tailed Minla	<i>Minla ignotincta</i>	Leiothrichidae
35	Red-vented Bulbul	<i>Pycnonotus cafer</i>	Pycnonotidae
36	Rufous sibia	<i>Malacias capistratus</i>	Timaliidae
37	Rufous-bellied Niltava	<i>Niltava sundara</i>	Muscicapidae
38	Rufous-gorgeted Flycatcher	<i>Ficedula strophiat</i>	Muscicapidae
39	Scaly Laughingthrush	<i>Garrulax austeni</i>	Turdidae
40	Scarlet Minivet	<i>Pericrocotus cinnamomeus</i>	Campephagidae
41	Silver-eared Mesia	<i>Mesia argentauris</i>	Leiothrichidae
42	Slender-billed Scimitar Babbler	<i>Xiphirhynchus superciliaris</i>	Timaliidae
43	Spangled Drongo	<i>Dicrurus hottentottus</i>	Dicruridae
44	Stripe-throated Yuhina	<i>Yuhina gularis</i>	Zosteropidae
45	Velvet-fronted Nuthatch	<i>Sitta frontalis</i>	Sittidae
46	Verditer flycatcher	<i>Eumyias thalassinus</i>	Muscicapidae
47	Whiskered Yuhina	<i>Yuhina flavicollis</i>	Zosteropidae
48	White-browed Fulvetta	<i>Fulvetta vinipectus</i>	Sylviidae
49	White-browed Piculat	<i>Sasia ochracea</i>	Picidae
50	White-capped Redstart	<i>Chaimarrornis leucocephalus</i>	Muscicapidae
51	White-crested Laughingthrush	<i>Garrulax leucolophus</i>	Turdidae
52	Yellow-bellied Fantail	<i>Chelidorhynch hypoxantha</i>	Rhipiduridae
Butterflies			
1	Autumn leaf	<i>Doleschallia bisaltidae</i>	Nymphalidae
2	Banded Treebrown	<i>Lethe confuse</i>	Nymphalidae
3	Blue Peacock	<i>Papilio acturus</i>	Papilionidae
4	Chocolate Pansy	<i>Junonia iphita</i>	Nymphalidae
5	Common Bushbrown	<i>Mycalesis perseus</i>	Nymphalidae
6	Common cerculean	<i>Jamides celeno</i>	Lycaenidae
7	Common Crow	<i>Euploea core</i>	Nymphalidae
8	Common Earl	<i>Tanaecia julii</i>	Nymphalidae
9	Common Evening Brown	<i>Melanitis leda</i>	Nymphalidae
10	Common Five Ring	<i>Ypthima baldus</i>	Nymphalidae
11	Common Grass Yellow	<i>Eurema hecabe</i>	Pieridae
12	Common Jester	<i>Symbrenthia hippoclus</i>	Nymphalidae
13	Common Line Blue	<i>Posotas nora</i>	Lycaenidae
14	Common Map	<i>Cyrestis thyodamas</i>	Nymphalidae
15	Common Maplet	<i>Chersonesia risa</i>	Nymphalidae
16	Common Mormon	<i>Papilio polytes</i>	Papilionidae
17	Common Nawab	<i>Polyuria athamas</i>	Nymphalidae
18	Common Palmfly	<i>Elymnias hypermnestra</i>	Nymphalidae
19	Common Peacock	<i>Papilio polyctor</i>	Papilionidae
20	Common Pierrot	<i>Castalius rosimon</i>	Lycaenidae
21	Common Red Eye	<i>Matapa aria</i>	Hesperiidae
22	Common Red Forester	<i>Lethe mekara</i>	Nymphalidae
23	Common Sergeant	<i>Athyma perius</i>	Nymphalidae
24	Common Silverline	<i>Spindasis vulcans</i>	Lycaenidae
25	Common Small Flat	<i>Sarangesa dasahara</i>	Hasperiidae

26	Common Windmill	<i>Atrophaneura polyeuctes</i>	Papilionidae
27	Dark Judy	<i>Abisara fylla</i>	Riodinidae
28	Fluffy tit	<i>Zeltus amasa</i>	Lycaenidae
29	Fulvous pied Flat	<i>Pseudocoladenia dan</i>	Hesperiidae
30	Glassy Bluebottle	<i>Graphium sarpedon</i>	Papilionidae
31	Golden Sapphire	<i>Heliophorus brahma</i>	Lycaenidae
32	Grass Demon	<i>Udaspes folus</i>	Hesperiidae
33	Green Commodore	<i>Sumalia daraxa</i>	Nymphalidae
34	Indian Cabbage White	<i>Pieris canidia</i>	Pieridae
35	Indian Fritillary	<i>Argynnis hyperbius</i>	Nymphalidae
36	Indian Red Admiral	<i>Venessa indica</i>	Nymphalidae
37	Indian Skipper	<i>Spialian galba</i>	Hesperiidae
38	Indian Tortoiseshell	<i>Aglais cashmiriensis</i>	Nymphalidae
39	Large Yeoman	<i>Cirrochroa aoris</i>	Nymphalidae
40	Lemon Pansy	<i>Junonia lemonias</i>	Nymphalidae
41	Mixed Punch	<i>Dodona ouida</i>	Riodinidae
42	Nigger	<i>Orsotrioena medus</i>	Nymphalidae
43	Orange Oakleaf	<i>Kallima inachus</i>	Nymphalidae
44	Orange Punch	<i>Dodona egeon</i>	Riodinidae
45	Painted Lady	<i>Venessa cardui</i>	Nymphalidae
46	Plain Tiger	<i>Danaus chrysippus</i>	Nymphalidae
47	Punchinello	<i>Zemeros flegyas</i>	Riodinidae
48	Purple Sapphire	<i>Heliophorus epicles</i>	Lycaenidae
49	Red Helen	<i>Papilio helenus</i>	Papilionidae
50	Red Lacewing	<i>Cethosia biblustisamena</i>	Nymphalidae
51	Redbreast	<i>Papilio alcmenor</i>	Papilionidae
52	Rice Swift	<i>Borbo cinnara</i>	Hesperiidae
53	Spotted sawtooth	<i>Prioneris thestylis</i>	Pieridae
54	Spotted Snow Flat	<i>Tagiades menaka</i>	Hesperiidae
55	Striped Tiger	<i>Danaus genutia</i>	Nymphalidae
56	Tailed Jay	<i>Graphium agamemnon</i>	Papilionidae
57	Tailed Judy	<i>Abisara fylla</i>	Riodinidae
58	Tiger Hooper	<i>Ochus subvittatus</i>	Hesperiidae
59	Water Snow Flat	<i>Tagiades litigiosa</i>	Hesperiidae
60	Yamfly	<i>Loxura atymnus</i>	Lycaenidae
61	Yellow Helen	<i>Papilio nephelus</i>	Papilionidae
62	Yellow Orange Tip	<i>Ixias pyrene</i>	Peiridae

DISCUSSION

Till date, the area remain unexplored which, during the present study, found to be rich in terms of the diversity of the species. Forest being subtropical to temperate type, trees is the most predominant taxa in the area, followed by herbs, shrubs and shrublets, ferns, climbers and epiphytes. The area constitutes a diverse habitat for both flora and fauna of the subtropical to temperate belt. The area is highly dominated with the trees and small trees species namely *Symplocos theifolia* Don., *Lithocarpus fenestrata* Roxb., *Castanopsis tribuloides* (Smith) A. DC., *Castanopsis hystrix* Hook. & Thomson ex. A. DC., *Brassaiopsis mitis* C.B. Clarke, *Quercus pachyphylla* Kurz., *Quercus lamellosa* Smith., *Pyralia edulis* (Wallich) A., *Pieris ovalifolia* D. Don, *Michelia cathcartii* Hook. f. Thomson, *Maesa chisia* Buch.-Ham. ex D. Don, *Machilus gammieana* King ex. Hook. f., *Antidesma acuminatum* Wight, *Acer caudatum* Wallich etc. Common shrub species recorded from the area are *Rubus ellipticus* Smith. , *Rubus niveus* Thunb., *Rubus paniculatus* (Smith) Rees. , *Viburnum erubescens* Wallich ex DC., *Dichroa febrifuga* Lour, *Maesa chisia* Don, *Oxyspora paniculata* (D. Don) DC, *Polygala arillata* Buch.-Ham ex D. Don etc. Diversity of the ground covering herbs species in the area recorded high, but in terms of density, in percent cover, was comparatively less. In addition, the area also provide diverse habitat for the faunal species.

Barapathing Reserve Forest is divided into five compartments. Compartment 1 is located in the lower belt, sharing the boundary with Machong Reserved Forest in the southern part, Parakha Reserve Forest in the western part, Latuk village in the eastern part and Compartment 2 of Barapathing RF in the northern part. Compartment 2 shares its boundary with Parakha RF in the western part, Latuk village in the eastern part, compartment 1 of Barapathing RF in the southern part and Compartment 3 of the same in the northern side. The places namely Dareli, Kattike dara, Harakkatay dara is located in the Compartment 2 (Fig 1, Table 1; Plots 39, 41). Compartment 3 is located in the area above Latuk village and the portion of Taal kharka area (Fig 1, Table 1; Plots 1, 2, 11, 12, 16, 17, 18). Coppartment 4 is located in the lower part of Malingay Kharka upto Dumphen Dara area, which shares its boundary in the north-western part with Assam RF (Fig 1, Table 1; Plots 20, 21 22, 32, 33, 34, 35, 36). Compartment 5 is located in upper part of Malingay Kharka upto Khedi (Fig 1, Table 1; Plots 23, 24, 25).

Lower part of the survey area, in and around Dumphen Dara, Taal Kharka, area above Latuk and Thek, Harakkatay Dara, in between 1800-2100m elevation are highly covered with *Antidesma acuminatum*, *Castanopsis hystrix*, *Castanopsis indica*, *Castanopsis tribuloides*, *Engelhardtia spicata*, *Eurya acuminata*, *Pieris ovalifolia*, *Symplocos theifolia*, *Symplocos glomerata*, *Dichroa febrifuga*, *Edgeworthia gardenierii*, *Rubus niveus*, *Rubus ellipticus*, *Viburnum erubescens*, *Rubus paniculatus* etc. Area above Kattike Dara till the lower side of malinge Kharka, in between 2150m – 2600m, the area is efficiently covered with *Acer caudatum*, *Actinodaphne sikkimensis*, *Brassaiopsis mitis*, *Cedrela febrifuga*, *Elaeocarpus lanceaefolius*, *Garuga pinnata*, *Glochidion acuminatum*, *Gynocardia odorata*, *Machilus edulis*, *Machilus gamblei*, *Machilus gammieana*, *Machilus odoratissimus*, *Michelia cathcartii*, *Michelia excels*, *Myrica esculenta*, *Nyssa sessiliflora*, *Rhus succedanea*, *Rhus succedanea* Linn. var. *acuminata*, *Daphne cannabina*, *Themnocalamus falconeri*, *Dichroa febrifuga* and so on. In the upper belt of the forest, above 2600m, which is the area below Khedi, and the upper side of Malinge Kharka, the area is

highly dominated with *Rhododendron falconeri* and *Yushania maling* with scattered *Acer pectinatum*, *Quercus lamellosa* etc. Species composition and forest density of Assam RF and Barapathing RF are almost the same, which may be due to the fact that altitudinal range, slope angle and slope aspect of both the RF is the same, and also these two forests are sharing the boundary from the middle belt, till the upper belt.



Forest below Khedi (ca. 2600m), dominated with *Rhododendron falconeri*

CONCLUSION AND RECOMMENDATIONS

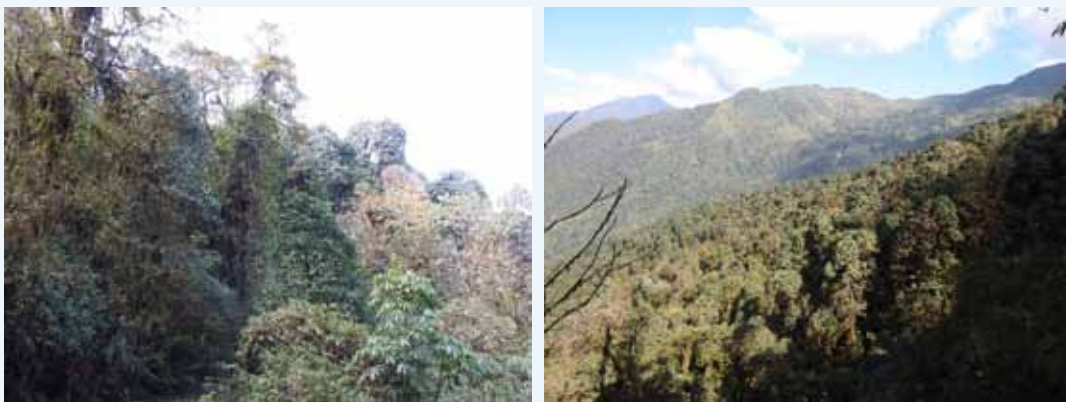
The area is not much impacted by the natural as well as anthropogenic disturbance. Intensity of threats to the biodiversity of the area due to grazing pressure by cow observed for which action should be taken. The unsustainable extraction of plants especially for firewood and livestock feed by the local inhabitants are the general disturbances resulted in the building up considerable pressure on the survival of the species. Other major threats are obviously, the effect of drastic changes in climate, hence studies on the impact of climate change on the biodiversity of the area is recommended, which will be helpful in framing conservation and management strategies.



Survey team in the habitat of *Acorus calamus* (Bojho) & *Hedychium gardnerianum* at Barapathing RF

Chitre Reserve Forest, South Sikkim

Nimesh Chamling, Anjana Pradhan, Suraj Subba & Dorjee Chewang Bhutia



An overview of Chitre Reserve Forest, South Sikkim

INTRODUCTION

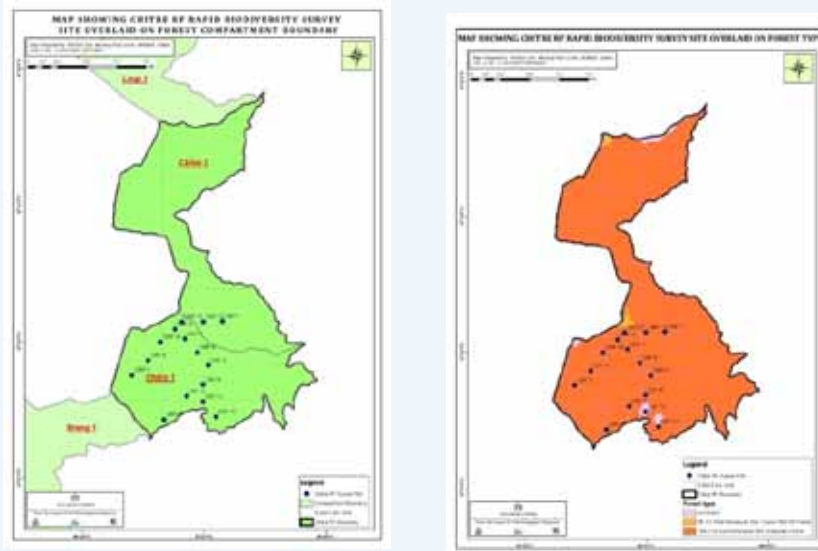
Chitre Reserve Forest is divided into two compartments and has two types of forest viz. 8B/C1 East Himalayan Sub Tropical Wet Hill Forest and 11B/C1b East Himalayan Wet Temperate Forest. The 8B/C1 East Himalayan Sub Tropical Wet Hill Forest (900-1800m asl), which receives an annual rainfall of about 2000m (79in). The ecoregion hosts a broad range of plant communities based on its complex topography, pedological characteristics and variations in rainfall. The main tree species of this forest are viz. *Macaranga denticulata*, *Symplocos glomerata*, *Symplocos lucida* and *Lithocarpus pachyphyllus*.

While, 11B/C1b East Himalayan Wet Temperate Forest (1800-2400m asl) is a transitional zone between subtropical mixed broad leaved to sub-temperate zone. Branches and tree bole are mainly covered with mosses, ferns and other epiphytes. The evergreen tree dominates the region and the undergrowth is mainly of dwarf species of bamboos. This forest type is the most widely distributed forest type in the State/division. The main tree species of the forest are *Quercus lamellosa*, *Q. lineata*, *Rhododendron arboreum* and *R. barbatum*.

The forest is home to more than 30 species of birds. Some of the birds which we encountered during our survey were House Sparrow, Common Myna, Black Bulbul, Blue Whistling Laughing Thrush, Red-Vented Bulbul. Some of the commonly found birds in the forest are Common Hill Partridge, Common Green Magpie, Verditer Flycatcher, Great Barbet, Oriental Turtle Dove and Scarlet Minivet. Apart from avifauna, the forest is also home to some mammalian species such as Barking Deer, Himalayan Black Bear, Wild Boar, Red Fox, Asian palm civet and Rhesus macaque.

SURVEY AREA

The current survey was carried out along the sampling path of Chitre Reserve Forest. The altitude of the surveyed path ranged from 2097m to 2450m asl lying between latitude 27°21'16.2" – 27°21'34.8"N and longitude 88°22'51.0" – 88°22'09.9"E. The slope angle of the surveyed area ranged from 30° to 45° and aspect facing towards E, S, SW, N and NE. The field visit was done in January 2018.



Survey Plots Along Chitre RF Covering Compartment & Forest Types



Taking GPS Coordinates



Enumeration of Plant Species

FINDINGS AND DISCUSSION

A total of 48 plant species were recorded by laying 15 sampling plots, covering an area of 0.015 ha. Out of these 13 tree species, 18 herb species, 4 shrub species, 5 epiphyte/climber species, 3 ferns and fern-allies species and 1 bamboo species. Apart from floral species avi-faunal, faunal and butterfly species were also recorded. A total of 31 Avi-faunal species, 8 faunal species and 11 butterfly species were recorded.

The Chitre Reserve Forest consists of rich floral and faunal diversity. The Reserve Forest has two types of forest viz. East Himalayan Sub Tropical Wet Hill Forest and East Himalayan Wet Temperate Forest. The Larger extant of the forest area is covered by East Himalayan Wet Temperate Forest while East Himalayan Sub Tropical Forest occupies the lesser extent. Though the Sub Tropical Forest occupies the smaller portion of the area but have good floral and faunal diversity.

Since, the larger extent of the forest falls under East Himalayan Wet Temperate Forest, so most of the plots were laid under this forest type, while fewer plots were laid under Sub Tropical Forest. Similarly, through our survey coordinates most of the plots came under very Dense Forest, while fewer plots were came under moderately dense Forest.

The reserve forest is divided into two forest types in the chitre RF viz., Wet Temperate Forest and Sub Tropical Wet Hill Forest. The Wet Temperate Forest was mostly covered by the tree species viz., *Symplocos glomerata*, *Symplocos lucida*, *Macaranga denticulata*. The ground vegetation was mostly covered by the grasses, herbs, ferns viz. *Bidens pilosa*, *Cynodon dactylon*, *Gerardiana diversifolia*, *Urtica dioica*, *Solanum khasianum*, *Hedychium gardnerianum*, *Fragaria nubicola*, *Rubus lineatus* and *Osbeckia stellata*.

While the Sub Tropical Wet Hill Forest were mostly covered by the tree species viz., *Rhododendron arboreum*, *Rhododendron barbatum*, *Quercus lineata*, *Quercus lamellosa*, *Machilus sp.*, and *Lithocarpus pachyphyllus*. Similarly, the ground vegetation was covered by the grasses, herbs, ferns viz., *Rubus lineatus*, *Edgeworthia gardnerii*, *Persicaria capitata*, *Polygonum molle*, *Rubia cordifolia*, *Swertia bimaculata*, *Commelina paludosa*, *Eragrostis sp.*, and *Astilbe rivularis*. While, the tree bole and branches were covered by orchids, epiphytes and climbers viz. *Agapetes serpens*, *Dendrobium sp.*, and *Pleione sp.*, etc.

During our survey encountered the two types of bamboo species viz., *Himalayacalamus falconeri* and *Yushania maling*. Since, bamboo species has the property to hold the soil firmly and prevent from soil erosion and soil binding species. As bamboo belonging in Poaceae family is fast growing species and helps in water retention.

Site characteristics of the sampling plots of Chitre Reserve Forest

Site code	Elevation (m)	Latitude (N)	Longitude (E)	Slope	Aspect
CRF1	2450	27°21'16.2"	88°22'51.0"	35	W
CRF2	2440	27°21'15.1"	88°22'25.3"	25	E
CRF3	2438	27°21'25.4"	88°22'36.6"	35	E
CRF4	2445	27°21'22.8"	88°22'44.6"	35	N
CRF5	2388	27°21'30.4"	88°22'44.8"	35	S
CRF6	2399	27°21'38.9"	88°22'47.4"	35	N
CRF7	2272	27°21'44.4"	88°22'42.1"	20	N
CRF8	2187	27°21'50.5"	88°22'36.2"	30	N
CRF9	2105	27°21'58.0"	88°22'34.8"	30	SW
CRF10	2097	27°21'57.9"	88°22'45.3"	35	N
CRF11	2155	27°21'58.0"	88°22'54.6"	40	NE
CRF12	2161	27°21'54.9"	88°22'31.4"	40	SW
CRF13	2150	27°21'49.2"	88°22'24.1"	45	N
CRF14	2149	27°21'41.2"	88°22'17.9"	30	S
CRF15	2146	27°21'34.8"	88°22'09.9"	45	N

Checklist of floral Species recorded in Chitre Reserve forest, South Sikkim

Sl. No.	Botanical Name	Local name	Family	Altitudinal Ranges (m) asl	IUCN Status
TREES					
1	<i>Evodia meliaefolia</i>		Rutaceae	1800-3000	NA
2	<i>Lithocarpus lanceaefolia</i>		Fagaceae	Upto 1600	NA
3	<i>Lithocarpus pachyphyllus</i> (Kurz) Rehder	Bantey	Fagaceae	1800-2700	NA
4	<i>Lyonia ovalifolia</i> (Wall.) Drude	Angeri	Rosaceae	1800-3000	NA
5	<i>Machilus edulis</i>	Pomsi	Lauraceae	1700-2000	NA
6	<i>Prunus bracteopadus</i> Koehne	Arupatey	Rosaceae	1700-2000	NA
7	<i>Quercus lamellosa</i> Sm.	Buk/Bajrath	Fagaceae	1600-2800	NA
8	<i>Quercus lineata</i> Blume	Phlant	Fagaceae	1900-3000	NA
9	<i>Rhododendron arboreum</i> ssp. <i>arboreum</i> (CB Clarke) Ridley.	Laligurans	Ericaceae	1800-3000	NA
10	<i>Rhododendron barbatum</i> Wall. ex G. Don	Lal chimal	Ericaceae	3000-3700	NA
11	<i>Symplocos glomerata</i> King ex C. B. Clarke	Khalmey	Symplocaceae	1200-2700	NA
12	<i>Symplocos lucida</i> (Thunb.) Siebold & Zucc.	Kharaney	Symplocaceae	1500-3000	NA
13	<i>Macaranga denticulata</i> (Blume) Müll.Arg.	Malato	Euphorbiaceae	100-1300	NA
SHRUB & SHRUBLET					
1	<i>Edgeworthia gardneri</i> Meissn.	Algeri / Lokti	Thymeliaceae	1000-2500	NA
2	<i>Osbeckia stellata</i> Buch.-Ham ex D. Don		Melastomaceae	500-2000	NA
3	<i>Rubus lineatus</i> Reinw. ex Blume	Ainselu	Rosaceae	1000-2600	NA

4	<i>Viburnum erubescence</i> Wall. ex DC	Asarey	Caprifoliaceae	1400-3950	NA
HERB					
1	<i>Astilberivularis</i> Ham	Budi okhati	Saxifragaceae	900-3200	NA
2	<i>Bidenspilosa</i> Linn.	Kuro	Asteraceae	200-1900	NA
3	<i>Campylandraaurantica</i> Baker	JangleeNakima	Liliaceae	1800--2900	NA
4	<i>Commelinapaludosa</i> Blume.	Kane jhar	Commelinaceae	Upto2800	
5	<i>Cynodondactylon</i> Linn.	Dubo	Poaceae	625-1750	
6	<i>Eragrostis sp.</i>	Banso	Poaceae	1500-2500	
7	<i>Ageratina adenophora</i> (Spreng.) R.M.King&H.Rob.	Kali jhar	Compositae	900-2200	
8	<i>Fragarianubicola</i> Lindley ex Lacaita	VuiAiselu	Rosaceae	2500-3900	NA
9	<i>Girardinia diversifolia</i> (Link) Friis	Bhangresisnu	Urticaceae	Upto 3000	
10	<i>Hedychiumgardnerianum</i> Sheppard ex Ker Gawl	Sara	Zingiberaceae	Upto 1700	
11	<i>Impatiens sp.</i>		Balsaminaceae		
12	<i>Oxalis corniculata</i> Linn.	Amilohjar	Oxalidaceae	1400-1900	NA
13	<i>Persicaria capitata</i> (Buch. Ham. ex D. Don) Gross	Ratneulo	polygonaceae	1500-2300	NA
14	<i>Pilea scripta</i> (Buch.-Ham. ex D. Don) Wedd.		Ulmaceae		
15	<i>Polygonum molle</i> D. Don	Thotne	Polygonaceae	1200-3400	NA
16	<i>Pouzolzia sanguinea</i> (Blume) Merrill	Chiple	Urticaceae		
17	<i>Rubia cordifolia</i> Linn.	Majito	Rubiaceae		
18	<i>Smilax zeylanica</i> Linn	Kukurdainey	Liliaceae		
19	<i>Solanum khasianum</i> CB Clarke	Boksikara	Solanaceae		
20	<i>Swertia bimaculata</i> (Siebold &Zuccarini) Hook. & Thom. ex CB Clarke	Bhaleychi- rowto	Gentianaceae	200-3500	NA
21	<i>Urticadioica</i> Linn.	Ghariasisnu	Urticaceae		
EPIPHYTES/CLIMBER					
1	<i>Agapetesserpens</i> (Wright) Sleumer		Ericaceae		
2	<i>Coelogyne sp.</i>		Orchidaceae		
3	<i>Dendrobium sp.</i>		Orchidaceae		
4	<i>Trichosanthes lepiniana</i> (Naudin) Cogn.	Indreni	Cucurbitaceae	700-2000	NA
5	<i>Pleione sp.</i>		Orchidaceae		
Ferns and Ferns-allies					
1	<i>Gleichenia gigantean</i> Wall. ex Hook	Kalamey	Gleicheniaceae		
2	<i>Pteriswallichiana</i> J. Agardh	ChateyUniu	Pteridaceae	800-2700	NA
3	<i>Selaginella sp.</i>		Selaginellaceae		
Bamboo					
1	<i>Himalayacalamus falconeri</i> (Hook.f. ex Munro) Keng f.	Singaney	Poaceae	Upto 2400	
2	<i>Yushania maling</i> (Gamble) R.B.Majumdar& Karthik.	Malingo	Poaceae		

Checklist of fauna & avifauna species encountered at Chitre Reserve Forest.

S. No.	Scientific Name	Common Name	Family		IUCN Status
FAUNA					
1	<i>Dremomyslokriah</i>	Orange-bellied Himalayan Squirrel	Sciuridae	Local Name	LC
2	<i>Macaca mulatta</i>	Rhesus macaque	Cercopithecidae	Lothurke	LC
3	<i>Muntiacusmuntjak</i>	Barking Deer	Cervidae	badhar	LC
4	<i>Paradoxurushermaphroditus</i>	Asian palm civet	Viverridae	DareyMirga	LC
5	<i>Prionailurusbengalensis</i>	Leopard cat	Felidae		LC
6	<i>Susscrofa</i>	Wild Boar	Suidae	Ningalo	LC
7	<i>Ursusthibetanus</i>	Himalayan Black Bear	Ursidae	Bodel	LC
8	<i>Vulpes vulpes</i>	Red Fox	Canidae	Ursusthibetanus	LC
AVI-FAUNA					
1	<i>Acridotherestrictis</i>	Common Myna	Sturnidae		
2	<i>Actinoduranepalensis</i>	Hoary Barwing	Timaliidae		
3	<i>Aegithaloslouschistos</i>	Rufous-fronted Tit	Paridae	Ruppi	
4	<i>Aethopyganepalensis</i>	Nepal Sunbird	Nectariniidae		
5	<i>Aethopygaspiraja</i>	Crimson Sunbird	Nectariniidae	Fista	
6	<i>Arborophilatorqueola</i>	Common Hill Partridge	Phasinidae	Kalobalchi	
7	<i>Cissachinensis</i>	Common Green Magpie	Corvidae		
8	<i>Columba livia</i>	Common Pigeon	Columbidae	Peura	
9	<i>Corvusmacrorhyncus</i>	Jungle Crow	Corvidae	DodayKoilee	
10	<i>Culicicapaceylonensis</i>	Grey Headed Canary Flycatcher	Muscicapidae		
11	<i>Dicrurusleucophaeus</i>	Ashy Drongo	Dicaeidae	Khag	
12	<i>Eumyiasthalassinus</i>	Verditer Flycatcher	Muscicapidae		
13	<i>Eumyiasthalassinus</i>	Verditer Flycatcher	Muscicapidae	Chibey	
14	<i>Fulvettavinipectus</i>	White Browed Fulvetta	Timaliidae	Hareney	
15	<i>Garrulaxleucolophus</i>	White Crested Laughing Thrush	Leiothrichidae	Hareney	
16	<i>Garrulaxstriatus</i>	Striated Laughing Thrush	Turdidae		
17	<i>Hypsipetesleucocephalus</i>	Black Bulbull	Pycnonotidae	Kolkoley	
18	<i>Laniustephronotus</i>	Grey backed Shrike	Laniidae	Kolkoley	
19	<i>Lophuraleucomelanos</i>	Kalij Pheasant	Phasianidae	Jureli	
20	<i>Megalaimavirens</i>	Great Barbet	Megalaimidae		
21	<i>Myiophonuscaeruleus</i>	Blue Whistling Laughing Thrush	Muscicapidae	Kalij	
22	<i>orthotomusatrogularis</i>	Common Tailor bird	Cisticolidae	Neual	
23	<i>Parusmonticulus</i>	Green Backed Tit	Paridae	Kulchura	
24	<i>Passer domesticus</i>	House Sparrow	Passeridae		
25	<i>Pericrocotus(flammuus) speciosu</i>	Scarlet Minivet	Campephagidae	ChichinkKotey	
26	<i>Pycnonotuscafer</i>	Red Vented Bulbull	Pycnonotidae	Bhangera	
27	<i>Pycnonotusstriatus</i>	Striated Bulbull	Pycnonotidae	Rani Chara	

28	<i>Rhipidura aureola</i>	White browed Fantail	Rhipiduridae	Jureli	
29	<i>Streptopelia orientalis</i>	Oriental Turtle Dove	Columbidae	Jureli	
30	<i>Yuhina flavicollis</i>	Whiskered Yuhina	Timaliidae		
31	<i>Yuhina gularis</i>	Striped Throated Yuhina	Sylviidae	Dhukur	
Butterfly					
1	<i>Argynnis childreni</i>	Large Silverstripe	Nymphalidae		
2	<i>Aglaia caschmirensis</i>	Indian tortoise shell	Nymphalidae		
3	<i>Cethosia cyane</i>	Lacewing	Nymphalidae		
4	<i>Eurema hecabe</i>	Grass Yellow	Pieridae		
5	<i>Heliophorus brahma</i>	Golden Sapphire	Lycaenidae		
6	<i>Notocrypta paralysos</i>	Common Banded Demon	Hesperiidae		
7	<i>Papilio paris</i>	Paris Peacock	Papilionidae		
8	<i>Pieris rapae</i>	cabbage white	Pieridae		
9	<i>Vanessa cardui</i>	Painted lady	Nymphalidae		
10	<i>Vanessa indica</i>	Indian Red Admiral	Nymphalidae		
11	<i>Zemeros flegyas</i>	Punchinello	Riodinidae		



Grass Yellow



Punchinello



Straight Swift



Restricted Demon

Darap Reserve Forest, West Sikkim

Sanjyoti Subba, Sanchi Subba & Sumitra Nepal



INTRODUCTION

Darap Reserve Forest (West Sikkim) is laying between latitude $27^{\circ}17'16.7''\text{N}$ to $27^{\circ}17'59.0''\text{N}$ and Longitude $88^{\circ}11'01.3''\text{E}$ to $88^{\circ}10'58.8''\text{E}$ along elevation between 1800 - 2200 m asl. The present study is represented by subtropical and wet temperate forest. The main vegetation of this reserve forest includes viz., *Juglans regia*, *Erythrina arborescens*, *Betula* sp., *Cryptomeria japonica*, *Exbucklandia populnea*, *Hovenia dulcis*, *Macaranga pustulata*, *Machilus* sp., *Schima wallichii*, *Tetradium fraxinifolia*, *Castanopsis hystrix*, *Castanopsis indica*, *Castanopsis tribuloides*, *Lithocarpus fenestratus*, *Magnolia doltsopa*, *Magnolia cathcartii*, *Magnolia velutina*, *Prunus nepalensis*, *Quercus lamellosa*, *Symplocos lucida*, *Symplocos glomerata*, etc., were dominated in the forest.

The common shrubs species viz., *Viburnum erubescens*, *Rubus ellipticus*, *Boehmeria* sp., *Osbeckia stellata*, *Oxyspora paniculata*, *Dichroa febrifuga*, etc., and ground floor is covered by herbaceous plant species such as *Biden pilosa*, *Pilea umbrosa*, *Drymaria cordata*, *Oxalis corniculata*, *Hedychium spicatum*, *Persicaria capitata*, *Fragaria nubicola*, *Swertia bimaculata*, *Centella asiatica*, *Viola* sp., *Hydrocotyle javanica*, *Rubus calycinus*, etc. The area also harbors many climber species such as *Rubia cordifolia*, *Tetrastigma serrulatum*, *Smilax* sp., other fern and many other fern-allies, mosses, and lichens too.

This reserve forest is home to many faunal species, viz., Himalayan Black bear, Wild Boar, Barking Deer, Flying squirrel, Wild dog and Red fox etc. Due to dense forest provides shelter as well as abundant fruits/feed and as such are good indicator of faunal presence and richness. Indirect evidence is recorded in reserve forest most in the case of Himalayan Black bear.

STUDY AREA

Darap Reserve Forest is located in the West District of Sikkim, occupies an areas of 1.22 km² sharing its border with Lunggang RF and Singrangpong RF over the Rimbi khola in the Western Sikkim. It is a biologically diverse reserve forest and the climate is wet and cold. We covered the sub-tropical forest to wet temperate forest, the elevation ranges between 1800-2200 m asl. The field survey was conducted during November 2017.



Showing the forest compartment, forest density & forest types along the sampling plots of Darap Reserve Forest, West Sikkim



Laying sampling plots and measuring circumference breast height



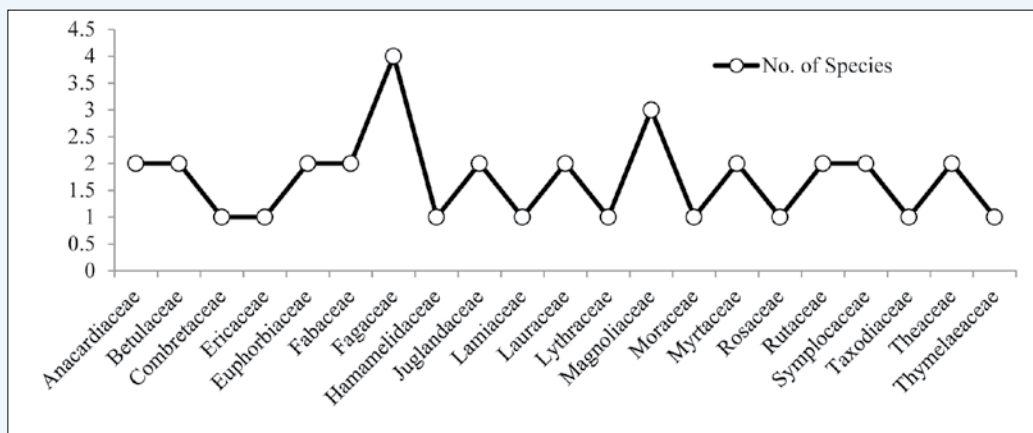
Hoya sp., and *Tetrastigma serrulatum* habitat in Darap Reserve Forest, West Sikkim

FINDINGS AND DISCUSSION

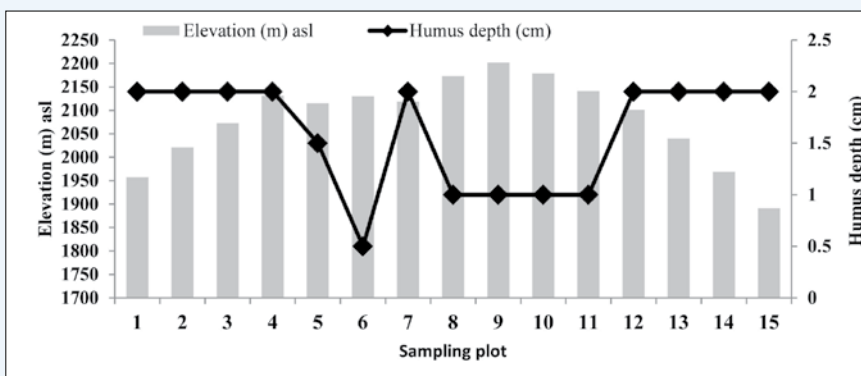
A total of 114 species were recorded along Darap Reserve forest in 15 sampling plots, covering an area of 0.15 ha. Of which 37 tree species belonging to 30 genera and 20 families were recorded. The tree species in the forest was dominated by Fagaceae (4 species each families) followed by Fabaceae & Magnoliaceae (3 species each), Anacardiaceae, Betulaceae, Euphorbiaceae, Juglandaceae, Lauraceae, Myrtaceae, Rutaceae, Symplocaceae, Theaceae (2 species each), respectively. Fagaceae family included several species belonging to the genus *Castanopsis hystrix*, *Castanopsis tribuloides*, *Castanopsis indica*, and *Lithocarpus fenestratus*. Similarly; *Erythrina arborescens*, *Albizia procera* belongs to Fagaceae family and *Magnolia cathcartii*, *Magnolia velutina*, & *Magnolia doltsopa* (Magnoliaceae) families were recorded in the study area.

Similarly, 15 species of shrubs belonging to 13 genera and 11 families, 42 herb species (33 genera & 19 families), 11 climbers & epiphytes (10 genera & 9 families) and 9 fern and fern-allies (9 genera & 7 families) were inventoried in the entire sampling plots. Correlation between the humus depth and elevation shows significantly lower (1.5 cm depth) in elevation 2115 and (0.5 cm depth) in elevation 2130 m asl.

Regarding forest compartment boundary, randomly laid 1-15 sampling plots for forest compartment boundary 1. In the forest density (dense) forest, randomly laid (1,3,4,7,10) & (13-15) sampling plots and other remaining sampling plots (2,5,6,8,9) & (11-12) were randomly laid for moderate dense forest. However, in the forest types, the sampling plots (14) were randomly laid in the wet temperate forest and only one sampling plot was laid in the sub-tropical forest and some part of the forest was not covered due to rocky slope in the forest.



Family-wise species composition of tree species of Darap Reserve Forest, West Sikkim



Correlation between the elevation and humus depth of Darap Reserve Forest, West Sikkim

Site Characteristics of the sampling plots of Darap Reserve Forest, West Sikkim

Site Code	Forest types	Altitude (m) asl	Coordinates		Slope Angle (°)	Slope Aspect	Humus depth (cm)	Disturbance	
			Lat	Long				Anthropogenic	Natural
SRF1	Wet temperate forest	1957	27°17'39.6"	88°11'18.3"	40	E	2	Fodder collection	
SRF2	Wet temperate forest	2021	27°17'35.5"	88°11'17.1"	60	NE	2	Fodder collection	
SRF3	Wet temperate forest	2073	27°17'25.0"	88°11'12.3"	60	NE	2		Natural
SRF4	Wet temperate forest	2131	27°17'17.7"	88°11'10.2"	40	E	2		Natural
SRF5	Wet temperate forest	2115	27°17'17.5"	88°11'01.3"	60	N	1.5		Natural
SRF6	Wet temperate forest	2130	27°17'16.7"	88°10'58.8"	60	E	0.5		Natural
SRF7	Wet temperate forest	2119	27°17'19.2"	88°11'12.8"	60	SW	2		Natural
SRF8	Wet temperate forest	2173	27°17'23.7"	88°11'26.7"	40	SW	1		Natural
SRF9	Wet temperate forest	2202	27°17'24.0"	88°11'39.1"	60	N	1		Natural
SRF10	Wet temperate forest	2179	27°17'28.3"	88°11'48.9"	60	SW	1		Natural
SRF11	Wet temperate forest	2141	27°17'35.4"	88°11'55.4"	50	SW	1		Natural
SRF12	Wet temperate forest	2101	27°17'40.4"	88°11'53.8"	50	SE	2		Natural
SRF13	Wet temperate forest	2040	27°17'45.7"	88°11'49.3"	60	SE	2		Natural
SRF14	Wet temperate forest	1969	27°17'51.1"	88°11'48.8"	50	S	2	Fodder collection	
SRF15	Sub-tropical forest	1891	27°17'59.0"	88°11'45.3"	40	NW	2		Natural

Checklist of floral species of Darap Reserve forest in West Sikkim

Sl. No	BOTANICAL NAME TREE	LOCAL NAME	FAMILY	Altitudinal ranges (m) asl	IUCN Status
1	<i>Albizzia procera</i> Benth.	Seto siris	Fabaceae		
2	<i>Alnus nepalensis</i> Don.	Utis	Betulaceae	200-2800	LC
3	<i>Betula cylindrostachya</i> Lindl. ex Wall.	Saur	Betulaceae	1400-2800	LC
4	<i>Castanopsis hystrix</i> Hook. & Thomson ex. A. DC.	Patley katush	Fagaceae	1600-1600	NA
5	<i>Castanopsis tribuloides</i> (Smith) A. DC	musre Katush	Fagaceae	450-2300	NA
6	<i>Castanopsis indica</i> (Roxb. ex Lindl.) A.DC.	Dalney katus	Fagaceae	1500-1500	NA
7	<i>Choerospondias axillaris</i> (Roxb.) B.L.Burt & A.W.Hill	Lapsi	Anacardiaceae	900-2500	NA
8	<i>Cryptomeria japonica</i> (Thunberg ex. Linn. F.) D. Don	Dhupi	Taxodiaceae	1100-2500	NT
9	<i>Duabanga grandiflora</i> (DC.) Walp.	Lampate	Lythraceae	900-1500	NA
10	<i>Engelhardtia spicata</i> Lechen ex Blume.	Mauwa	Juglandaceae	500-2100	LC
11	<i>Erythrina arborescens</i> Roxb.	Phalado	Fabaceae	400-2100	NA
12	<i>Eurya acuminata</i> DC.	Jhingni	Theaceae	700-3000	NA
13	<i>Exbucklandia populnea</i> (R. Br. Ex Griff) R. W. Br	Piplee	Hamamelidaceae	1200-2000	NA
14	<i>Ficus nemarolis</i> Wall.	Dudhilo	Moraceae		NA
15	<i>Hovenia dulcis</i> Thunb.	Bangi	Thymelaeaceae		NA
16	<i>Jambosa formosa</i> (Wall.) G. Don.	Ambakey	Myrtaceae		
17	<i>Juglans regia</i> L.	Okhar	Juglandaceae	500-1800	LC
18	<i>Leucosceptrum canum</i> Sm.	Gurpis	Lamiaceae		NA
19	<i>Lithocarpus fenestratus</i> (Roxb.) Rehde	Arkowlo	Fagaceae		NA
20	<i>Lyonia ovalifolia</i> var. <i>ovalifolia</i>	Angeri	Ericaceae	200-3400	NA
21	<i>Macaranga denticulata</i> (Blume) Müll.Arg.	Malata	Euphorbiaceae	100-1300	NA
22	<i>Machilus</i> sp.	Kawlo	Lauraceae	1700-2000	NA
23	<i>Maesa</i> sp.	Bilauney	Myrtaceae		NA
24	<i>Magnolia velutina</i> DC.	Phusre champ	Magnoliaceae		NA
25	<i>Magnolia doltsopa</i> (Buch.-Ham. ex DC.) Figlar	Ranichamp	Magnoliaceae	1500-2400	NA
26	<i>Magnolia cathcartii</i> (Hook. f. & Thomson) Noot.	Titey champ	Magnoliaceae	1400-2700	LC
27	<i>Ostodes paniculata</i> Blume	Bepari	Euphorbiaceae		NA
28	<i>Persea odoratissima</i> (Nees) Kosterm.	Kawlo	Lauraceae	1500-2100	NA

29	<i>Prunus bracteopadus</i> Koehne	Arupatey	Rosaceae	1700-2000	NA
30	<i>Rhuschinensis</i> Mill.	Bhakimlo	Anacardiaceae		NA
31	<i>Rhus succedanea</i> Linn.	Rani bhalayo	Anacardiaceae		NA
32	<i>Schima wallichii</i> Choisy	Chilaune	Theaceae	800-1800	NA
33	<i>Symplocos glomerata</i> King ex C.B. Clarke	Kholme	Symplocaceae	1200-2700	NA
34	<i>Symplocos lucida</i> (Thunb.) Siebold & Zucc	Kharane	Symplocaceae	1500-3000	NA
35	<i>Terminalia myriocarpa</i> Van Heurck & Müll. Arg	Panisaj	Combretaceae		
36	<i>Tetradium fraxinifolium</i> (Hook. f.) T.G. Hartley	Khanakpa	Rutaceae		
37	<i>Zanthoxylum acanthopodium</i> DC	Boke timmur	Rutaceae		
	SHRUB& SHRUBLETS				
1	<i>Ardisia macrocarpa</i> Wall.	Damai phal	Myrsinaceae	1500-2400	NA
2	<i>Brassaiopsis mitis</i> Clarke	Chuletro	Araliaceae		
3	<i>Dichroa febrifuga</i> Lour.	Basak	Hydrangaceae	200-2000	NA
4	<i>Mahonia napaulensis</i> DC.	Kesar	Berberidaceae		
5	<i>Mussaenda roxburghii</i> Hook. f.	Dhobini phul	Rubiaceae		
6	<i>Neillia rubiflora</i> D. Don	Kirkeray	Rosaceae		
7	<i>Osbeckia stellata</i> Buch.-Ham.ex D. Don	Lote Jhar	Melastomataceae	200-2300	NA
8	<i>Osbeckia nepalensis</i> Hook. f	Lote Jhar	Melastomataceae		
9	<i>Oxyspora paniculata</i> (D.Don) DC	Chulesee	Melastomataceae		
10	<i>Pilea</i> sp.	Chipley	Urticaceae		
11	<i>Polygonum</i> sp.	Rani thotney	Polygonaceae		
12	<i>Rubus ellipticus</i> Sm.	Aiselu	Rosaceae	1000-2600	NA
13	<i>Rubus paniculatus</i> Sm.	Aiselu	Rosaceae		
14	<i>Strobilanthes</i> sp.	kebu	Acanthaceae	2700-3600	NA
15	<i>Viburnum erubescence</i> Wall. ex D	Asarey	Adoxaceae	1400-3950	NA
	HERB				
1	<i>Arisaema intermedium</i> Blume	Larua/Banko	Araceae	2600-3400	NA
2	<i>Artemisia vulgaris</i> L.	Titey pate	Compositae	1500-3800	NA
3	<i>Astilbe rivularis</i> Buch.-Ham. ex D. Don	Budi okhati	Saxifragaceae	900-3200	NA
4	<i>Begonia rubella</i> Buch.-Ham. ex D. Don	Magarkachi	Begoniaceae	1000-1900	NA
5	<i>Begonia</i> sp.	Magarkachi	Begoniaceae		

6	<i>Bidens pilosa</i> Linn.	Kuro	Asteraceae	200-1900	NA
7	<i>Carex</i> sp.	Harkatto	Cyperaceae	1500-2000	
8	<i>Carex baccans</i> Nees	Harkatto	Cyperaceae	200-2700	LC
9	<i>Commelina benghalensis</i> Linn.	Kaney jhar	Commelinaceae		
10	<i>Crotalaria</i> sp.		Leguminosae		
11	<i>Cyperus eragrostis</i> Lam	Harkatto	Cyperaceae	200-1000	LC
12	<i>Cyperus scariosus</i> R.Br.	Harkatto	Cyperaceae	200-1500	NA
13	<i>Desmodium</i> sp.		Leguminosae		
14	<i>Digitaria</i> sp.	Banso	Poaceae		
15	<i>Elatostema platyphyllum</i> Weddell.	Gagleto	Urticaceae	200-1500	NA
16	<i>Elatostema sessile</i> J.R.Forst. & G.Forst.	Galato	Urticaceae	1000-1700	NA
17	<i>Eragrostis</i> sp.		Poaceae	1500-2500	
18	<i>Eupatorium adenophorum</i> Spreng.	Kalijhar	Asteraceae		
19	<i>Fragaria nubicola</i> Lindley ex Lacaita	Vui Aiselu	Rosaceae	2500-3900	NA
20	<i>Gerardiana diversifolia</i> (Link) Friis	Bhangre sisnu	Urticaceae	300-2800	NA
21	<i>Globba sessiliflora</i> Sims	Sara	Zingiberaceae	1700-2300	LC
22	<i>Hedychium spicatum</i> Smith	Sara	Zingiberaceae	1800-2800	NA
23	<i>Heracleum wallichii</i> DC	Chimphing	Apiaceae	1900-2700	NA
24	<i>Hemiphragma heterophyllum</i> Wall.		Plantaginaceae	2600-4100	NA
25	<i>Impatiens arguta</i> Hook.f. & Thomson	Mujuro	Balsaminaceae	1800-3200	NA
26	<i>Impatiens dolichoceras</i> Pritz. ex Diels	Mujuro	Balsaminaceae	1800-3200	NA
27	<i>Impatiens latiflora</i> Hook.f. & Thomson	Mujuro	Balsaminaceae	1200-2100	NA
28	<i>Impatiens</i> sp.		Balsaminaceae		
29	<i>Impatiens stenantha</i> Hook.f.	Mujuro	Balsaminaceae		
30	<i>Laportea terminalis</i> Wight.	Patle sisnu	Urticaceae	1600-2600	NA
31	<i>Nepeta</i> sp.		Lamiaceae		
32	<i>Oxalis corniculata</i> Linn	Amilo jhar	Oxalidaceae	1400-1900	NA
33	<i>Persicaria capitata</i> (Buch.Ham.ex D.Don) Gross	Ratneulo	Polygonaceae	1500-2300	
34	<i>Persicaria nepalensis</i> (Meisn.) Miyabe	Ratneulo	Polygonaceae		
35	<i>Pilea umbrosa</i> Wall. ex Blume	Chiple ghans	Urticaceae	1200-2500	NA
36	<i>Polygonum molle</i> D. Don	Thotney	Polygonaceae	1200-3400	NA
37	<i>Potentilla penduncularis</i> D. Don		Rosaceae	3000-4800	NA

38	<i>Rohdea nepalensis</i> (Raf.) N.Tanaka	Janglee Nakima	Asparagaceae		
39	<i>Rubus calycinus</i> Wall. ex D. Don		Rosaceae	1200-3000	NA
40	<i>Rumex nepalensis</i> Sprengel	Halhalley	Polygonaceae	1000-4300	NA
41	<i>Selinum</i> sp.		Apiaceae		
42	<i>Swertia bimaculata</i> (Siebold & Zucc.) Hook. f. & Thomson ex C.B. Clarke	Chirito	Gentianaceae	200-3000	NA
CLIMBER & EPIPHYTE					
1	<i>Clematis buchananiana</i> DC.	Pinasey lahara	Ranunculaceae	1200-2800	NA
2	<i>Herpetospermum pedunculatum</i> (Seringe.) C.B. Clarke	Ban karela	Cucurbitaceae	2300-2500	NA
3	<i>Holboellia angustifolia</i> Wall.	Gulfa	Lardizabalaceae	1000-2700	NA
4	<i>Piper boechmeriaefolium</i> (Miq.) DC.	Chambo	Piperaceae	1000-2400	NA
5	<i>Rhaphidophora decursive</i> (Roxb.) Scott	Kanchirna	Araceae	2000	NA
6	<i>Rhaphidophora</i> sp.	Kanchirna	Araceae		
7	<i>Rubia cordifolia</i> L	Manjith	Rubiaceae	300-2800	NA
8	<i>Smilax zeylanica</i> Linn.	Kukur dainey	Liliaceae	600-1700	NA
9	<i>Stephania</i> sp.	Tamarkey	Menispermaceae	1500-2300	NA
10	<i>Tetrastigma serrulatum</i> (Roxb.) Planch	Charcharay lahara	Vitaceae	1800-2500	NA
11.	<i>Trichosanthes lepiniana</i> (Naudin) Cogn.	Inderani	Cucurbitaceae	700-2000	NA
FERN & FERN-ALLIES					
1	<i>Asplenium lacinatedum</i> D.Don		Aspleniaceae	1000-2500	NA
2	<i>Cyathea</i> sp.		Cyatheaceae		
3	<i>Dicranopteris</i> sp.	Sottar	Gleicheniaceae		NA
4	<i>Diplazium</i> sp.	Sauney ningro	Athyriaceae	1700-2500	NA
5	<i>Diplopterygium gigantean</i> Wall. ex Hook		Gleicheniaceae	800-2800	NA
6	<i>Huperzia</i> sp.		Lycopodiaceae		
7	<i>Lycopodium japonicum</i> Thunb.	Nagbelli	Lycopodiaceae	100-3300	NA
8	<i>Plagiogyria pycnophylla</i> (Kunze) Mett		Plagiogyriaceae		
9	<i>Selaginella</i> sp.		Selaginellaceae	2500	NA

SIGNIFICANCE OF THE RESERVE FOREST

1. Over 12 orchid species were recorded in 0.15 ha in 15 sampling plots.
2. Habitat of Himalayan Black Bear
3. Eco-tourism destination

A total of 12 species of orchid belonging to (9) genera were recorded in the survey period of which some of the species is full blooming were identified easily while only genus were recorded for some other species.

Checklist of orchid species of Darap Reserve Forest, West Sikkim

Sl. No	Botanical Name
1	<i>Agrostophyllum callosum</i> Rchb.f
2	<i>Bulbophyllum</i> sp.
3	<i>Coelogyne fuscescens</i> Lindl.
4	<i>Coelogyne</i> sp.
5	<i>Cymbidium cochleare</i> Lindl.
6	<i>Gastrochilus acutifolius</i> (Lindl.) Kunze
7	<i>Gastrochilus inconspicuus</i> (Hook.f.) Kuntze
8	<i>Pleione humilis</i> (Sm.) D. Don
9	<i>Pleione praecox</i> (pink) (Smith) D. Don
10	<i>Vanda</i> sp.
11	<i>Otochilus fuscus</i> Lindl.
12	<i>Liparis</i> sp.

A host-tree and orchid species specificity of Darap Reserve Forest, West Sikkim

Sl. No	Botanical name	Local Name	Orchid species
1	<i>Lyonia ovalifolia</i>	Angeri	<i>Coelogyne fuscescens</i> , <i>Bulbophyllum</i> sp., <i>Vanda</i> sp., <i>Pleione praecox</i> , etc.
2	<i>Engelhardtia spicata</i>	Mauwa	<i>Dendrobium</i> sp., <i>Coelogyne</i> sp., <i>Cymbidium</i> sp., etc.
3	<i>Schima wallichii</i>	Chilaune	<i>Gastrochilus acutifolius</i> & <i>Gastrochilus inconspicuus</i>
4	<i>Castanopsis tribuloides</i>	Musre Katus	<i>Pleione humilis</i> & <i>Pleione praecox</i> , <i>Eria coronaria</i> , <i>Agrostophyllum callosum</i> , etc.
5	<i>Symplocos lucida</i>	Kharaney	<i>Dendrobium</i> sp., <i>Pleione humilis</i> & <i>Pleione praecox</i> , etc.

These species specific relationships were highly correlated with host tree species which have some of the physical characteristics like water holding capacity of the host tree bark, exposure to wind, light attenuation by the canopy played a important role for orchid growth. Epiphytic plant especially orchid are an important part of biological diversity and for forest ecology. It is therefore essential to understand the relation between the host tree species, growth habitat and its distribution patterns for the conservation of biodiversity.



Cymbidium cochleare



Eria coronaria



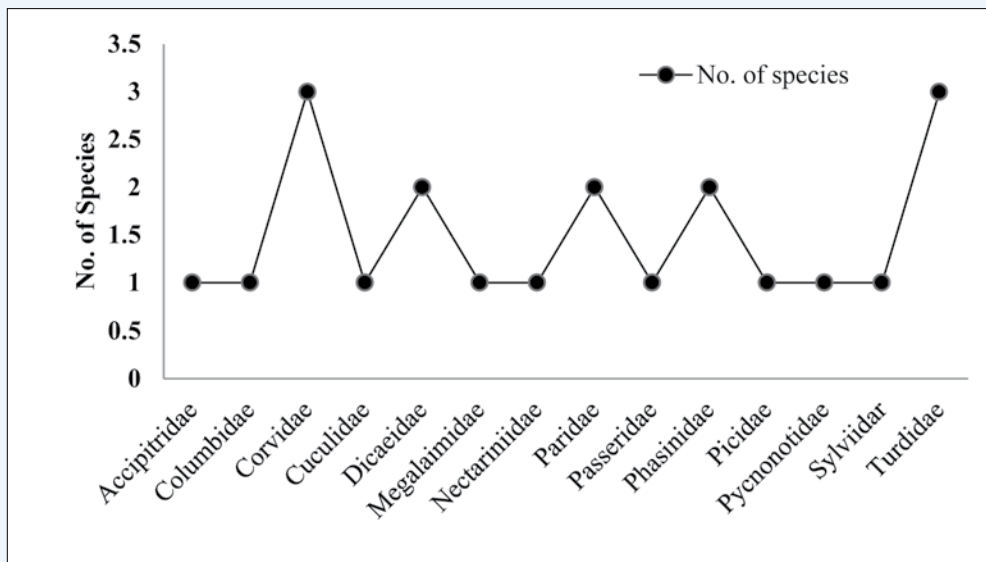
Otochilus fuscus



Liparis sp

FAUNA

During the survey, 5 species of animal were recorded from Darap Reserve Forest. Further, a total of 21 bird species belonging to 14 families were recorded. The family-wise bird species composition were recorded for Turdidae & Corvidae (3 species each) followed by Dicaeidae, Paridae, Phasinidae (2 species each) from this particular transect. The other remaining family represented by single species.



Family-wise bird species composition of Darap Reserve forest

Checklist of fauna & avifauna species encountered at Darap Reserve Forest, West Sikkim

Sl. No	Scientific Name	Family	Common Name	Local Name
FAUNA				
1	<i>Muntiacus muntjak</i>	Cervidae	Barking deer	Mirga
2	<i>Ursus thibetanus</i>	Carnivora	Himalayan Black bear	Ban kukur
3	<i>Cuon alpinus</i>	Carnivora	Wild dog	Bhalu
4	<i>Sus scrofa</i>	Suidae	Wild Boar	Bodyal
5	<i>Canis sp</i>	Carnivora	Common Jackal	Syall
AVI-FAUNA				
1	<i>Aegithalos louschistos</i>	Paridae	Rufous-fronted Tit	Fista
2	<i>Cettia major</i>	Sylviidae	Chestnut Crowned Warbler	Fista
3	<i>Fulvetta vinipectus</i>	Paridae	Coal Tit	Fista

4	<i>Corvus macrorhincus</i>	Corvidae	Jungle Crow	Khag
5	<i>Cuculus canorus</i>	Cuculidae	Eurassian	Cuckoo
6	<i>Dendrocopos darjellensis</i>	Picidae	Darjeeling Woodpecker	Laachey
7	<i>Dicrurus leucophaeus</i>	Dicaeidae	Ashy Drongo	Chibey
8	<i>Dicrurus macrocerus</i>	Dicaeidae	Black Drongo	Chibey
9	<i>Garrulax leucolophus</i>	Turdidae	White-crested Laughingthrush	Kolkoley
10	<i>Garrulax ocellatus</i>	Turdidae	Spotted Laughing Thrush	Kolkoley
11	<i>Gypaetus barbatus</i>	Accipitridae	Lammergeier	Chill
12	<i>Lophura leucomelana</i>	Phasinidae	Kalij pheasant	Kalij
13	<i>Megalaima virens</i>	Megalaimidae	Great Barbet	Neual
14	<i>Myophonus caeruleus</i>	Turdidae	Blue Whistling Thrush	Kalchura
15	<i>Passer rutilans</i>	Passeridae	Russet Sparrow	Bhangera
16	<i>Pycnonotus cafer</i>	Pycnonotidae	Red Vented Bulbull	Jureli
17	<i>Streptopelia orientalis</i>	Columbidae	Oriental Turtle Dove	Dhukur
18	<i>Urocissa ornata</i>	Corvidae	Yellow Billed Blue Magpie	Lampucharey
19	<i>Corvus macrorhincus</i>	Corvidae	Large billed Crow	Kag
20	<i>Arborophila torqueola</i>	Phasinidae	Hill Partridge	Peura
21	<i>Aethopyga ignicauda</i>	Nectariniidae	Fire-tailed sunbird	Balchi

During the survey period, the disturbance of Himalayan Black bear was found in the forest floor. Maximum indirect evidences were recorded like, felling of tree branches, drooping, and scrap mark on tree bark. This is indirect evidences of Himalayan Black Bear, the felling of tree branches of *Symplocos lucida* having huge matured fruits. It is one of the indicators for the presences of faunal species in the forest.

Conservation Recommendations And Conculsion

Biodiversity conservation is an important issue in the world. Conservation initiatives of the reserve forest for the preservation of the natural forest and maintain the ecosystem. As per the forest density and forest types, the similar species were recorded in the entire study area. Some of the epiphytic species like orchid and climber like *Clematis* sp., were highly dominated in the forest margin due to wet and cool forest. The locally called “Inderine” is hanging on the maximum density of tree species as a good indicator of avi-faunal diversity in the forest. It is conclude that the area is natural, undisturbed and virgin forest.



Trichosanthes lepiniana (Naudin) Cogn

Garethang Reserve Forest, West Sikkim

Anjana Pradhan, Nimesh Chamling and Dorjee Chewang Bhutia

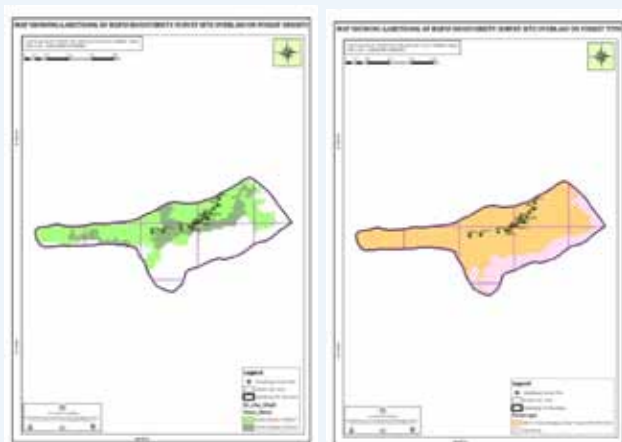


INTRODUCTION

Garethang Reserve forest is located in the district of West Sikkim under the jurisdiction of Sribadam Block in Soreng Range. The forest lies in compartment “Garethang 1” of the Dethang Mane Garethang Beat covering an area of 0.91km² (90.50ha). The Reserve Forest is classified as 8B/C1 East Himalayan Subtropical Wet Hill Forest with warm and humid climate with high levels of rainfall and humidity.

STUDY AREA

The survey was conducted along the altitudinal range from 1381m to 1426m above sea level lying between 27°11'34.4"N – 27°17'0.3"N latitude and 88°18'03.6"E – 88°18'25.2"E longitude. A total of 14 plots were laid starting from the border of Kamling village in the east of the RF where a boundary pillar was recorded at an elevation of 1381m asl. The current field survey was conducted during the month of October 2017 covering an area of 0.14ha. The slope angle of the area is a maximum of 60 degrees facing North aspect with a canopy cover of maximum 50 – 60%.



Map of survey plots along Garethang RF covering forest density and forest type



Site characteristics of the sampling plots along Garethang Reserve Forest in West Sikkim

Site Code	Forest Type	Altitude (m)	GPS Coordinates		Slope Aspect	Slope Angle (°)	Canopy Cover (%)
			Latitude (N)	Longitude (E)			
GRF 01	Open sub-tropical forest	1381	27°11'43.9"	88°18'25.2"	N	20	10
GRF 02	Open sub-tropical forest	1386	27°11'42.0"	88°18'24.9"	N	10	10
GRF 03	Open sub-tropical forest	1410	27°11'41.0"	88°18'23.3"	NE	10	30
GRF 04	Open sub-tropical forest	1418	27°11'39.6"	88°18'22.3"	E	25	35
GRF 05	Moderate sub-tropical forest	1420	27°11'38.4"	88°18'21.5"	NE	45	40
GRF 06	Moderate sub-tropical forest	1420	27°11'39.4"	88°18'20.6"	E	30	45
GRF 07	Open sub-tropical forest	1421	27°11'38.3"	88°18'19.9"	NW	50	20
GRF 08	Moderate sub-tropical forest	1405	27°11'37.2"	88°18'19.0"	NE	50	50
GRF 09	Open sub-tropical forest	1411	27°11'37.0"	88°18'17.6"	E	45	30
GRF 10	Open sub-tropical forest	1408	27°11'35.9"	88°18'16.8"	E	45	10
GRF 11	Moderate sub-tropical forest	1407	27°11'35.9"	88°18'15.5"	NE	20	40
GRF 12	Dense sub-tropical forest	1404	27°11'35.5"	88°18'13.0"	N	50	60
GRF 13	Open sub-tropical forest	1408	27°11'34.7"	88°18'07.2"	E	10	30
GRF 14	Open sub-tropical forest	1426	27°11'34.4"	88°18'03.6"	N	25	30

NOTE: N, North; NE, North-East; E, East

FINDINGS

Flora

During the survey of the forest, a total of 58 floral species was recorded including general species outside the plots. Herbs represented the highest number of species (19 species) of 16 genera belonging to 14 families. Trees represented 16 species of 13 genera in 10 family members including 1 unidentified species. Six species of orchids belonging to five genera were recorded while ferns were represented by six species belonging to six genera and six family members. While five climbers belonging to four families were recorded, only five shrub species of five genera belonging to five families were encountered in the forest.

Habit	Species	Genera	Family
Tree	17	13	10
Shrub	5	5	5
Herb	19	16	14
Fern & fern-allies	6	6	6
Climber/Epiphyte	11	9	5
Total	58	49	40

The highest tree species were recorded from the families Euphorbiaceae representing *Macaranga denticula*, *M. peltata* and *Ostodes paniculatus*, Leguminosae representing *Albizia lebbeck*, *Bauhinia purpurea* and *Erythrina arborescens*, and Moraceae representing *Ficus benjamina* and *F. hookeriana*. However, within the plots, the highest tree species was recorded from Theaceae representing *Schima wallichii* (35 nos.) followed by Fagaceae representing *Castanopsis indica* (29 nos.) and Juglandaceae representing *Engelhardtia spicata* (26 nos.). These species were found distributed in the entire sampling plot. The dominant herb species belonged to Compositae family representing *Ageratina adenophora*, *Artemisia vulgaris* and *Bidens pilosa* followed by Orchidaceae representing the orchids.

Checklist of floral species recorded along Garethang Reserve Forest in West Sikkim			
S. No	Scientific Name	Local Name	Family
TREES			
1	<i>Albizia lebbeck</i> (L.) Benth.	Siris	Leguminosae
2	<i>Bauhinia purpurea</i> L.	Tanki	Leguminosae
3	<i>Castanopsis indica</i> (Roxb. ex Lindl.) A.DC.	Dhalne katus	Fagaceae
4	<i>Choerospondias axillaris</i> (Roxb.) B.L. Burt & A.W. Hill	Lapsi	Anacardiaceae
5	<i>Engelhardtia spicata</i> Lechen ex Blume	Mauwa	Juglandaceae
6	<i>Erythrina arborescens</i> Roxb.	Phaledo	Leguminosae
7	<i>Ficus benjamina</i> L.	Rai khanew	Moraceae
8	<i>Ficus hookeriana</i> Corner	Nebara	Moraceae
9	<i>Ficus</i> sp.	Bar	Moraceae
10	<i>Leucosceptrum canum</i> Sm.	Ghurpis	Lamiaceae
11	<i>Macaranga denticulata</i> (Blume) Müll.Arg.	Malato	Euphorbiaceae
12	<i>Macaranga peltata</i> (Big leaves)	Chillo malato	Euphorbiaceae
13	<i>Ostodes paniculatus</i>	Bepari	Euphorbiaceae
14	<i>Prunus cerasoides</i> Buch.-Ham. ex D.Don	Paiyun	Rosaceae
15	<i>Schima wallichii</i> Choisy	Chilaune	Theaceae
16	<i>Symplocos glomerata</i>	Kholme	Sapindaceae
17	Unidentified	Gueolo	
SHRUBS			
1	<i>Clerodendrum infortunatum</i> L.	Raajbeli/Chitu	Lamiaceae
2	<i>Chromolaena odorata</i> (L.) R.M. King & H. Rob.	Aule banamaaraa	Compositae
3	<i>Maesa chisia</i> Buch.-Ham. ex D. Don	Kalo bilauney	Berberidaceae
4	<i>Osbeckia nepalensis</i> Hook. f.	Lote jhar	Melastomataceae
5	<i>Reinwardtia indica</i> Dumort.	Pyauli	Linaceae
HERBS			
1	<i>Ageratina adenophora</i> (Spreng.) R.M. King & H. Rob.	Banmara	Compositae
2	<i>Artemisia vulgaris</i> L.	Titeypati	Compositae
3	<i>Bidens pilosa</i> L.	Kuro	Compositae
4	<i>Bidens</i> sp.	Dallo kuro	Compositae
5	<i>Carex baccans</i> Nees	Harkatto	Cyperaceae
6	<i>Centella asiatica</i> (L.) Urb.	Golpatta	Apiaceae
7	<i>Colocasia esculenta</i> (L.) Schott	Mane	Araceae
8	<i>Dicliptera chinensis</i> (L.) Juss.		Acanthaceae
9	<i>Elsholtzia blanda</i> (Benth.) Benth.	Ban silam/Silamey jhar	Lamiaceae

10	<i>Eragrostis</i> sp.	Banso ghans	Poeceae
11	<i>Eragrostis</i> sp.	Thulo banso	Poeceae
12	<i>Fragaria nubicola</i> (Lindl. ex Hook.f.) Lacaíta	Bhui ainselu	Rosaceae
13	<i>Hedychium gardnerianum</i>	Saro	Zingiberaceae
14	<i>Hedychium spicatum</i>	Saro	Zingiberaceae
15	<i>Impatiens</i> sp.		Balsaminaceae
16	<i>Molineria</i> sp.		Hypoxidaceae
17	<i>Oxalis corniculata</i> Linn.	Amilo jhar	Oxalidaceae
18	<i>Polygonum molle</i> D. Don	Thotney	Polygonaceae
19	<i>Zingiber clarkei</i> King ex Baker		Zingiberaceae
FERNS AND FERN-ALLIES			
1	<i>Drynaria propinqua</i> (Wall. ex Mett.) Bedd.	Oak fern	Polypodiaceae
2	<i>Nephrolepis cordifolia</i> (L.) C. Presl	Pani amla	Nephrolepidaceae
3	<i>Odontosoria chinensis</i> (L.) J. Sm.	Lace fern	Lindsaeaceae
4	<i>Polystichum lentum</i> (D. Don) T. Moore	Pani amla	Dryopteridaceae
5	<i>Pteridium revolutum</i> (Blume) Nakai	Sottarey uniu, Pere ningro	Dennstaedtiaceae
6	<i>Selaginella</i> sp.	Sindure	Selaginellaceae
ORCHIDS/EPIPHYTES/CLIMBERS			
1	<i>Bulbophyllum</i> sp.	Sunakhari	Orchidaceae
2	<i>Cissus elongata</i> Roxb.	Charcharey lahara	Vitaceae
3	<i>Coelogyne</i> sp.	Sunakhari	Orchidaceae
4	<i>Coelogyne fuscescens</i> Lindl.	Sunakhari	Orchidaceae
5	<i>Cymbidium</i> sp.	Sunakhari	Orchidaceae
6	<i>Dendrobium</i> sp.	Sunakhari	Orchidaceae
7	<i>Dioscorea</i> sp.	Ban tarul	Dioscoreaceae
8	<i>Mycaranthes pannea</i> (Lindl.) S.C. Chen & J.J. Wood	Sunakhari	Orchidaceae
9	<i>Piper boehmerifolium</i> (Miq.) Wall. ex C. DC.	Chambo / Panpatta	Piperaceae
10	<i>Rhaphidophora decursiva</i> (Roxb.) Schott	Kanchirna	Araceae
11	Unidentified	Pani lahara	

Fauna

In the faunal diversity, a total of 15 bird species were recorded belonging to 14 genera and 11 families out of which 12 were confirmed based direct and indirect signs. Seven mammal species were recorded. Amongst the butterflies, seven species were recorded out of which Indian Tortoise Shell, Indian Common Crow, Painted Lady, Common Bush Brown and Nigger Butterflies were observed and confirmed.

The canopy is home to many animals, birds and butterflies that are recorded through direct and indirect evidence. Barking deer, fox, Marten and porcupine are some of the reported animals in the forest. Tinchuley – Bisthang Tanki Dara at 1431m was observed as a Butterfly Zone with numerous beautiful butterflies. Indian Common Crow, Indian Red Admiral, Indian Tortoise Shell, Painted Lady, Common Fivering, Common Bush Brown and Nigger Butterfly are some of the sighted and recorded butterflies of the forest. Amongst the bird species, Wedge-tailed Green Pigeon, Whiskered Yuhina, White-capped Redstart, Red-vented Bulbul, Red-tailed Minla, Common Myna, Common Pigeon and Common Tailorbird are some of the reported birds of the region.



Common Fivering



Common Bush Brown



Red-vented Bulbul



Black Bulbul

Checklist of faunal, avi-faunal species and Butterfly recorded in Garethang Reserve Forest in West Sikkim

Sl. No	Scientific Name	Common Name	Local Name	Family	Evidences	IUCN Status
BIRDS						
1	<i>Acridotheres tristis</i>	Common Myna	Ruppi	Sturnidae	Sighted	LC
2	<i>Chaimarrornis leucocephalus</i>	White-capped Redstart	Dhobi Chara	Muscicapidae	Call	LC
3	<i>Columba livia</i>	Common Pigeon	Parewa	Columbidae	Sighted	LC
4	<i>Dicrurus leucophaeus</i>	Ashy Drongo	Chibey	Dicruridae	Sighted	LC
5	<i>Hypsipetes leucocephalus</i>	Black Bulbull	Jureli	Pycnonotidae	Call	LC
6	<i>Ictinaetus malayensis</i>	Black Eagle	Cheel	Accipitridae	Sighted	LC
7	<i>Minla ignotincta</i>	Red-tailed Minla		Leiothrichidae	Call	LC
8	<i>Myophonus caeruleus</i>	Blue Whistling Thrush	Kalchura	Turdidae	Reported	NA
9	<i>Orthotomus atrogularis</i>	Common Tailor bird		Cisticolidae	Reported	LC
10	<i>Parus monticulus</i>	Green-backed Tit	ChichinkKotey	Paridae	Reported	LC
11	<i>Pycnonotus cafer</i>	Red-vented Bulbull	Jureli	Pycnonotidae	Sighted	LC
12	<i>Streptopelia orientalis</i>	Oriental Turtle Dove	Dhukur	Columbidae	Sighted	LC
13	<i>Treron sphenurus</i>	Wedge-tailed Green Pigeon	Haaleysho	Columbidae	Call	NA
14	<i>Yuhina flavicollis</i>	Whiskered Yuhina	Megma	Zosteropidae	Call	LC
BUTTERFLY						
1	<i>Aglais caschmirensis</i>	Indian Tortoiseshell		Nymphalidae	Sighted	NA
2	<i>Euploea core</i> Cramer	Indian Common Crow		Nymphalidae	Sighted	LC
3	<i>Vanessa cardui</i>	Painted Lady		Nymphalidae	Sighted	NA
4	<i>Vanessa indica</i>	Indian Red Admiral		Nymphalidae	Reported	NA
5	<i>Ypthima baldus</i> Fabricius	Common Fivering		Nymphalidae	Sighted	NA
6	<i>Mycalesis janardana</i> Moore	Common Bush Brown		Nymphalidae	Sighted	LC
7	<i>Orsotriaena medus</i> Fabricius	Nigger Butterfly		Nymphalidae	Sighted	NA
FAUNA						
1	<i>Hylopetes</i> sp.	Flying Squirrel	Squirrel	Sciuridae	Sighted	LC
2	<i>Martes flavigula</i>	Yellow-throated Marten		Mustelidae	reported	LC
3	<i>Muntiacus muntjak</i>	Barking Deer	Mirga	Cervidae	Foot mark	LC
4	<i>Vulpes</i> sp.	Fox	Syaal	Canidae	Reported	LC
6	<i>Macaca</i> sp.	Monkey	Badar	Cebidae	Reported	LC
NOTE: LC, Least Concern; NA, Not Assessed.						

DISCUSSION

Forest composition of the surveyed path is dominated by evergreen and deciduous tree species. Large evergreen trees of *Engelhardtia spicata* (Mauwa) and *Schima wallichii* (Chilaune) are found throughout the forest. Other tree species inhabiting the area are *Bauhinia purpurea* (Tanki), *Castanopsis indica* (Dhalne katus), *Choerospondias axillaris* (Lapsi), *Ficus benjamina* (Rai khanew), *F. hookeriana* (Nebara), *Leucosceptrum canum* (Ghurpis) and *Ostodes paniculatus* (Bepari). The lower storey is mixed with shrubby species of *Clerodendrum infortunatum* (Raajbeli) and *Maesa chisia* (Kalo bilauney) along with numerous saplings and seedlings of *Engelhardtia spicata*, *Symplocos glomerata*, *Macaranga denticulata*, *M. peltata*, *Leucosceptrum canum* and *Castanopsis indica*. This forest is characterized by lianas and buttress roots of *Engelhardtia spicata* indicating the need for nutrients and sunlight. The growth of mosses covering the tree trunks and branches are the common sights supporting the habitat of various epiphytic orchids. *Bulbophyllum* sp., *Cymbidium* sp., *Coelogyne fuscescens*, *Dendrobium* sp. and *Mycaranthes pannea* are some of the epiphytic orchids found to be growing on the tree branches especially on *Engelhardtia spicata* and *Castanopsis indica*. The presence of numerous saplings and seedlings of *Engelhardtia spicata*, *Macaranga denticulata*, *M. peltata* and *Castanopsis indica* indicate good regeneration of these species throughout the forest.

However, the forest floor is densely covered with ferns, *selaginella* and many herbaceous plants along with dried leaves. Tall ferns of *Pteridium revolutum* (Sottarey uniu) also form a dense route through the forest which is used as livestock bed for cattle and pigs. *Nephrolepis cordifolia* (Pani amla) and *Selaginella* sp. (Sindure) are commonly distributed throughout the forest floor. Epiphytic ferns such as *Drynaria propinqua* and *Polystichum lentum* also form regular habitat on trees as well.



Flowering of *Engelhardtia spicata*



Coelogyne fuscescens in full bloom

The forest also harbours many perennial herb species having medicinal properties viz., *Hedychium spicatum*, *H. gardnerianum* and *Zingiber clarkei* are seen growing on a large scale. *Ageratina adenophora* (Banmara), *Artemisia vulgaris* (Titey pati), *Aconogonum molle* (Thotney), *Dicliptera chinensis*, *Carex baccans* (Harkatto) and *Elsholtzia blanda* (**Silamey jhar**) are some of the important herb species contributing to the dense forest floor composition.

SIGNIFICANCE

Garethang Reserve Forest, being a subtropical zone ranging from 1381m to 1426m asl, is a moderately dense forest with a vast vegetation of species having important values in terms of medicine and commercial. Since the forest naturally harbours many medicinal plants that are used not only by the local inhabitants but can also be used globally. The medicinal plants have traditionally occupied important position in the socio-cultural, spiritual and medicinal arena of the people in the State. Hence, it becomes necessary to focus on conserving the wild populations of such medicinal plant diversity in this forest as well. Even though the forest is a small area of just 0.91km², it harbours such important species and hence, care must be taken to conserve the otherwise threatened species. *Hedychium spicatum*, an important but a vulnerable herb as per the IUCN criteria due to reduction in population, is sparsely distributed in the region which otherwise is used for its anti-microbial property and an anti-cancerous drug. A lot of the plant is being exploited from its natural habitat due to its high medicinal properties in India. Hence, this species can be conserved and cultivated for future prospect.

Garethang Reserve Forest is a natural habitat with no anthropogenic or natural disturbances. The virgin land of the RF is yet to be explored for its vegetation diversity and for framing a strong conservation and management strategy. The removal of plants for firewood and livestock feed by the local inhabitants disturbs the survival of species diversity. A place called Tinchuley – Bisthang Tanki Dara, at 1431m, was observed as a Butterfly Zone with numerous butterflies holding a strong host specific relationship.

Kartok Reserve Forest, East Sikkim

Sanjyoti Subba, Sanchi Subba & Sumitra Nepal



Calibrating GPS at Kartok RF

INTRODUCTION

The present study is represented by subtropical and humid-temperate forest. The main vegetation of the reserve forest is represented by tree species viz., *Acer campbellii*, *Actinodaphne sikkimensis*, *Alnus nepalensis*, *Beilschmiedia sikkimensis*, *Betula cylindrostachya*, *Castanopsis tribuloides*, *Castanopsis indica*, *Toona sureni*, *Choerospondias axillaris*, *Cordia myxa*, *Cryptomeria japonica*, *Daphniphyllum himalayense*, *Sloanea dasycarpa*, *Elaeocarpus lanceifolius*, *Engelhardtia spicata*, *Erythrina arborescens*, *Eurya acuminata*, *Exbucklandia populnea*, *Glochidion acuminatum*, *Juglans regia*, *Leucoscepterum canum*, *Litsea cubeba*, *Macaranga denticulate*, *Persea odoratissima*, *Mahonia napaulensis*, *Magnolia cathcartii*, *Magnolia doltsopa*, *Myrica esculenta*, *Nyssa javanica*, *Lyonia ovalifolia*, *Prunus bracteopadus*, *Quercus lamellose*, *Quescus lineate*, *Rhododendron arboreum*, *Schima wallichii*, *Symplocos glomerata*,

Symplocos lucida, etc., form the dense forest with common shrubs such as *Rubus ellipticus*, *Oxyspora paniculata*, *Viburnum erubescence*, *Boehmeria* sp., *Hypericum* sp., etc., many other herbs species too.

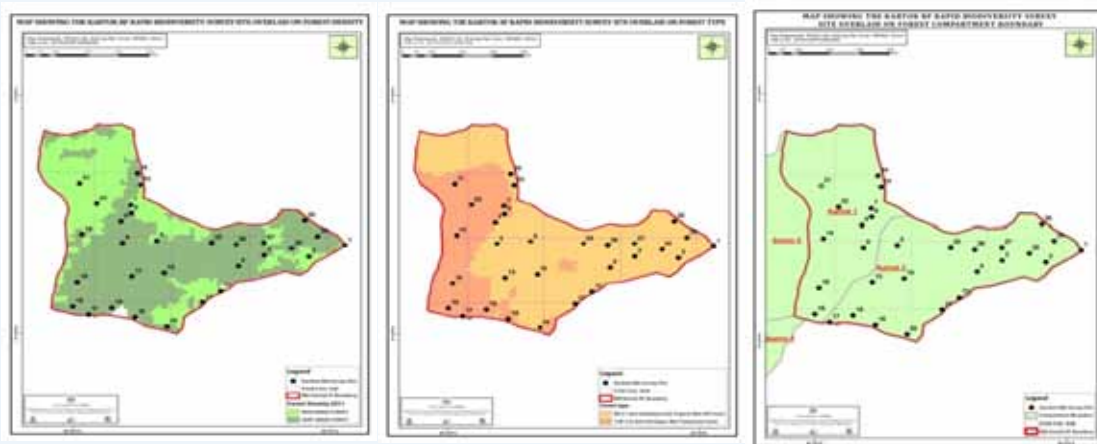
The reserve forest had pure patches of *Castanopsis tribuloides*, *Juglans regia*, *Exbucklandia populnea*, *Magnolia doltsopa*, *Machilus edulis* belt and many others ferns and fern-allies, epiphytes, climbers, lianas, mosses and lichens.

Most interesting factor of the reserve forest is that, forest harbors over 70 wild orchid species diversity viz., *Acampe praemorsa*, *Acrochaene punctata*, *Anthogonium gracile*, *Bhutanthera albomarginata*, *Bulbophyllum cainiflorum*, *B. leopardinum*, *B. reptans*, *B. tortuosum*, *B. bisetum*, *Calanthe puberula*, *Calanthe yuksomensis*, *Coelogyne barbata*, *C. corymbosa*, *C. cristata*, *C. fuscescens*, *Cryptochilus lutca*, *Cymbidium devonianum*, *C. ethyraeum*, *C. irridioides*, *C. mastersii*, *Dendrobium desniflorum*, *D. fimbriatum*, *D. heterocarpum*, *D. longicornum*, etc. form the epiphytic and lithophytic in nature and was found to favour many tree species (host tree) viz., *Lyonia ovalifolia*, *Castanopsis tribuloides* & *Castanopsis indica* etc.

The reserve forest is home to many faunal species, viz., Wild Boar, Barking Deer, Flying squirrel, Wild dog, and Red fox etc. The dense forests provide good shelter as well as abundant fruits/feed for wildlife and as such are good indicator of faunal presence.

STUDY AREA

Kartok Reserve Forest is located in the east district of Sikkim, between latitude 27°13'55.0"N to 27°14'42.8"N and Longitude 88°33'37.2"E to 88°40'02.4"E. The total area of the reserve forest is 1.50 sq.km and the altitudinal ranges between 1676 to 2142 m asl. The field survey was conducted during September 2017.



Showing the forest compartment boundary, forest density & forest types along the sampling plots of Kartok

Reserve Forest, East Sikkim



Laying sampling plots



Measuring of circumference at breast height

Laying sampling plots & measuring circumference at breast height in Kartok Reserve Forest, East Sikkim

FINDINGS AND DISCUSSION

A total of 176 plant species were recorded by laying 30 sampling plots, covering an area 0.3 ha. Out of these 45 trees species, 12 shrubs, 26 herbs, 13 fern & fern-allies, 9 climbers and epiphytes. Additionally, this reserve forest is harbor over 70 orchid species diversity were encountered along the sampling plots Regarding, forest compartment boundary, randomly laid (6- 9,14, 18,19 & 21-24) sampling plot for compartment 1 and other remaining sampling plots for compartment 2 . In the forest density (dense) forest, randomly laid (3-8, 9, 10, 13-30) sampling plots and other remaining sampling plots were randomly laid for moderate dense forest.

However, in the forest types, the sampling plots (1-5, 10-13 & 23-30) were randomly laid in the sub-tropical forest and other remaining were laid in the wet temperate forest in the entire study area. In sub-tropical forest, the most common trees species are *Engelhardtia spicata*, *Erythrina arborescens*, *Sloanea dasycarpa*, *Juglans regia*, *Litsea cubeba*, *Macaranga denticulata*, *Castanopsis* sp., *Tetradium fraxinifolia*, *Rhus* sp., etc. The forest type is either evergreen or semi evergreen and the trees are longer and some are busy in appearance. Many orchid species were encountered in vegetative stages and favour to grow epiphyte in tree and some are lithophytic in nature. *Pleione praecox* was encountered in many host tree species viz., *Schima wallichii* and *Engelhardtia spicata* and many other species too.

Similarly, in the wet temperate forest, the main tree species are *Castanopsis* sp., *Magnolia doctosopa*, *Machilus* sp., *Elaeocarpus* sp., *Eurya* sp., etc. The orchid species were encountered viz., *Gastrochilus affinis* and *Bulbophyllum reptans* found growing to favour in the host tree species. Here the forest floor is rich humus depth 5 cm depth from the ground, measured by measuring scale. There is good relation between the humus depth and species richness. Humus depth (cm) play significant role for the determination of species presence & richness.

It is clearly observed the ground growing **the** orchid species *Zeuxine goodyeroides* were encountered in the forest floor and many other herbaceous species were encountered along the forest.

Regarding the non-wood forest product (NTFP), are abundantly distributed in the reserve forest. Sikkim is one endowed with wide variety of non-timber forest product (NTFP). Some of the species were recorded during the rapid biodiversity survey like *Smilax* species which the young shoot is sold in local market which have high medicinal properties, eat as vegetables purpose to maintain diabetics & blood pressure. *Allantodia maximum* (Sauney ningro) is edible fern is abundantly found in Kartok forest which is used as vegetables purpose & making pickles etc.



Allantodia maximum



Showing young shoot of *Smilax* sp., (JFMc President)

There are number of herb species in found in the forests, whose young shoots (*Laportea terminalis*), and flowers (*Tupistra nutans*) are eaten as vegetables and rhizome (*Astilbe rivularis*), matured seeds (*Heracelum wallichii*) are use as medicinal purpose. Wild edible plants found in the forests offer a variety of fruits for wildlife and birds. Some of the species such as *Juglans regia*, *Machilus edulis*, *Tetradium fraxinifolium*, *Symplocos lucida*, *Symplocos glomerata*, *Persea odoratissima*, *Elaeocarpus lanceifolius* provides abundant fruits and as such are good indicator of faunal presence and richness.

SIGNIFICANCE OF THE KARTOK RESERVE FOREST

1. Over 70 orchid species were recorded in 0.3 ha. It means the high orchid diversity in the reserve forest as compared to other forest.
2. State flower, *Dendrobium nobile*, Habitat
3. Non-timber forest product like *Smilax*, *Allantodia maxima* (edible fern). These are the valuable natural resources in the forest.
4. Best tourist destination near to Capital, best view of Lord Sleeping Buddha.



Overview of Lord Sleeping Buddha from Kartok Reserve Forest, East Sikkim



***Aristolochia platanifolia* (Flowering & Vegetative stages)**

Aristolochia L., is a core genus of the family Aristolochiaceae comprising of about 120 species, and is distributed in tropical and temperate Asia, Africa, Europe and America. Several members of the genus have been used extensively in traditional Chinese and Indian medicines for the treatment of hypertension, leukocyte enhancement, rheumatism, eczema, snakebite, festering wounds and as analgesic and diuretic and against tumours. This species is found growing under the canopy of *Oak* species and found to favour in *Symplocos lucida* as lians species.

Additionally, avi-fauna were encountered, viz., Laughing Thrush, Blue Whistling Thrush, Russet Sparrow, Red Vented Bulbul, Oriental Turtle Dove, Large billed Crow, Fire-tailed sunbird and many other birds were seen during the survey due to the presence and the calls of birds were identified and recorded by the local guide.

CONSERVATION RECOMMENDATIONS AND CONCLUSION

Through the rapid biodiversity survey, it has been found that the area have rich diversity of orchids species and ground vegetation (herb & forb) due to rich humus depth (5 cm depth) contents in the forest. Humus depth is good indicator of species richness and species diversity. The study reveals a floral assemblage and orchid diversity of plant in an estimated 0.34 ha of study area which is slightly higher compared to other reserve forest. On a small area level this figure can be considered as a fair representation of biodiversity if it is compared with the total floral constituents of Sikkim (ca.4500 speices within 7096km²), it harbours a high diversity of orchid species due to a large variation in macro and micro-climatic conditions. Orchids are incredible taxa forming an important component in the forest. The orchid is differing greatly in distribution and abundance; consequently, rare species may be recognized as those of low numerical abundance compared with others rare species according to space, time or group relatedness. Restoration and preservation of genetic diversity is now viewed as a major goal of conservation of rare and threatened species. So, the area is need to conserved in time for future generation.

However, out of 4 *Pleione* species in Sikkim, 3 *Pleione* were encountered viz., *Pleione praecox* pink form, *Pleione praecox* pure white form (very rare) & *Pleione maculata*, and *Pleione humilis* in the study site. *Pleione* has the limited time of flowering period as compared to other orchids like *Cymbidium*, *Vanda*, *Coelygyne* etc. So, it needs to document more and explore the area in different flowering season too.

Hence, this area needs more documented and immediate conservation measures are suggested. The state took a lavish step to protect the biodiversity-rich network's protected area and national park. This is recommended as per the survey that the area need to conserve for *Pleione* orchid species including many other orchid species which play significant role in the forest. Conservation of orchid species and their habitats has been keystone of the region. It is therefore clear that conservation through reserve is unlikely to provide protection of all plants species.

For the point of ecosystem services, in the every household the villages have Apiculture practises for sustainable livelihood options and it is also maintain the ecosystem in the forest. Orchids are one of the pioneer groups of flowering plants, which play a unique and crucial role in the forest ecosystem. The area is covered by *Oak* species and pure patches of *Magnolia doltsopa*, *Exbucklandia populnea*, *Machilus edulis*, *Juglans regia* and *Cryptomeria japonica*, etc. In terms of ecotourism, this village is one of the ecotourism destinations and even near to Gangtok city in Sikkim.

Best view of Lord Sleeping Budha from Kartok Reserve Forest and nature based interpretation, home stay and trekking route. The livelihood of the people is depend on nature based tourism and organic farming. So, the conservation of biological diversity is first & foremost.



Coelogyne fuscescens



Gastrochilus acutifolium



Zeuxine goodyeroides

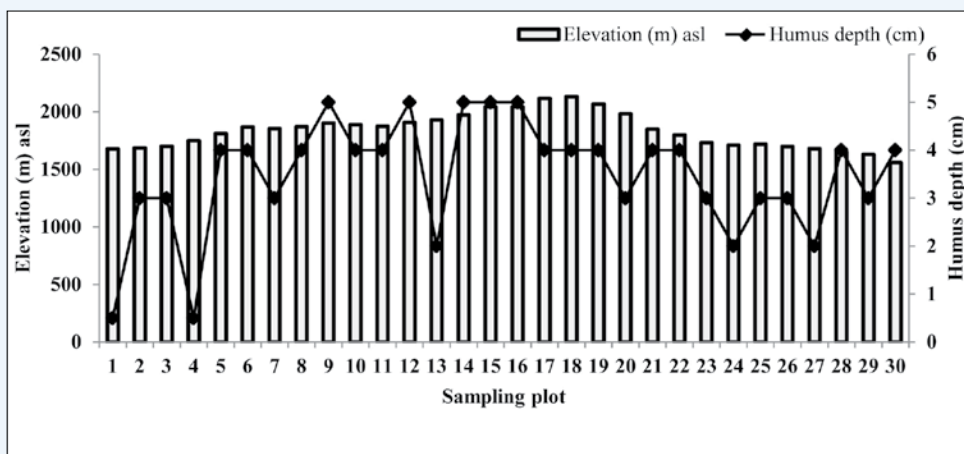


Pleione maculata

Site Characteristics of the sampling plots of Kartok Reserve Forest, East Sikkim

Site Code	Forest types	Altitude (m) asl	Coordinates	Long(E)	Slope Angle (°)	Slope Aspect	Humus depth (cm)	Disturbance	Natural
			Lat(N)					Anthropogenic	Natural
K1	Sub-tropical	1676	27°14'22.2"	88°34'53.4"	50 SW		0.5		Natural
K2	Sub-tropical	1686	27°14'19.4"	88°34.44.9"	25 NE		3		Natural
K3	Sub-tropical	1700	27°14'21.3"	88°34.31.6"	60 SW		3		
K4	Sub-tropical	1749	27°14'18.6"	88°34'25.6"	20 NE		0.5	Fodder collection	
K5	Sub-tropical	1812	27°14'25.3"	88°34'06.7"	35 E		4		Natural
K6	Wet temperate forest	1867	27°14'32.2"	88°34'00.7"	20 E		4		Natural
K7	Wet temperate forest	1853	27°14'34.3"	88°34'00.6"	70 E		3		Natural
K8	Wet temperate forest	1870	27°14'30.2"	88°33'58.3"	20 E		4		Natural
K9	Sub-tropical	1903	27°14'24.8"	88°33'58.6"	30 E		5		Natural
K10	Wet temperate forest	1886	27°14'17.1"	88°34'08.2"	25 NE		4		Natural
K11	Sub-tropical	1875	27°14'09.6"	88°34'23.2"	25 NE		4		Natural
K12	Sub-tropical	1907	27°14'06.7"	88°34'19.0"	30 NE		5		Natural
K13	Sub-tropical	1928	27°14'16.3"	88°34'00.6"	20 NE		2		Natural
K14	Wet temperate forest	1971	27°14'27.1"	88°33'49.1"	30 E		5		Natural

K15	Wet temperate forest	2042	27°14'08.4"	88°33'55.9"	30 NE	5		Natural
K16	Wet temperate forest	2043	27°14'04.5"	88°34'00.0"	40 NE	5		Natural
K17	Wet temperate forest	2116	27°14'01.9"	88°33'43.6"	80 NE	4		Natural
K18	Wet temperate forest	2132	27°14'08.8"	88°33'46.8"	30 E	4		Natural
K19	Wet temperate forest	2067	27°14'15.0"	88°33'47.9"	70 E	4		Natural
K20	Wet temperate forest	1983	27°14'03.6"	88°34'08.7"	60 NW	3	Fodder & fuel wood collection	
K21	Wet temperate forest	1848	27°14'37.6"	88°40'02.4"	60 N	4		Natural
K22	Wet temperate forest	1798	27°14'34.7"	88°33'52.8"	60 E	4		Natural
K23	Sub-tropical	1730	27°14'40.0"	88°34'06.6"	40 E	3		Natural
K24	Sub-tropical	1710	27°14'42.8"	88°34'05.9"	20 NE	2		Natural
K25	Sub-tropical	1718	27°14'24.6"	88°34'19.4"	30 E	3		Natural
K26	Sub-tropical	1698	27°14'24.1"	88°34'25.1"	70 E	3		Natural
K27	Sub-tropical	1679	27°14'24.5"	88°34'31.6"	50 SW	2		Natural
K28	Sub-tropical	1651	27°14'23.0"	88°34'38.1"	60 N	4		Natural
K29	Sub-tropical	1629	27°14'25.9"	88°34'44.1"	60 S	3		Natural
K30	Sub-tropical	1558	27°14'32.1"	88°34'43.2"	61 S	4		Natural



Correlation between the humus depth & elevation in entire sampling plot

Checklist of Flora species in Kartok Reserve Forest, East Sikkim

Sl. No.	Botanical Name	Local Name	Family	Altitudinal ranges	IUCN Status
	TREE				
1.	<i>Acer campbellii</i> Hook. & Thom. Ex Hiern.	Kapasey	Sapindaceae	1800-2700	LC
2.	<i>Actinodaphne sikkimensis</i> Meissn.	Sisi phal	Lauraceae	1700-1700	NA
3.	<i>Alnus nepalensis</i> Don.	Utis	Betulaceae	200-2800	LC
4.	<i>Beilschmiedia sikkimensis</i> King ex Hook. f.	Tarsing	Lauraceae	300-2400	NA
5.	<i>Betula cylindrostachya</i> Lindl. ex Wall.	Saur	Betulaceae	1400-2800	LC
6.	<i>Castanopsis hystrix</i> Hook. & Thomson ex. A. DC.	Patley katush	Fagaceae	1600-1600	NA
7.	<i>Castanopsis tribuloides</i> (Smith) A. DC.	Musrey katush	Fagaceae	450-2300	NA
8.	<i>Castanopsis indica</i> (Roxb. ex Lindl.) A. DC.	Dalney katus	Fagaceae	1500-1500	NA
9.	<i>Toona sureni</i> (Blume) Merr	Tuni	Meliaceae	700-1600	NA
10.	<i>Choerospondias axillaris</i> (Roxb.) B.L.Burt & A.W.Hill	Lapsi	Anacardiaceae	900-2500	NA
11.	<i>Cordia myxa</i> L.	Bohori	Boraginaceae	200-1500	NA
12.	<i>Cryptomeria japonica</i> (Thunberg ex. Linn. F.) D. Don	Dhupi	Taxodiaceae	1100-2500	NT
13.	<i>Daphniphyllum himalayense</i> (Benth.) Mull. Arg.	Lall Chandan	Euphorbiaceae	1200-2500	NA
14.	<i>Sloanea dasycarpa</i> (Benth.) Hemsl.	Gobre	Elaeocarpaceae	1500-2200	NA
15.	<i>Elaeocarpus lanceifolius</i> Roxb.	Bhadrasey	Elaeocarpaceae	1800-2500	NA
16.	<i>Engelhardtia spicata</i> Lechen ex Blume.	Mauwa	Juglandaceae	500-2100	LC
17.	<i>Erythrina arborescens</i> Roxb.	Phalado	Fabaceae	400-2100	NA
18.	<i>Eurya acuminata</i> DC.	Jhingni	Theaceae	700-3000	NA

19.	<i>Exbucklandia populnea</i> (R. Br. Ex Griff) R. W. Br	Piplee	Hamamelidaceae	1200-2000	NA
20.	<i>Glochidion acuminatum</i> Müll.Arg.	Latikath	Phyllanthaceae	1000-2100	NA
21.	<i>Juglans regia</i> L.	Okhar	Juglandaceae	500-1800	LC
22.	<i>Leucosceptrum canum</i> Sm.	Gurpis	Lamiaceae	1000-2600	NA
23.	<i>Litsea cubeba</i> (Lour.) Pers	Siltimur	Lauraceae	300-3200	NA
24.	<i>Macaranga denticulata</i> (Blume) Müll.Arg.	Malata	Euphorbiaceae	100-1300	NA
25.	<i>Persea odoratissima</i> (Nees) Kosterm.	Kawlo	Lauraceae	1500-2100	NA
26.	<i>Machilus</i> sp.	Kawlo	Lauraceae	1700-2000	
27.	<i>Magnolia cathcartii</i> (Hook.f. & Thomson) Noot	Titey champ	Magnoliaceae	1400-2700	LC
28.	<i>Magnolia doltsopa</i> (Buch.-Ham. ex DC.) Figlar	Ranichamp	Magnoliaceae	1500-2400	DD
29.	<i>Myrica esculenta</i> Buch.-Ham. ex D. Don	Kafal	Myricaceae	300-2500	NA
30.	<i>Myrsine semiserrata</i> Wall	Phalame	Primulaceae	500-2700	NA
31.	<i>Nyssa javanica</i> (Blume) Wangerin	Lek chilauney	Cornaceae	100-2500	NA
32.	<i>Lyonia ovalifolia</i> var. <i>ovalifolia</i>	Angeri	Ericaceae	200-3400	NA
33.	<i>Prunus bracteopadus</i> Koehne	Arupatey	Rosaceae	1700-2000	NA
34.	<i>Pyrularia edulis</i> (Wall.) A. DC.	Amphi	Santalaceae	1700-1700	NA
35.	<i>Quercus lamellosa</i> Sm.	Buk/Bajranth	Fagaceae	1600-2800	NA
36.	<i>Quercus lineata</i> Blume	Phalut	Fagaceae	1900-3000	NA
37.	<i>Rhododendron arboreum</i> sp. <i>arboreum</i> (CB Clarke) Ridley.	Guras	Ericaceae	1800-3000	NA
38.	<i>Schima wallichii</i> Choisy	Chilaune	Theaceae	800-1800	NA
39.	<i>Symplocos glomerata</i> King ex C.B. Clarke	Kholme	Symplocaceae	1200-2700	NA
40.	<i>Symplocos lucida</i> (Thunb.) Siebold & Zucc	Kharane	Symplocaceae	1500-3000	NA
41.	<i>Tetradium fraxinifolium</i> (Hook. f.) T.G. Hartley	Khanakpa	Rutaceae	1200-2500	NA
42.	unidentified	Putlee			
43.	unidentified	Nakpirey			
44.	unidentified	hukus			
45.	unidentified	Barkawlow			
	SHRUB				
1	<i>Osbeckia stellata</i> Buch.-Ham.ex D. Don	Chulesi	Melastomataceae	200-2300	NA
2	<i>Strobilanthus wallichii</i> Nees.	kibu	Thymeleaceae	2700-3600	NA
3	<i>Daphne cannabina</i> Wall	Kalo argeli	Thymeleacea	1900-2700	NA
4	<i>Ardisia macrocarpa</i> Wall.	Damai phal	Myrsinaceae	1500-2400	NA
5	<i>Edgeworthia gardenieri</i> Meissn	Algeri/Lokti	Thymeleaceae	1000-2500	NA
6	<i>Viburnum erubescence</i> Wall. ex D	Asarey	Adoxaceae	1400-3950	NA
7	<i>Rubus ellipticus</i> Sm.	Aiselu	Rosaceae	1000-2600	NA

8	<i>Oxyspora paniculata</i> (D.Don) DC	Chulesee	Melastomataceae	500-2000	NA
9	<i>Polygala arillata</i> Buch.-Ham.ex D.Don	Parcha plant	Polygalaceae	1000-2800	NA
10	<i>Dichroa febrifuga</i> Lour.	Basak	Hydrangaceae	200-2000	NA
11	<i>Boehmeria platyphylla</i> D. Don.	Kamley	Urticaceae	700-1500	NA
12	<i>Mahonia napaulensis</i> DC.	Kesari	Berberidaceae	1500-2500	NA
	HERB				
1	<i>Ageratum conyzoides</i> Linn.	Elame jhar	Asteraceae	1000-1500	NA
2	<i>Arisaema intermedium</i> Blume	Larua/Banko	Araceae	2600-3400	NA
3	<i>Artemisia vulgaris</i> L.	Titepati	Compositae	1500-3800	NA
4	<i>Astilbe rivularis</i> Buch.-Ham. ex D. Don	Budi okhati	Saxifragaceae	900-3200	NA
5	<i>Begonia crenata</i> Dryand	Magarkachi	Begoniaceae	1000-1900	NA
6	<i>Begonia rubella</i> Buch.-Ham. ex D. Don	Magarkachi	Begoniaceae	1000-1900	NA
7	<i>Bidens pilosa</i> Linn.	Kuro	Asteraceae	200-1900	NA
8	<i>Rohdea verruculosa</i> (Q.H.Chen) N. Tanaka	Jungali Nakima	Asparagaceae	1800-2500	NA
9	<i>Carex</i> sp.		Cyperaceae	1500-2000	
10	<i>Colocasia esculanta</i> (L.) Schott.		Caryophyllaceae	1400-2000	NA
11	<i>Elatostema</i> sp.	Gagleto	Urticaceae	1500-2500	
12	<i>Eragrostis</i> sp.	Gagleto	Poaceae	1500-2500	
13	<i>Ageratina adenophorum</i> (Spreng) R. M.King & H. Rob.	Kali jhar	Compositae	900-2200	NA
14	<i>Fragaria nubicola</i> Lindley ex Lacaita	Vui Aiselu	Rosaceae	2500-3900	NA
15	<i>Globba sessiliflora</i> Sims		Zingiberaceae		LC
16	<i>Hedychium spicatum</i> Smith	Sara	Zingiberaceae	1800-2800	NA
17	<i>Heracleum wallichii</i> DC	Chimphing	Apiaceae	1900-2700	NA
18	<i>Impatiens</i> sp.		Balsaminaceae		
19	<i>Laportea terminalis</i> Wight.	Patle sisnu	Urticeae	1600-2600	NA
20	<i>Nephrolepis cordifolia</i> (Linn.)		Davalliaceae	1500	NA
21	<i>Oxaliscorniculata</i> Linn	Amilo jhar	Oxalidaceae	1400-1900	NA
22	<i>Persicaria capitata</i> (Buch.Ham.ex D.Don) Gross	Ratneulo	Polygonaceae	1500-2300	NA
23	<i>Pilea umbrosa</i> Wall. ex Blume	Chiplepy	Urticaceae	1200-2500	NA
24	<i>Polygonum molle</i> D. Don	Thotney	Polygonaceae	1200-3400	NA
25	<i>Polygonatum</i> sp.		Asparagaceae	2500	
26	<i>Swertia bimaculata</i> (Siebold & Zucc.) Hook. f. & Thomson ex C.B. Clarke	Bhaley chirowto	Gentianaceae	200-3500	NA
	CLIMBER & EPIPHYTE				
1	<i>Rubia cordifolia</i> L	Majito	Rubiaceae	300-2800	NA
2	<i>Trichosanthes lepiniana</i> (Naudin) Cogn.	Indreni	Cucurbitaceae	700-2000	NA
3	<i>Holboellia angustifolia</i> Wall.	Gulfa	Lardizabalaceae	1000-2700	NA

4	<i>Rhaphidophora decursive</i> (Roxb.) Scott	Kanchirno	Araceae	2000	NA
5	<i>Piper boechmeriaefolium</i> (Miq.) DC.		Piperaceae	1000-2400	NA
6	<i>Stephania</i> sp.	Tamarkey	Menispermaceae	1500-2300	NA
7	<i>Herpetospermum pedunculatum</i> (Seringe.) C.B. Clarke	Ban karela	Cucurbitaceae	2300-2500	NA
8	<i>Aristolochia platanifolia</i> (Klotzsch) Duch		Aristolochiaceae	2300	NA
9	<i>Tetrastigma serrulatum</i> (Roxb.) Planch	Vitaceae	Charcharay lahara	1800-2500	NA
10	<i>Tetrastigma</i> sp.	Vitaceae	Charcharay lahara	1800-2500	NA
FERNS & FERN-ALLIES					
1	<i>Asplenium lacinatedum</i> D.Don		Aspleniaceae	1000-2500	NA
2	<i>Allantodia maxima</i> (D.Don) Ching		Athyriaceae		NA
3	<i>Selaginella</i> sp.		Selaginellaceae	2500	NA
4	<i>Lycopodium</i> sp		Lycopodiaceae	1900-2400	NA
5	<i>Diplazium</i> sp.	Sauney ningro	Athyriaceae	1700-2500	NA
6	<i>Nephrolepis cordifolia</i> (L.) C. Presl.		Nephrolepidaceae	2000	NA
7	<i>Oleandra pistillaris</i> (Sw.) C. Chr.		Oleandraceae	1400-2500	NA
8	<i>Pteris wallichiana</i> J. Agardh.		Pteridaceae	800-2700	NA
9	<i>Athyrium foliolosum</i> T. Moore ex R. Sim.		Woodsiaceae	1200-3500	NA
10	<i>Lepisorus loriformis</i> (Wall. ex Mett.) Ching		Polypodiaceae	2000-3000	NA
11	<i>Asplenium yoshinage</i> Makino		Aspleniaceae	700-2000	NA
12	<i>Dennstaedtia scabra</i> (Wall. ex Hook) T. Moore		Dennstaedtiaceae	1300-2600	NA
13	<i>Arthromeris wallichiana</i> (Spreng.) Ching		Polypodiaceae	1200-2600	NA
ORCHID					
1	<i>Acampe praemorsa</i> (Roxb.) Blatt. & McCann		Orchidaceae		NA
2	<i>Acrochaene punctata</i> Lindl.		Orchidaceae		NA
3	<i>Anthogonium gracile</i> Wall. ex Lindl.		Orchidaceae		NA
4	<i>Bhutanthera albomarginata</i> (King & Pant.) Renz		Orchidaceae		NA
5	<i>Bulbophyllum cainiflorum</i> H.G. Reichenbach		Orchidaceae	2100-2200	NA
6	<i>B. leopardinum</i> (Wallich) Lindley		Orchidaceae	1300-3300	LC
7	<i>B. reptans</i> (Lindley) Lindley		Orchidaceae	1000-2800	NA
8	<i>B. tortuosum</i> (Blume) Lindl.		Orchidaceae		NA
9	<i>B. bisetum</i> Lindl.		Orchidaceae		NA
10	<i>Calanthe biloba</i> Lindl.		Orchidaceae		NA
11	<i>C. plantaginea</i> Lindl.		Orchidaceae		NA
12	<i>C. puberula</i> Lindley		Orchidaceae		NA
13	<i>C. sylvatica</i> (Thouars) Lindl.		Orchidaceae		NA

14	<i>C. yuksomnensis</i> Lucksom		Orchidaceae		NA
15	<i>Galeola falconeri</i> Hook.f.		Orchidaceae		NA
16	<i>Cheirostylis pabongnensis</i> S.Z. Lucksom		Orchidaceae		NA
17	<i>Coelogyne barbata</i> Lindley		Orchidaceae		NA
18	<i>Coelogyne corymbosa</i> Lindley		Orchidaceae	1300-3500	NA
19	<i>Coelogyne cristata</i> Lindley		Orchidaceae	1700-1900	NA
20	<i>Coelogyne fuscescens</i> Lindley		Orchidaceae	1300-2000	NA
21	<i>Coelogyne nitida</i> (Wallich ex. D. Don) Lindley		Orchidaceae		NA
22	<i>Cryptochilus lutca</i> Lindl.		Orchidaceae		NA
23	<i>Cryptochilus sanguinea</i> wall		Orchidaceae		NA
24	<i>Cymbidium devonianum</i> Paxton.		Orchidaceae	1450-2200	NA
25	<i>Cymbidium ethyraeum</i> Lind.		Orchidaceae		NA
26	<i>Cymbidium iridioides</i> D. Don		Orchidaceae	900-2800	NA
27	<i>Cymbidium lancifolium</i> Hook.		Orchidaceae	300-2200	NA
28	<i>Cymbidium mastersii</i> Griffith ex Lindley		Orchidaceae	900-2400	NA
29	<i>Dendrobium desniflorum</i> Wallich		Orchidaceae		NA
30	<i>Dendrobium fimbriatum</i> Hooker.		Orchidaceae		NA
31	<i>Dendrobium heterocarpum</i> Wall. ex Lindl.		Orchidaceae		NA
32	<i>Dendrobium hookerianum</i> Lindl.		Orchidaceae		NA
33	<i>Dendrobium longicornu</i> Lindley		Orchidaceae		NA
34	<i>Dendrobium nobile</i> Lindl.		Orchidaceae		NA
35	<i>Dendrobium amoenum</i> Wall. ex Lindl.		Orchidaceae		NA
36	<i>Diphylax urcèolata</i> (C.B. Clarke) Hook.f.		Orchidaceae		NA
37	<i>Epipogium roseum</i> (D.Don) Lindl.		Orchidaceae		NA
38	<i>Eria muscicola</i> (Lindl.) Lindl.		Orchidaceae		NA
39	<i>Gastrochilus acutifolius</i> (Lindl.) Kunze		Orchidaceae		NA
40	<i>Gastrochilus inconspicuous</i> (Hook.f.) Kuntze		Orchidaceae		NA
41	<i>Goodyera hemsleyana</i> King & Pantling		Orchidaceae		NA
42	<i>Goodyera procera</i> (Ker Gawler) Hook.		Orchidaceae		NA
43	<i>Liparis bistrinata</i> C.S.P.Parish & Rchb. f.		Orchidaceae		NA
44	<i>Liparis cordifolia</i> Hook.f.		Orchidaceae		NA
45	<i>Liparis dongchenii</i> S.Z. Lucksom		Orchidaceae		NA
46	<i>Oberonia pachyrachis</i> Rchb. f. ex Hook. f.		Orchidaceae		NA
47	<i>Odontochilus grandiflorus</i> (Lindl.) Bentham & Hook. f. ex Hook. f.		Orchidaceae		NA
48	<i>Odontochilus lanceolatus</i> (Lindl.)B1.		Orchidaceae		NA
49	<i>Ornithochilus defformis</i> (Wall ex Lindl.) Schltr.		Orchidaceae		NA

50	<i>Otochilus albus</i> Lindl.		Orchidaceae		NA
51	<i>Otochilus fuscus</i> Lindl.		Orchidaceae		NA
52	<i>Otochilus lancilabius</i> Seidenfaden.		Orchidaceae		NA
53	<i>Pholidota articulata</i> Lindl.		Orchidaceae		NA
54	<i>Pholidota articulata</i> var. <i>griffithii</i> (Hook. f.) King & Pantling.		Orchidaceae		NA
55	<i>Pholidota imbncata</i> Hook		Orchidaceae		NA
56	<i>Pholidota protracta</i> Hook.f.		Orchidaceae		NA
57	<i>Pholidota recurva</i> Lindl		Orchidaceae		NA
58	<i>Pleione maculata</i> (Lindley)		Orchidaceae		NA
59	<i>Pleione praecox</i> (pink) (Smith) D. Don		Orchidaceae		NA
60	<i>Pleione praecox</i> (pure white) (Smith) D. Don		Orchidaceae		NA
61	<i>Rhomboda lanceolata</i> (Lindl.) Ormerod		Orchidaceae		NA
62	<i>Rhynchosstylis retusa</i> (L.)Bl.		Orchidaceae		NA
63	<i>Smitmandia micrantha</i> (Lindl.) Holttum		Orchidaceae		NA
64	<i>Tainia minor</i> Hook.f.		Orchidaceae		NA
65	<i>Uncifera lancefolia</i> (King & Pantling) Schltr.		Orchidaceae		NA
66	<i>Vanda cristata</i> Lindl.		Orchidaceae		NA
67	<i>Vanda cristata</i> Wall.ex Lindl.		Orchidaceae		NA
68	<i>Vanda pumila</i> Hook.f		Orchidaceae		NA
69	<i>Vandopsis undulata</i> (Lindl.)J .J. Smith.		Orchidaceae		NA
70	<i>Zeuxine goodyeroides</i> Lindl		Orchidaceae		NA



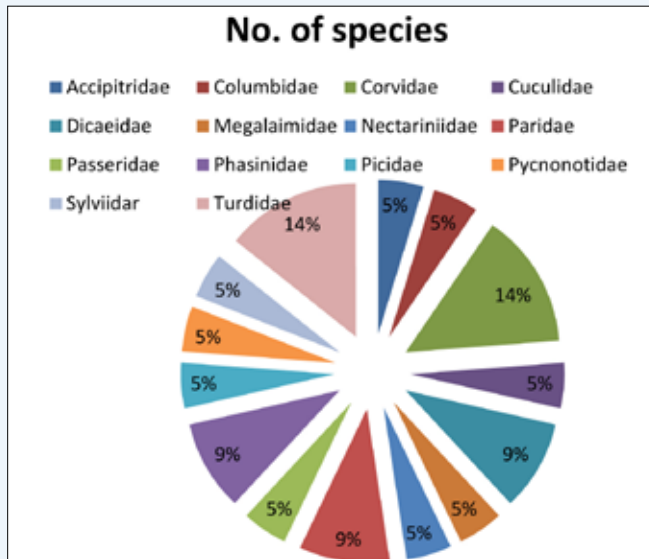
Globba sessiliflora



Clematis buchananiana

FAUNA

During the survey, 5 species of animal were recorded from Kartok Reserve Forest. Further, a total of 22 bird species belonging to 14 families were recorded. The family-wise bird species composition were recorded for Turdidae & Corvidae (3 species each) followed by Dicaeidae, Paridae, Phasinidae (2 species each) from this particular transect. The other remaining family represented by single species.



Family-wise bird species composition of Kartok Reserve forest



Fire-tailed sunbird (Female)



Long tail shrike

Checklist of fauna & avifauna species were encountered at Kartok Reserve Forest, East Sikkim

Sl. No	Scientific Name	Family	Common Name	Local Name	Evidence(Direct & Indirect)
	FAUNA				
1.	<i>Muntiacus muntjak</i>	Cervidae	Barking deer	Mirga	Pellets
2.	<i>Ursus thibetanus</i>	Carnivora	Himalayan Black bear	Bhalu	Mark
3.	<i>Cuon alpinus</i>	Carnivora	Wild dog	Ban kukur	Scat
4.	<i>Sus scrofa</i>	Suidae	Wild Boar	Bodyal	Scat
5.	<i>Canis sp</i>	Carnivora	Common Jackal	Syall	Scat
	AVI-FAUNA				
1	<i>Aegithalos louschistos</i>	Paridae	Rufous-fronted Tit	Fista	Direct Sighting
2	<i>Cettia major</i>	Sylviidae	Chestnut Crowned Warbler	Fista	Direct Sighting
3	<i>Fulvetta vinipectus</i>	Paridae	Coal Tit	Fista	Direct Sighting
4	<i>Corvus macrorhincus</i>	Corvidae	Jungle Crow	Khag	Direct Sighting
5	<i>Cuculus canorus</i>	Cuculidae	Eurassian	Cuckoo	Direct Sighting
6	<i>Dendrocopos darjellensis</i>	Picidae	Darjeeling Woodpecker	Laachey	Direct Sighting
7	<i>Dicrurus leucophaeus</i>	Dicaeidae	Ashy Drongo	Chibey	Direct Sighting
8	<i>Dicrurus macrocercus</i>	Dicaeidae	Black Drongo	Chibey	Direct Sighting
9	<i>Garrulax leucolophus</i>	Turdidae	White-crested Laughingthrush	Kolkoley	Direct Sighting
10	<i>Garrulax ocellatus</i>	Turdidae	Spotted Laughing Thrush	Kolkoley	Direct Sighting
11	<i>Gypaetus barbatus</i>	Accipitridae	Lammergeier	Chill	Direct Sighting
12	<i>Lophura leucomelana</i>	Phasianidae	Kalij pheasant	Kalij	Direct Sighting
13	<i>Megalaima virens</i>	Megalaimidae	Great Barbet	Neual	Direct Sighting
14	<i>Myophonus caeruleus</i>	Turdidae	Blue Whistling Thrush	Kalchura	Direct Sighting
15	<i>Passer rutilans</i>	Passeridae	Russet Sparrow	Bhangera	Direct Sighting
16	<i>Pycnonotus cafer</i>	Pycnonotidae	Red Vented Bulbull	Jureli	Direct Sighting
17	<i>Streptopelia orientalis</i>	Columbidae	Oriental Turtle Dove	Dhukur	Direct Sighting
18	<i>Urocissa ornata</i>	Corvidae	Yellow Billed Blue Magpie	Lampucharey	Direct Sighting
19	<i>Corvus macrorhincus</i>	Corvidae	Large billed Crow	Kag	Direct Sighting
20	<i>Arborophila torqueola</i>	Phasianidae	Hill Partridge	Peura	Direct Sighting

21	<i>Aethopyga ignicauda</i>	Nectariniidae	Fire-tailed sunbird	Balchi	Photocaptured
22	<i>Lanius schach</i>	Liniidae	Long tail shrike		Photocaptured
	BUTTERFLIES				
1	<i>Symbrenthia niphanda</i>	Nymphalidae	Bluetail Jester		Direct Sighting
2	<i>Pseudocoladenia dan</i>	Hesperiidae	Fulvous Pied Flat		Direct Sighting
3	<i>Pelopidas assamensis</i>	Hesperiidae	Great Swift		Direct Sighting
4	<i>Issoria lathonia</i>	Nymphalidae	Queen of Spain Fritillary		Direct Sighting
5	<i>Cethosia cyane</i>	Nymphalidae	Red Lacewing		Direct Sighting
6	<i>Notocrypta curvifascia</i>	Hesperiidae	Restricted Demon		Direct Sighting
7	<i>Eurema blanda</i>	Pieridae	Three Spot Grass Yellow		Direct Sighting

Kau Reserve Forest, South Sikkim

Nimesh Chamling, Anjana Pradhan, Suraj Subba & Dorjee Chewang Bhutia

INTRODUCTION

The Forest is comprised of single compartment and divided into two forest types namely 8B/C1 East Himalayan Sub Tropical Wet Hill Forest (900-1800 m asl), which receives an annual rainfall of about 2000mm (79in). The ecoregion hosts a broad range of plant communities based on its complex topography, pedological characteristics and variations in rainfall. The main tree species of this region are *Ficus hookeriana*, *Erythrina arborescens*, *Brassaiopsis hispida*, *Elaeocarpus lanceaefolius*, *Macaranga pustulata*, *Saurauia nepalensis*, *Ficus neriifolia* & *Terminalia chebula*.

While, 11B/C1b East Himalayan Wet Temperate Forest (1800-2400 m asl) is a transitional zone between subtropical mixed broad leaved to sub-temperate zone. Branches and tree bole are mainly covered with mosses, ferns and other epiphytes. The evergreen tree dominates the region and the undergrowth is mainly of dwarf species of bamboos. This forest type is the mostwidely distributed forest type in the State/division. Species ranges from *Alnus nepalensis*, *Magnolia cathcartii*, *Quercus glauca*, *Symplocos glomerata*, *Machilus edulis* & *Leucosceptrum cannum*.

The forest is home to more than 30 species of birds. Some of the birds which we encountered during our survey were House Sparrow, Common Myna, Black Bulbull, Blue Whistling Laughing Thrush, Red Vented Bulbull. Some of the commonly found birds in the forest are Common Hill Partridge, Common Green Magpie, Verditer Flycatcher, Great Barbet, Oriental Turtle Dove, Scarlet Minivet. Apart from avifauna the forest is also home to some mammalian species such as Barking Deer, Himalayan Black Bear, Wild Boar.

SURVEY AREA

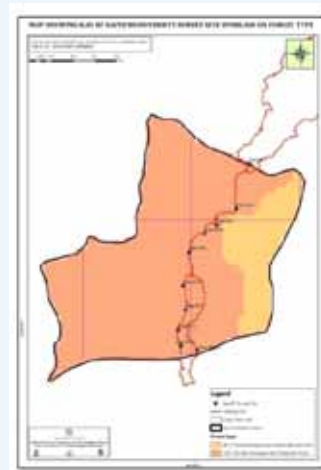
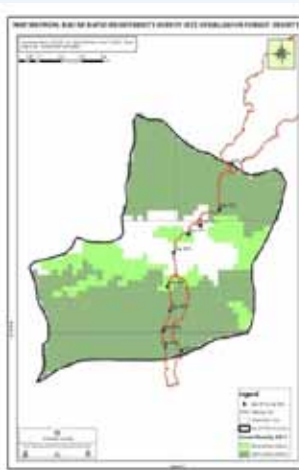
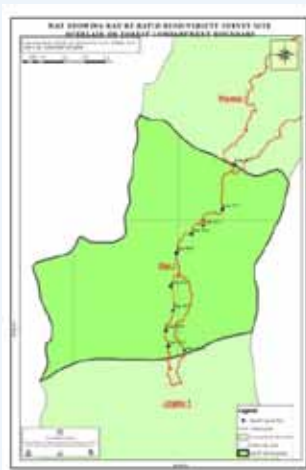
The current survey was carried out along the sampling path of Kau Reserve Forest. The altitude of the surveyed path ranged from 1911-2001m asl lying between 27°21'46.4"- 27°20'55.6"N latitude and 88°26'25.0"- 88°26'00.5"E longitude. The slope angle of the surveyed area ranged from 30° to 55° and aspect facing towards N, NE, E and S. The field visit was done in January 2018.



CBH Measurement



Survey Pathway



Showing forest compartment boundary, forest density & forest types



***Calamus* sp.**



Chestnut Bellied Rock Thrush



Three Spot Grass Yellow

FINDINGS AND DISCUSSION

Study revealed total of 43 floral species in 10 sampling plots in Kau Reserve Forest, covering an area 0.10 ha. Trees represented with highest number of species (18 species, 16 genera and 15 family) followed by herbs hosting second highest number of species with (11 species, 11 genera and 10 family). Similarly, Epiphytes/Orchids/Climbers and succulents represented third highest with (6 species, 6 genera and 6 family). While a total of about 4 species, 4 genera and 4 family of ferns and fern-allies were recorded during the survey. Elaeocarpaceae, Moraceae, Symplocaceae family dominated in tree species, Asteraceae family in herb category and Gleicheniaceae family dominated in ferns and fern-allies. The forest hosts 1 species of bamboo viz. *Cephalostachyum capitatum* var. *decomposita* and has 1 species of Cane viz. *Calamus* sp.

Apart from floral species, faunal species is also being recorded, where a total of about 46 faunal species is been listed. Among these with 31 species, 25 genera and 18 family of avian-faunal is being recorded the highest. During our survey trail we could encountered some common avian species such as common Myna, Blue Whistling Laughing Thrush, Ashy Drongo, House Sparrow, Red Vented Bulbul. While Nectariniidae and Pycnonotidae family dominated in avifauna. Similarly, the forest also hosts 4 mammalian species viz. Himalayan Black Bear, Wild Boar, Barking Deer and Leopard Cat. The Reserve Forest also hosts beautiful butterflies which we sighted during our survey viz. Paris Peacock, Large Silver Stripe, Golden Sapphire, Indian Red Admiral. Nymphalidae family mainly dominated in butterfly.

The Kau Reserve Forest lies in South Sikkim, though it is small in area but rich in terms of floral and faunal diversity. The Reserve Forest has two types of forest viz. East Himalayan Sub Tropical Wet Hill Forest and East Himalayan Wet Temperate Forest. The larger extent of the forest area is covered by East Himalayan Wet Temperate Forest while East Himalayan Sub Tropical Forest occupies the lesser extent. Though the Sub Tropical Forest occupies the smaller portion of the area but have good floral and faunal diversity.

The larger extent of the forest is covered by Wet Temperate Forest, so maximum plots were covered under this forest cover. Most of the plots laid was covered under very Dense Forest, while fewer plots were recorded under moderately dense forest.

As the forest has not been divided into compartment, the whole RF is considered as a compartment. The Kau Reserve Forest is adjoining to the Lingmoo Reserve Forest and it is being bisected by Dharay Kholcha. During our survey we could notice soil erosion caused by the flash floods along the Dharay Kholcha. May be due to the soil erosion caused by the flash flood we could encountered *Alnus nepalensis* coming up along the periphery of Dharay Kholcha. Since, *Alnus nepalensis* acts as a pioneer species in any ecological succession, we can recommend this species along with bamboo and grass species as major steps in controlling the soil erosion in future course of action.

Similarly, during our survey in the RF we found the species of Cane viz. *Calamus* Sp. It is an important species as we were able to locate only in Kau Reserve Forest so far apart from the other reserve forest surveyed. During our survey we could record only few plants in the RF, so proper conservation steps is needed to protect it. *Rattan* acts as an alternative source of timber, as it is used in furniture, handicrafts and building materials. Apart from this rattan continues to be an invaluable part of rural people's livelihoods.

Beside this we were also successful in recording the Gopi baans a species of bamboo viz. *Cephalostachyum capitatum* var. *decomposita* which comes under grass family and is a fast-growing species. The forest is habitat for this species and we need to protect and conserve it. So we can go for the inter plantation between *Alnus nepalensis* and *Cephalostachyum capitatum* in order to control the soil erosion soil.

The forest also bears some important timber species viz. *Terminalia chebula*, *Magnolia cathcartii* & *Toona ciliata*. Apart from these species the forest also bears multipurpose tree species (MPTS) viz. *Alnus nepalensis*, *Elaeocarpus lanceaefolius*, *Ficus neriifolia*, *Ficus hookeriana*, *Symplocos glomerata*, *Symplocos lucida*, these are the trees which are deliberately used for multi purposes such as fuelwood, fodder, fruit, nuts.

The forest also bears some important medicinal plants viz. *Rubia cordifolia*, *Hedychium spicatum*, *Artemesia myriantha*. The *Rubia cordifolia* is a perennial herbaceous climber, its root and fruits are used in medicinal treatment of gout and pains. *Hedychium spicatum* root is used in cough, ulcer, inflammation etc. Apart from medicinal property, *Artemesia myrianthais* also used in traditional and religions functions.

Site characteristics along sampling plots of Kau Reserve Forest

Site code	Elevation (m)	Latitude (N)	Longitude (E)	Slope Angle	Slope Aspect	Canopy Cover (%)
KRF1	1911	27°21'46.4"	88°26'25.0"	55	N	20
KRF2	1964	27°21'41.6"	88°26'20.3"	35	N	30
KRF3	2001	27°21'36.4"	88°26'14.4"	45	N	40
KRF4	1985	27°21'28.6"	88°26'12.0"	40	NE	45
KRF5	1999	27°21'23.5"	88°26'09.5"	30	E	51
KRF6	1983	27°21'17.0"	88°26'07.4"	50	S	40
KRF7	1941	27°21'13.3"	88°26'02.2"	35	NE	20
KRF8	1958	27°21'03.5"	88°25'59.1"	45	N	15
KRF9	1945	27°20'53.7"	88°25'28.2"	35	N	35
KRF10	1978	27°20'55.6"	88°26'00.5"	35	E	45

Checklist of floral Species recorded in Kau Reserve forest, South Sikkim

S. No	Botanical Name	Local Name	Family
TREES			
1	<i>Alnus nepalensis</i> D. Don	Uttis	Betulaceae
2	<i>Beilschmiediasikkimensis</i> King ex Hook. f.	Tarsing	Lauraceae
3	<i>Brassaiopsishispida</i> Seem.	Phutta	Araliaceae
4	<i>Cedrelafebrifuga</i> Blume./Toonaciliata M. Roem.	Tooni	Meliaceae
5	<i>Echinocarpus dasycarpus</i> Benth.	Gobre	Elaeocarpaceae
6	<i>Elaeocarpus lanceaefolius</i> Roxb.	Bhadrasey	Elaeocarpaceae
7	<i>Erythrina arborescens</i> Roxb.	Phaledo	Fabaceae
8	<i>Ficus nerifolia</i> Sm.	Dhudilo	Moraceae
9	<i>Ficus hookeriana</i> Corner	Nebaro	Moraceae
10	<i>Leucosceptrum cannum</i> Smith.	Ghurpis	Lamiaceae
11	<i>Macaranga pustulata</i> King.	Malato	Euphorbiaceae
12	<i>Maesachisia</i> Buch. –Ham ex. D. Don	Bilauney	Myrsinaceae
13	<i>Magnolia cathcartii</i> (Hook.f. & Thomson) Noot.	Titechangp	Magnoliaceae
14	<i>Quercus glauca</i> Thunb.	Phalant	Fagaceae
15	<i>Saurauianepalensis</i> DC	Gagun	Actinidaceae
16	<i>Symplocos glomerata</i> King ex C. B. Clarke	Kholmey	Symplocaceae
17	<i>Symplocos lucida</i> D. Don	Kharaney	Symplocaceae
18	<i>Terminalia chebula</i> Retz.	Harra	Combretaceae
SHRUB			
1	<i>Rubus paniculatus</i> Smith	Aiselu	Rosaceae
2	<i>Viburnum erubescence</i> Wall. ex DC	Asare	Caprifoliaceae
3	<i>Osbeckiastellata</i> Buch.-Ham. ex D. Don	Chulesi	Melastomataceae
4	<i>Daphne cannabina</i> Wall.	Kaloargeli	Thymelaeaceae
HERB			
1	<i>Gerardianadiversifolia</i> (Link) Friis	Bhangresisnu	Urticaceae
2	<i>Setariapalmifolia</i> (K.D. Koenig) Stapf.	Dhoti sara	Poaceae
3	<i>Strobilanthes</i> sp.	Kibughans	Acanthaceae
4	<i>Dichroafebrifuga</i> Lour.	Basak	Hydrangaceae
5	<i>Eupatorium adenophorum</i> Spreng.	Kali jhar	Asteraceae
6	<i>Oxalis corniculata</i> Linn.	Amilojhar	Oxalidaceae
7	<i>Smilax zeylanica</i> Linn.	Kukurdaaney	Liliaceae
8	<i>Artemesiamyriantha</i> Wall. ex Bess	Titeypati	Asteraceae
9	<i>Anaphalisadnata</i> Wall. ex DC	Bukiful	Asteraceae

10	<i>Swertiabimaculata</i> (Siebold &Zuccarini) Hook. & Thom. ex CB Clarke	Bhaleychirowto	Gentianaceae
11	<i>Hedychium spicatum</i> Sm.	Saro	Zingiberaceae
12	<i>Urticadioica</i> Linn.	Ghariasisnu	Urticaceae
EPIPHYTES/ORCHIDS, CLIMBERS & SUCCULENTS			
1	<i>Rubiaccordifolia</i> Linn.	Majito	Rubiaceae
2	<i>Rhapidophoradecursiva</i> (Roxb.) Schott.	Kanchirna	Araceae
3	<i>Agapetesserpens</i> (Wright) Sleumer		Ericaceae
4	<i>Cissuselongata</i> Roxb.	Charcharey lahara	Vitaceae
5	<i>Trichosantheslepiniana</i> (Naud.) Cogn.	Indreni	Cucurbitaceae
6	<i>Smilax zeylanica</i> Linn.	Kukurdainey	Liliaceae
FERNS AND FERNS-ALLIES			
1	<i>Pteriswallichiana</i> J. Agardh	ChateyUniu	Pteridaceae
2	<i>Dicranopteris</i> sp.	Sottar	Gleicheniaceae
3	<i>Gleichenia gigantean</i> Wall. ex Hook	Kalameyunew	Gleicheniaceae
BAMBOO AND CANE			
1	<i>Cephalostachyumcapitatum</i> var. <i>decomposita</i>	Gope bans	Poaceae
2	<i>Calamus</i> Sp.		Arecaceae

Checklist of fauna, avi-fauna & Butterfly species encountered at Kau Reserve Forest.

Sl No	Scientific Name	Common Name	Local Name	Family	IUCN Status
FAUNA					
1	<i>Dremomyslokriah</i>	Orange-bellied Himalayan Squirre	Lothurke	Sciuridae	LC
2	<i>Macaca mulatta</i>	Rhesus macaque	badhar	Cercopithecidae	LC
3	<i>Muntiacusmuntjak</i>	Barking Deer	DareyMirga	Cervidae	LC
4	<i>Paradoxurushermaphroditus</i>	Asian palm civet		Viverridae	LC
5	<i>Prionailurusbengalensis</i>	Leopard cat	Ningalo	Felidae	LC
6	<i>Sus scrofa</i>	Wild Boar	Bodel	Suidae	LC
7	<i>Ursusthibetanus</i>	Himalayan Black Bear	Ursusthibetanus	Ursidae	LC
8	<i>Vulpes vulpes</i>	Red Fox	Sheyal	Canidae	LC
AVI-FAUNA					
1	<i>Acridotherestrictis</i>	Common Myna		Sturnidae	LC
2	<i>Actinoduranepalensis</i>	Hoary Barwing		Timaliidae	LC
3	<i>Aegithaloslouschistos</i>	Rufous-fronted Tit		Paridae	LC
4	<i>Aethopyganepalensis</i>	Nepal Sunbird		Nectariniidae	LC
5	<i>Aethopygaspiraja</i>	Crimson Sunbird		Nectariniidae	
6	<i>Arborophilatorqueola</i>	Common Hill Partridge		Phasinidae	LC

7	<i>Cissachinensis</i>	Common Green Magpie		Corvidae	LC
8	<i>Columba livia</i>	Common Pigeon		Columbidae	LC
9	<i>Corvusmacrorhyncus</i>	Jungle Crow		Corvidae	
10	<i>Culicicapaceylonensis</i>	Grey Headed Canary Flycatcher		Muscicapidae	
11	<i>Dicrurusleucophaeus</i>	Ashy Drongo		Dicaeidae	LC
12	<i>Eumyiasthalassinus</i>	Verditer Flycatcher		Muscicapidae	LC
13	<i>Fulvettavinipectus</i>	White Browed Fulvetta		Timaliidae	
14	<i>Garrulaxleucolophus</i>	White Crested Laughing Thrush		Leiothrichidae	LC
15	<i>Garrulaxstriatus</i>	Striated Laughing Thrush		Turdidae	LC
16	<i>Hypsipetesleucocephalus</i>	Black Bulbull		Pycnonotidae	LC
17	<i>Laniustephronotus</i>	Grey backed Shrike		Laniidae	LC
18	<i>Lophuraleucomelanos</i>	Kalij Pheasant		Phasianidae	LC
19	<i>Megalaimavirens</i>	Great Barbet		Megalaimidae	LC
20	<i>Myiophonuscaeruleus</i>	Blue Whistling Laughing Thrush		Muscicapidae	LC
21	<i>Orthotomusatrogularis</i>	Common Tailor bird		Cisticolidae	LC
22	<i>Passer domesticus</i>	House Sparrow		Passeridae	LC
23	<i>Parusmonticulus</i>	Green Backed Tit		Paridae	LC
24	<i>Pericrocotus(flammeus) speciosus</i>	Scarlet Minivet		Campephagidae	
25	<i>Pycnonotuscafer</i>	Red Vented Bulbull		Pycnonotidae	LC
26	<i>Pycnonotusstriatus</i>	Straited Bulbull		Pycnonotidae	LC
27	<i>Rhipiduraaureola</i>	White browed Fantail		Rhipiduridae	LC
28	<i>Stroptopeliaorientalis</i>	Oriental Turtle Dove		Columbidae	LC
29	<i>Eumyiasthalassinus</i>	Verditer Flycatcher		Muscicapidae	LC
30	<i>Yuhina flavicollis</i>	Whiskered Yuhina		Timaliidae	LC
31	<i>Yuhina gularis</i>	Striped Throated Yuhina		Sylviidae	LC
BUTTERFLY					
1	<i>Argynnischildreni</i>	Large Silverstripe		Nymphalidae	
2	<i>Aglaiscascashmirensis</i>	Indiantortoise shell		Nymphalidae	
3	<i>Cethosiacyane</i>	Lacewing		Nymphalidae	
4	<i>Euremahecabe</i>	Grass Yellow		Pieridae	
5	<i>Heliophorus brahma</i>	Golden Sapphire		Lycaenidae	
6	<i>Notocryptaparalysos</i>	Common Banded Demon		Hesperiidae	
7	<i>Papilioparisparis</i>	Paris Peacock		Papilionidae	
8	<i>Pieris rapae</i>	cabbage white		Pieridae	
9	<i>Vanessa cardui</i>	Painted lady		Nymphalidae	
10	<i>Vanessa indica</i>	Indian Red Admiral		Nymphalidae	
11	<i>Zemerosflegyas</i>	Punchinello		Riodinidae	

Lapdang Reserved Forest, West Sikkim

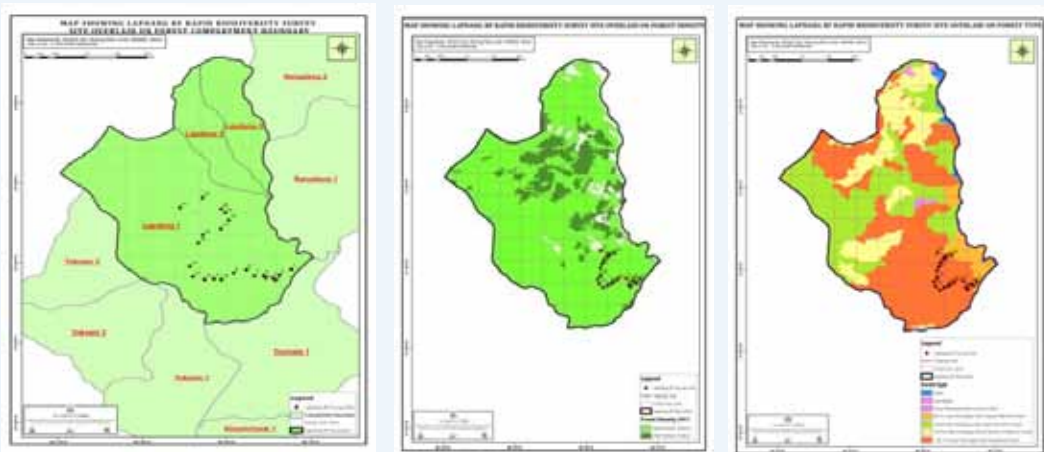
Sabita Dahal & Meena Tamang



STUDY AREA

A field trip for conducting Rapid Biodiversity Survey to Lapdang Reserve Forest covering a sampling path along Thulo Dharay - Toribari – Gai Kharka in West Sikkim, were carried out during the month of November 2017 by the SBFP survey team. The trip was aimed for inventory and monitoring of the biodiversity of the area.

The present survey area encompasses along Thulo Dharay - Toribari – Gai Kharka sampling path, the forest type of which is represented by wet temperate forest. The elevation range covered during the survey was from 1800m (Gaikharka) to 2400m (Toribari) which is represented by Figure 1. The slope angle of the area ranged between mild (5 degree) to stiff (75 degree) slope and is facing towards E, NE and SE aspect (Table)



Showing the forest compartment boundary, forest density and forest types of Labdang RF, West Sikkim

Site characteristics of the survey area along Thulo Dharay - Toribari – Gai Kharaka sampling path in Lapdang RF, West Sikkim

Site Code	Forest type	Elevation (M)	GPS co-ordinates		Slope Angle (Degree)	Slope Aspect	Canopy cover/ Forest density	Dominate taxa	Disturbances	Location name
			Lat	Long						
Plot1	Wet Temperate Forest	2075	27.38285	88.29147	50	SE	80%, Very dense	Trees	Nil	Thulo Dharay
Plot2	Wet Temperate Forest	2072	27.38281	88.29148	40	NE	45%, Moderately dense	Trees	Grazing	Thulo Dharay
Plot3	Wet Temperate Forest	2096	27.38179	88.29067	35	NE	90%, very dense	Trees	Grazing	Thulo Dharay
Plot4	Wet Temperate Forest	2101	27.38227	88.29013	30	NE	95%, very dense	Trees	Nil	Pakhay Kharaka
Plot5	Wet Temperate Forest	2192	27.38102	88.28923	40	NE	95%, very dense	Trees	Nil	-
Plot6	Wet Temperate Forest	2195	27.38145	88.28886	45	E	75%, very dense	Trees	Nil	Bhote Kharaka
Plot7	Wet Temperate Forest	2193	27.38293	88.28832	55	E	85%, very dense	Trees	Nil	Dhodray Kharaka
Plot8	Wet Temperate Forest	2218	27.38267	88.28628	45	E	70%, very dense	Trees	Nil	Dhodray Kharaka
Plot9	Wet Temperate Forest	2247	27.38217	88.2853	75	E	90%, very dense	Trees	Nil	Below Toribari
Plot10	Wet Temperate Forest	2282	27.38184	88.28488	60	E	90%, very dense	Herbs		
Plot11	Wet Temperate Forest	2311	27.38144	88.28397	30	E	90%, very dense	Trees	Nil	Toribari
Plot12	Wet Temperate Forest	2342	27.38094	88.28291	30	E	75%, Very dense	Trees	Nil	Musay Thapla

Plot13	Wet Temperate Forest	2334	27.3818	88.28196	45	E	50%, Moderately dense	Trees	Nil	
Plot14	Wet Temperate Forest	2301	27.38282	88.28159	45	E	50%, Moderately dense	Trees	Nil	Musay Pakha
Plot15	Wet Temperate Forest	2264	27.38353	88.28243	45	SE	40%, moderately dense	Trees	Nil	Musay Chauri
Plot16	Wet Temperate Forest	2178	27.38503	88.28233	45	SE	45%, moderately dense	Trees	Nil	Musay Goat Kharka
Plot17	Wet Temperate Forest	2117	27.38597	88.28284	50	SE	45%, moderately dense	Trees	Nil	
Plot18	Wet Temperate Forest	2091	27.3868	88.28321	60	SE	75%, very dense	Trees	Nil	Piplay Dara
Plot19	Wet Temperate Forest	2030	27.38743	88.28391	70	SE	70%, very dense	Tree	Nil	Piplay dara
Plot20	Wet Temperate Forest	2014	27.38782	88.28453	5	SE	20%, open	Planted Tree	Nil	-
Plot21	Wet Temperate Forest	2019	27.38872	88.28235	10	SE	40%, Moderately Dense	Trees	Nil	Gai Kharka
Plot 22	Wet Temperate Forest	1987	27.38814	88.28569	15	SE	40%, Moderately dense	Trees	Nil	Gai Kharka

FINDINGS

FLORA

During the survey, a total of 22 plots were laid covering 0.22 ha area (Table & Figure). A general checklist of the floral species (Table 2) of the area (including the areas outside of the plots) were prepared of which, Herbs represented the highest number of species (74 species) followed by trees and small trees (57 species). 17 species of shrubs, 29 species of climbers and epiphytes and climbers, 24 species of ferns and ferns allies and 5 species of bamboos and cane were inventorised from the area. Location name, dominate taxa, elevation, GPS-co-ordinates, forest type, slope angle, Slope aspect, disturbances and forest density of the area in terms of canopy cover in and around the sample plots are provided in the Table.

Checklist of floral species in Lapdang Reserve Forest, West Sikkim

Sl No,	Botanical Name	Family	Common name
TREE AND SMALL TREE SPECIES			
1	<i>Acer pectinatum</i> wall.ex G.Nicholson	Sapindaceae	Lek Kapasay
2	<i>Acer caudatum</i> Wallich.	Sapindaceae	Kapasey
3	<i>Actinodaphne sikkimensis</i> Meissn.	Lauraceae	Phurkey Sissi
4	<i>Alangium begoniaefolium</i> (Roxb.) Baill	Alangiaceae	Akhanay
5	<i>Alnus nepalensis</i> D. Don.	Betulaceae	Utis
6	<i>Antidesma acuminatum</i> Wight	Euphorbiaceae	Lekh bilaune
7	<i>Betula alnoides</i> Wall. ex Diels	Betulaceae	Saur
8	<i>Brassaiopsis mitis</i> C.B.Clarke	Araliaceae	Phutta
9	<i>Castanopsis hystrix</i> Hook. & Thomson ex. A. DC.	Fagaceae	Patley katush
10	<i>Castanopsis indica</i> (Roxb.ex Lindl.) A.DC.	Fagaceae	Dhalne kattus
11	<i>Castanopsis tribuloides</i> (Smith) A. DC.	Fagaceae	Musrey katus
12	<i>Cedrela febrifuga</i> Blume.	Meliaceae	Tuni
13	<i>Cinnamomum impressinervium</i> Meisn.	Lauraceae	Sinkoli
14	<i>Daphniphyllum himalayense</i> (Benth.) Mull. Arg.	Euphorbiaceae	Lal Chandan
15	<i>Elaeocarpus lanceaefolius</i> Roxburgh.	Elaeocarpaceae	Bhadrasey
16	<i>Engelhardtia spicata</i> Blume	Juglandaceae	Mauwa
17	<i>Erythrina arborescens</i> Roxb	Leguminosae	Phaledo
18	<i>Eurya acuminata</i> DC.	Theaceae	Jhingni
19	<i>Eurya acuminata</i> DC.	Theaceae	Jhinganey
20	<i>Exbucklandia populnea</i> R. Br. Ex Griff	Hamamelidaceae	Piplee
21	<i>Ficus hookeri</i> Miq.	Moraceae	Nebhara
22	<i>Ficus nemoralis</i> Wall.	Moraceae	Dudilo
23	<i>Garuga pinnata</i> Roxb.	Burseraceae	Dabdabay
24	<i>Glochidion acuminatum</i> Muell.	Euphorbiaceae	Latikaath
25	<i>Gynocardia odorata</i> Roxburgh	Flacourtiaceae	Bandre/Gante
26	<i>Hovenia dulcis</i> Thunb.	Thymelaeaceae	Bangi

27	<i>Juglans regia</i> Linn.	Juglandaceae	Okhar
28	<i>Leucosceptrum cannum</i> Smith	Lamiaceae	Ghurpis
29	<i>Lithocarpus fenestrata</i> Roxb.	Fagaceae	Arkaulo
30	<i>Litsea kingii</i> Hook.	Lauraceae	Siltimmur
31	<i>Macaranga pustulata</i> King.	Euphorbiaceae	Malato
32	<i>Machilus edulis</i> King.	Lauraceae	Pumsee / Funchey
33	<i>Machilus gamblei</i> King ex J. D. Hooker	Lauraceae	Lapche Kaulo / Chiplay Kaulo
34	<i>Machilus odoratissimus</i> Nees	Lauraceae	Ghew funchey
35	<i>Maesa chisia</i> Buch.-Ham. ex D. Don	Myrsinaceae	Bilaune
36	<i>Magnolia cathartii</i> (Hook.f. & Thomson) Noot.	Magnoliaceae	Tite champ
37	<i>Magnolia doltsopa</i> (Buch.-Ham. ex DC.) Figlar	Magnoliaceae	Rani champ
38	<i>Myrica esculenta</i> Buch. Ham.	Myricaceae	Kafal
39	<i>Myrsine semiserrata</i> Wall.	Myrsinaceae	Phalame
40	<i>Nyssa sessiliflora</i> Hook. f. & Thomson ex Benth	Cornaceae	Lek chilauney
41	<i>Ostedes paniculatus</i> Blume.	Euphorbiaceae	Bepari
42	<i>Pieris ovalifolia</i> D. Don	Ericaceae	Angari
43	<i>Prunus cerasoides</i> D. Don.	Rosaceae	Paiyun
44	<i>Prunus nepalensis</i> (Ser) Stendel	Rosaceae	Arupatey
45	<i>Pyralia edulis</i> (Wallich) A.	Santalaceae	Amphi
46	<i>Quercus lamellosa</i> Smith.	Fagaceae	Buk/ Bajranth
47	<i>Quercus pachyphylla</i> Kurz.	Fagaceae	Sungure Katus/ Bantay/ Oitay.
48	<i>Rhododendron arboreum</i> ssp. <i>arboreum</i> (CB Clarke) Ridley.	Ericaceae	Lali gurans
49	<i>Rhododendron falconeri</i> Hook.f.	Ericaceae	Korlinga
50	<i>Rhododendron grande</i> Wright.	Ericaceae	Patle korlinga
51	<i>Rhus succedanea</i> Linn.	Anacardiaceae	Bhalayo
52	<i>Rhus succedanea</i> Linn.var. <i>acuminata</i>	Anacardiaceae	Rani bhalayo
53	<i>Schima wallichii</i> (DC) Korth.	Theaceae	Chilaune
54	<i>Symingtonia populnea</i> (R. Br. Ex Griff.)	Hamamelidaceae	Piple
55	<i>Symplocos glomerata</i> King, ex. C.B. Clarke	Symplocaceae	Kholme
56	<i>Symplocos lucida</i> Don.	Symplocaceae	Kharanay
57	<i>Tetradium fraxinifolium</i> (Hook.) Hartley	Rutaceae	Khanakpa
	SHRUBS		
1	<i>Ardisia macrocarpa</i> Wall.	Myrsinaceae	Damai phal
2	<i>Berberis</i> sp.	Berberidaceae	
3	<i>Daphne cannabina</i> Wall.	Thymeleaceae	Kalo Argeli/Kagate
4	<i>Dichroa febrifuga</i> Lour	Hydrangeaceae	Basak
5	<i>Edgeworthia gardenieri</i> Meissn.	Thymeliaceae	Argali
6	<i>Eupatorium adenophorum</i> Sprengel	Asteraceae	Kalijhar
7	<i>Hypericum oblongifolium</i> Choisy	Hypericaceae	Urilo

8	<i>Maesa chisia</i> Don	Myrsinaceae	Bilauney
9	<i>Mahonia napaulensis</i> DC	Berberidaceae	Chutro
10	<i>Neillia rubiflora</i> D.Don	Rosaceae	Khareto jhar
11	<i>Oxyspora paniculata</i> (D.Don) DC	Melastomataceae	Chulesi
12	<i>Polygala arillata</i> Buch.- Ham ex D.Don.	Polygalaceae	Marcha jhar
13	<i>Rubus ellipticus</i> Smith.	Rosaceae	Aiselu
14	<i>Ribes griffithii</i> Hook.f.& Thomson	Grassulariaceae	-
15	<i>Rubus niveus</i> Thunb	Rosaceae	Aiselu / Biralu kanra
16	<i>Rubus paniculatus</i> (Smith) Rees.	Rosaceae	Kalo Aiselu
17	<i>Viburnum erubescens</i> Wallich ex DC	Sambucaceae	Asaray
	HERBS		
1	<i>Aconogonum molle</i> D. Don	Polygonaceae	Thotnay
2	<i>Acorus calamus</i> Linn.	Acoraceae	Bojo
3	<i>Aeschynanthus hookeri</i> C.B.Clarke	Gesneriaceae	Baklay patay
4	<i>Aeschynanthus parviflorus</i> (D.Don) Spreng.	Gesneriaceae	Baklay patay
5	<i>Ampelocissus latifolia</i> (Roxb.) Planch	Vitaceae	Pani lahara
6	<i>Anaphalis contorta</i>		
7	<i>Anaphalis triplinervis</i> C.B. Clarke	Asteraceae	Bukey Phool
8	<i>Anthogonium gracile</i> Wall.ex Lindl.	Orchidaceae	Bamboo Orchid
9	<i>Arisaema flavum</i> (Forsskal) Schott	Araceae	Sap ko makai
10	<i>Arisaema intermedium</i> Blume	Araceae	Larua/Banko
11	<i>Arisaema speciosum</i> (Wall.) Mart.	Araceae	Sap ko Makai
12	<i>Artemisia vulgaris</i> Linn.	Asteraceae	Titaypati
13	<i>Astilbe rivularis</i> Ham	Saxifragaceae	Burokhathi
14	<i>Balanophora</i> sp.	Balanophoraceae	
15	<i>Begoniapicta</i> Sm.	Asteraceae	Magar kanje
16	<i>Boehmeria platyphylla</i> D.Don	Urticaceae	Kamley
17	<i>Carex</i> sp.	Cyperaceae	Harkatto
18	<i>Cautleya spicata</i> – (J. M. Sm.) Bak	Zingiberaceae	Sara
19	<i>Calanthe biloba</i> Lindl.	Orchidaceae	
20	<i>Centella asiatica</i> (L.) Urban	Umbelliferae	Golpatta
21	<i>Commelina benghalensis</i> L.	Commelinaceae	Kanay
22	<i>Coelogyne</i> sp.	Orchidaceae	
23	<i>Corydalis</i> sp.	Paaveraceae	
24	<i>Cremanthodium reniforme</i>		
25	<i>Cyanotis vaga</i> (Loour.) Roem & Schult.	Commelinaceae	Kanay
26	<i>Cyanotis vaga</i> (Lour.) Schult. & Schult.f.	Commelinaceae	Kanay
27	<i>Cymbidium erythraeum</i> Lindl.	Orchidaceae	Sunakhari
28	<i>Cynodon dactylon</i> Linn	Poaceae	Dubo
29	<i>Digitaria ciliaris</i> (Retzius) Koeler	Poaceae	Chitray Banso

30	<i>Digitaria sanguinalis</i> (Linn.) Scopoli.	Poaceae	Banso
31	<i>Drymaria cordata</i> Wild. ex. Roem & Schult.	Caryophyllaceae	Abhijalo
32	<i>Elatostema platyphyllum</i> Weddell.	Urticaceae	Gagleto
33	<i>Elatostema sessile</i> J.R.Forst. & G.Forst.	Urticaceae	Gagleto
34	<i>Eragrostis cilianensis</i> (All.) Lut. ex	Poaceae	Banso
35	<i>Eupatorium adenophorum</i> Spreng.	Asteraceae	Kali jhar
36	<i>Fragaria nubicola</i> Lindley ex. Lacaita	Rosaceae	Bhui-aiselu
37	<i>Gerardiana diversifolia</i> (Link) Friis	Urticaceae	Bhangre sisnu
38	<i>Goodyera foliosa</i> (Lindl.) Benth. ex C.B.Clarke	Orchidaceae	
39	<i>Goodyera repens</i> (L.) R.Br.	Orchidaceae	
40	<i>Hedychium</i> sp.	Zingiberaceae	Qiura
41	<i>Hedychium spicatum</i>	Zingiberaceae	Gai sara
42	<i>Heracleum wallichi</i> DC.	Umbelliferae	Chimphing
43	<i>Houttuynia cordata</i> Thunb	Saururaceae	Raktha-jhar
44	<i>Impatiens stenantha</i> Hook. f.	Balsaminaceae	Mujuro
45	<i>Impatiens stenantha</i> Hook.f	Balsaminaceae	Mujuro
46	<i>Impatiens urticifolia</i> Wallich	Balsaminaceae	Mujuro
47	<i>Juncus himalensis</i> Klotzsch	Juncaceae	
48	<i>Lecanthus peduncularis</i> (Wall. ex Royle) Wedd.	Urticaceae	Gagleto
49	<i>Osbeckia stellata</i> Hook.f	Melastomataceae	Arbal
50	<i>Otochilus fuscus</i> Lindl.	Orchidaceae	
51	<i>Oxalis corniculata</i> Linn.		Chariamilo
52	<i>Persicaria capitata</i> (Buch.- Ham. ex D.Don) H. Gross	Polygonaceae	Ratnaulo
53	<i>Pilea stricta</i> (Buchanan-Hamilton ex D. Don) Weddell	Urticaceae	Chiple
54	<i>Pilea umbrosa</i> Blume.	Urticaceae	Chiple
55	<i>Polygonum</i> sp	Polygonaceae	
56	<i>Potentilla cuneata</i> Wall. ex Lehm.	Rosaceae	-
57	<i>Pouzolzia sanguine</i> (Blume) Merrill	Urticaceae	Chiple
58	<i>Rumex nepalensis</i> Spreng.	Polygonaceae	Halhalley
59	<i>Rumex nepalensis</i> Sprengel	Polygonaceae	Halhaley
60	<i>Sedum</i> sp.	Crassulaceae	
61	<i>Selaginella biformis</i> A. Br. ex Kuhn	Selaginellaceae	Jhew
62	<i>Selaginella chrysocaulos</i> (Hook. & Grev.) Spring.	Selaginellaceae	Jhew
63	<i>Selaginella monospora</i> Spring.	Selaginellaceae	Jhew
64	<i>Sinopodophyllum hexandrum</i> (Royle) T.S.Ying	Lardizabalaceae	Panchpatey
65	<i>Smilax</i> sp.	Smilacaceae	Madaney kara / Kirney ghans
66	<i>Strobilanthes</i> sp.	Acanthaceae	Kibu ghans
67	<i>Swertia bimaculata</i> (Roxb. ex Flem.) Karsten	Gentianaceae	Bhaley chiraito
68	<i>Swertia chirayita</i> H. Karsten	Gentianaceae	Chiraito
69	<i>Urtica dioica</i> Linn.	Urticaceae	Patley sisnu

70	<i>Urtica parviflora</i> Roxburgh	Urticaceae	Gharia sisnu
71	<i>Valeriana hardwickii</i> Wallich	Dipsacaceae	
72	<i>Valeriana jatamansii</i> Jones	Dipsacaceae	
73	<i>Villebrunea frutescens</i> (Thunb.) Blume	Urticaceae	Chiple
74	<i>Viola sikkimensis</i> W. Becker	Violaceae	Silamey jhar
	EPIPHYTES / CLIMBERS		
1	<i>Aconogonum molle</i> (D. Don) H. Hara	Polygonaceae	Thotne
2	<i>Arisaema intermedium</i> Blume	Araceae	Larua/Banko
3	<i>Boehmeria</i> sp.	Urticaceae	Kamley
4	<i>Cardamine hirsuta</i> L.	Brassicaceae	Titey
5	<i>Carex</i> sp.	Cyperaceae	Harkatto
6	<i>Clematis acuminata</i> DC	Ranunculaceae	Pinasay lahara
7	<i>Clematis buchananiana</i> DC	Ranunculaceae	Pinasey lahara
8	<i>Clematis buchananiana</i> DC.	Ranunculaceae	Pinasey lahara
9	<i>Codonopsis viridis</i> Wallich.	Campanulaceae	Padey lahara
10	<i>Coelogyne flaccida</i> (Lindl.) Kuntz.	Orchidaceae	Sunakhari
11	<i>Cymbidium erythraeum</i> Lindl.	Orchidaceae	Sunakhari
12	<i>Davallodes membranulosa</i> (Hook.) Copel.	Davalliaceae	Uniu
13	<i>Digitaria sanguinalis</i> (Linn.) Scopoli.	Poaceae	Banso
14	<i>Diplazium dilatatum</i> Blume Lek	Woodsiaceae	Chipley Ningro
15	<i>Diplazium stoliczkae</i> Beddome	Woodsiaceae	Lek kalo ningro
16	<i>Elatostema platyphyllum</i> Weddell.	Urticaceae	Gagleto
17	<i>Eragrostis cilianensis</i> (All.) Lut. ex Janchen	Poaceae	Banso
18	<i>Galium</i> sp.	Rubiaceae	
19	<i>Machilus gamblei</i> King ex J. D. Hooker		Seti kaulo / Ghew kaulo
20	<i>Mucuna macrocarpa</i> Wall.	Leguminosae	Baldengra
21	<i>Piper boehmeriaefolia</i> (Miq.) DC.	Piperaceae	Chabo / Jungali pan
22	<i>Rhapidiphora decursiva</i> (Roxb.) Schott.	Araceae	Kanchirno
23	<i>Rubia cordifolia</i> Linn	Rubiaceae	Majito
24	<i>Rubia manjith</i> Roxb. ex Fleming	Rubiaceae	Majito
25	<i>Smilax zeylanica</i> Linn.	Liliaceae	Kukur dainey
26	<i>Smilax aspara</i> L.	Liliaceae	Kukurdaina
27	<i>Tetrastigma serrulatum</i> (Roxb.) Planchon	Vitaceae	Charcharey lahara
28	<i>Trichosanthes lepiniana</i> (Naud.) Cogn.	Cucurbitaceae	Indreni
29	<i>Viscum articulatum</i> Burm. f.	Lorantahceae	Harchur
	FERNS AND FERN- ALLIES		
1	<i>Blechnum orientale</i> L.	Blechnaceae	Deer Fern
2	<i>Coniogramme intermedia</i> Heiron.	Pteridaceae	Uniu
3	<i>Coniogramme fraxinea</i> (D. Don) Fee ex Diels	Pteridaceae	Bamboo leaf fern
4	<i>Cyathea spinulosa</i> Wall. ex Hook	Cyatheaceae	Rukh uniu
5	<i>Dennstaedtia appendiculata</i> (Wall. ex Hook.) J. Sm	Dennstaedtiaceae	Piray uniu

6	<i>Diplazium dilatatum</i> Blume	Woodsiaceae	Lek Chipley Ningro
7	<i>Diplazium esculentum</i> (Retz.) Sw	Woodsiaceae	Chiplay ningro
8	<i>Diplazium stoliczkae</i> Beddome	Woodsiaceae	Lek Kalo Ningro
9	<i>Equisetum diffusum</i> D.Don.	Equiaetaceae	Salli bisalli
10	<i>Gleichenia gigantean</i> Wall. ex Hook	Dryopteridaceae	Kalamey Uniu
11	<i>Gleichenia longissima</i> Blume	Dryopteridaceae	Sottarey uniu
12	<i>Lepisorus</i> sp.	Polypodiaceae	Polypods
13	<i>Leucostegia truncata</i> (D.Don) Fras.-Jenk.	Davalliaceae	Deer fern
14	<i>Lycopodium japonicum</i> Thunb	Lycopodiaceae	Nagbelli
15	<i>Monachosoram henryi</i> Christ.	Monachosoraceae	Uniu
16	<i>Microsorium membranaceum</i> (D.Don) Cing	Polypodiaceae	Uniu
17	<i>Nephrolepis cordifolia</i> (Linn.) C. Presl.	Davalliaceae	Pani amala
18	<i>Odontosoria chinensis</i> (L.) J.Smith	Lindsaeaceae	Uneu
19	<i>Plagiogyria pycnophylla</i> (Kunze.) Mett.	Plagiogyriaceae	Uniu
20	<i>Pseudodrynaria coronans</i> (Wall.ex Mett.) T.Moore	Polypodiaceae	Kamray lahara
21	<i>Pteridium revolutum</i> (Blume) Nakai	Dennstaedtiaceae	Uniu
22	<i>Pteris biaurita</i> L.	Pteridaceae	Uniu
23	<i>Pteris wallichiana</i> J. Agardh	Pteridaceae	Uneu
24	<i>Vittaria elongata</i> Sw	Vittariaceae	Uniu
BAMBOO / CANE SPECIES			
1	<i>Himalayacalamus hookerianus</i> (Munro) Stapleton	Poaceae	Pareng
2	<i>Sinarundinaria intermedia</i> (Munro) C.S.Chao & Renvoize	Poaceae	Nigalo/Tite Nigalo
3	<i>Schizostachyum capitatum</i> (Munro) R.B.Majumdar	Poaceae	Gope Bans
4	<i>Themnocalamus falconeri</i> Hook.f. ex. Munro.	Poaceae	Singanay Bans
5	<i>Costus speciosus</i> Koenig Sm.	Costaceae	Bethlauri



Viscum articulatum (Harchur) as an epiphyte in *Acer* sp. at Lapdang RF, West Sikkim

FAUNA

During the biodiversity survey in Lapdang Reserve forest, the existence of a total of 19 mammalian species, 51 birds species and 60 butterflies species were recorded through direct sightings and indirect evidences, which are listed in table.

Checklist of Faunal species, including Mammals, Avi-fauna and butterflies of Lapdang RF and surrounding area in West Sikkim.

Sl. No	Common name	Scientific name	Family
Mammalian Species			
1	Jackel	<i>Cannis aurens</i>	Canidae
2	Himalayan Serow	<i>Capricornis thar</i>	Bovidae
3	Parti-colored flying squirrel	<i>Hylopetes alboniger</i>	Sciuridae
5	Yellow-Throated marten	<i>Martes flavigula</i>	Mustelids
6	Barking Deer	<i>Muntiacus muntjak</i>	Cervidae
7	Goral	<i>Naemorhedus goral</i>	Bovidae
8	Himalayan palm civet	<i>Paguma larvata</i>	Viverridae
9	Wild Boar	<i>Sus scrofa</i>	Suidae
11	Himalayan black Bear	<i>Ursus thibetanus</i>	Ursidae
12	Himalayan Crestless Porcupine	<i>Hystrix brachyura</i>	Hystricidae
13	Hoary Bellied Himalayan Squirrel	<i>Callosciurus pygarythrus</i>	Sciuridae
14	Himalayan Tahr	<i>Hemitragus jemlahicus</i>	Bovidae
15	Wild Dog	<i>Cuon alpinus</i>	Canidae
16	Musk deer	<i>Moschus</i> sp.	Moschidae
17	Leopard cat	<i>Prionailurus</i> sp.	Felidae
18	Jungle cat	<i>Felis chaus</i>	Felidae
19	Macaque / Monkey	<i>Macaca</i> sp.	Cercopithecidae
Avi - Fauna			
1	Ashy Drongo	<i>Dicrurus leucophaeus</i>	Dicruridae
2	Barred Cuckoo Dove	<i>Macropygia unchall</i>	Columbidae
3	Blue Whistling Thrush	<i>Myophonus caeruleus</i>	Turdidae
4	Blue-fronted Redstart	<i>Phoenicurus frontalis</i>	Muscicapidae
5	Blue-winged Siva	<i>Siva cyanouoptera</i>	Timaliidae
6	Black bulbul	<i>Hypsipetes leucocephalus</i>	Pycnonotidae
7	Common Green Magpie	<i>Cissa chinensis</i>	Corvidae
8	Common Hoopoe	<i>Upupa epops</i>	Upupidae
9	Common Myna	<i>Acridotheres tristis</i>	Sturnidae
10	Common pigeon	<i>Columba libia</i>	Columbidae
11	Common Tailored Bird	<i>Orthotomus sutorius</i>	Cisticolidae
12	Golden-breasted Fulvetta	<i>Lioparus chrysotis</i>	Sylviidae

13	Great Barbet	<i>Megalaima virens</i>	Ramphastidae
14	Greater Yellownappe	<i>Picus flavinucha</i>	Picidae
15	Green-backed Tit	<i>Parus monticolus</i>	Paridae
16	Green-tailed Sunbird	<i>Aethopyga nipalensis</i>	Nectariniidae
17	Grey-backed Shrike	<i>Lanius tephronotus</i>	Laniidae
18	Grey-headed Canary Flycatcher	<i>Culicicapa ceylonensis</i>	Stenostiridae
19	Grey-headed Parakeet	<i>Psittacula finschii</i>	Psittacidae
20	Himalayan Bluetail	<i>Tarsiger rufilatus</i>	Muscicapidae
21	Himalayan Bulbul	<i>Pycnonotus leucogenys</i>	Pycnonotidae
22	Hodgson's Redstart	<i>Phoenicurus hodgsoni</i>	Muscicapidae
23	House Crow	<i>Corvus splendens</i>	Corvidae
24	House Sparrow	<i>Passer domesticus</i>	Passeridae
25	Kalij Pheasant	<i>Lophura leucomelanos</i>	Phasianidae
26	Large-billed Crow	<i>Corvus macrorhynchos</i>	Corvidae
27	Lesser Yellownappe	<i>Picus chlorolophus</i>	Picidae
28	Little Spiderhunter	<i>Aracanothra longirostra</i>	Nectariniidae
29	Nepal Fulvetta	<i>Alcippe nipalensis</i>	Sylviidae
30	Oriental Magpie Robin	<i>Copsychus saularis</i>	Muscicapidae
31	Oriental Turtle Dove	<i>Streptopelia orientalis</i>	Columbidae
32	Oriental White-eye	<i>Zosterops palpebrosus</i>	Zosteropidae
33	Red-billed Leiothrix	<i>Leiothrix lutea</i>	Timaliidae
34	Red-tailed Minla	<i>Minla ignotincta</i>	Leiothrichidae
35	Red-vented Bulbul	<i>Pycnonotus cafer</i>	Pycnonotidae
36	Rufous sibia	<i>Malacias capistratus</i>	Timaliidae
37	Rufous-bellied Niltava	<i>Niltava sundara</i>	Muscicapidae
38	Rufous-gorgeted Flycatcher	<i>Ficedula strophiat</i>	Muscicapidae
39	Scaly Laughingthrush	<i>Garrulax austeni</i>	Turdidae
40	Scarlet Minivet	<i>Pericrocotus cinnamomeus</i>	Campephagidae
41	Silver-eared Mesia	<i>Mesia argentauris</i>	Leiothrichidae
42	Slender-billed Scimitar Babbler	<i>Xiphirhynchus superciliaris</i>	Timaliidae
43	Spangled Drongo	<i>Dicrurus hottentottus</i>	Dicruridae
44	Stripe-throated Yuhina	<i>Yuhina gularis</i>	Zosteropidae
45	Velvet-fronted Nuthatch	<i>Sitta frontalis</i>	Sittidae
46	Verditer flycatcher	<i>Eumyias thalassinus</i>	Muscicapidae
47	Whiskered Yuhina	<i>Yuhina flavicollis</i>	Zosteropidae
48	White-browed Fulvetta	<i>Fulvetta vinipectus</i>	Sylviidae
49	White-browed Piculat	<i>Sasia ochracea</i>	Picidae
50	White-capped Redstart	<i>Chaimarrornis leucocephalus</i>	Muscicapidae
51	White-crested Laughingthrush	<i>Garrulax leucolophus</i>	Turdidae

	Butterfly		
1	Autumn leaf	<i>Doleschallia bisaltidae</i>	Nymphalidae
2	Banded Treebrown	<i>Lethe confuse</i>	Nymphalidae
3	Blue Peacock	<i>Papilio acturus</i>	Papilionidae
4	Chocolate Pansy	<i>Junonia iphita</i>	Nymphalidae
5	Common Bushbrown	<i>Mycalesis perseus</i>	Nymphalidae
6	Common cerculean	<i>Jamides celeno</i>	Lycaenidae
7	Common Crow	<i>Euploea core</i>	Nymphalidae
8	Common Earl	<i>Tanaecia julii</i>	Nymphalidae
9	Common Evening Brown	<i>Melanitis leda</i>	Nymphalidae
10	Common Five Ring	<i>Ypthima baldus</i>	Nymphalidae
11	Common Grass Yellow	<i>Eurema hecabe</i>	Pieridae
12	Common Jester	<i>Symbrenthia hippoclus</i>	Nymphalidae
13	Common Line Blue	<i>Posotas nora</i>	Lycaenidae
14	Common Map	<i>Cyrestis thyodamas</i>	Nymphalidae
15	Common Maplet	<i>Chersonesia risa</i>	Nymphalidae
16	Common Mormon	<i>Papilio polytes</i>	Papilionidae
17	Common Nawab	<i>Polyuria athamas</i>	Nymphalidae
18	Common Palmfly	<i>Elymnias hypermnestra</i>	Nymphalidae
19	Common Peacock	<i>Papilio polyctor</i>	Papilionidae
20	Common Pierrot	<i>Castalius rosimon</i>	Lycaenidae
21	Common Red Eye	<i>Matapa aria</i>	Hesperiidae
22	Common Red Forester	<i>Lethe mekara</i>	Nymphalidae
23	Common Sergeant	<i>Athyma perius</i>	Nymphalidae
24	Common Silverline	<i>Spindasis vulcans</i>	Lycaenidae
25	Common Small Flat	<i>Sarangesa dasahara</i>	Hasperiidae
26	Common Windmill	<i>Atrophaneura polyeuctes</i>	Papilionidae
27	Dark Judy	<i>Abisara fylla</i>	Riodinidae
28	Fluffy tit	<i>Zeltus amasa</i>	Lycaenidae
29	Fulvous pied Flat	<i>Pseudocoladenia dan</i>	Hesperiidae
30	Glassy Bluebottle	<i>Graphium sarpedon</i>	Papilionidae
31	Golden Sapphire	<i>Heliophorus brahma</i>	Lycaenidae
32	Grass Demon	<i>Udaspes folus</i>	Hesperiidae
33	Green Commodore	<i>Sumalia daraxa</i>	Nymphalidae
34	Indian Cabbage White	<i>Pieris canidia</i>	Pieridae
35	Indian Fritillary	<i>Argynnis hyperbius</i>	Nymphalidae
36	Indian Red Admiral	<i>Venessa indica</i>	Nymphalidae
37	Indian Skipper	<i>Spialian galba</i>	Hesperiidae

38	Indian Tortoiseshell	<i>Aglais cashmiriensis</i>	Nymphalidae
39	Large Yeoman	<i>Cirrochroa aoris</i>	Nymphalidae
40	Lemon Pansy	<i>Junonia lemonias</i>	Nymphalidae
41	Mixed Punch	<i>Dodona ouida</i>	Riodinidae
42	Nigger	<i>Orsotrioena medus</i>	Nymphalidae
43	Orange Oakleaf	<i>Kallima inachus</i>	Nymphalidae
44	Orange Punch	<i>Dodona egeon</i>	Riodinidae
45	Painted Lady	<i>Venessa cardui</i>	Nymphalidae
46	Plain Tiger	<i>Danaus chrysippus</i>	Nymphalidae
47	Punchinello	<i>Zemeros flegyas</i>	Riodinidae
48	Purple Sapphire	<i>Heliophorus epicles</i>	Lycaenidae
49	Red Helen	<i>Papilio helenus</i>	Papilionidae
50	Red Lacewing	<i>Cethosia biblustisamena</i>	Nymphalidae
51	Redbreast	<i>Papilio alcmenor</i>	Papilionidae
52	Rice Swift	<i>Borbo cinnara</i>	Hesperiidae
53	Spotted sawtooth	<i>Prioneris thestylis</i>	Pieridae
54	Spotted Snow Flat	<i>Tagiades menaka</i>	Hesperiidae
55	Striped Tiger	<i>Danaus genutia</i>	Nymphalidae
56	Tailed Jay	<i>Graphium agamemnon</i>	Papilionidae
57	Tiger Hooper	<i>Ochus subvittatus</i>	Hasperiidae
58	Water Snow Flat	<i>Tagiades litigiosa</i>	Hesperiidae
59	Yamfly	<i>Loxura atymnus</i>	Lycaenidae
60	Yellow Helen	<i>Papilio nephelus</i>	Papilionidae



Himalayan Bulbul



Oriental Turtle Dove

DISCUSSION

Till date, the area remain unexplored which, during the present study, found to be rich in terms of the diversity of the species. Forest being temperate to subalpine type, trees are the most predominant taxa in the area. The area constitutes a diverse habitat for both flora and fauna of the temperate to subalpine belt. The area is highly dominated with the trees and small trees species namely *Symplocos theifolia*, *Lithocarpus fenestrata*, *Castanopsis tribuloides*, *Castanopsis hystrix*, *Brassaiopsis mitis*, *Quercus pachyphylla*, *Quercus lamellos*, *Pyrularia edulis*, *Pieris ovalifolia*, *Michelia cathcartii*, *Maesa chisia*, *Machilus gammieana*, *Antidesma acuminatum*, *Acer caudatum*, *Rhododendron arboreum* etc. and the high altitudes covers mainly the species of *Rhododendron falconeri*, *Acer pectinatum*, *Betula utilis*, *Tsuga dumosa* etc. Common shrub species recorded from the area are *Rubus ellipticus*, *Rubus niveus*, *Rubus paniculatus*, *Viburnum erubescens*, *Dichroa febrifuga*, *Maesa chisia*, *Oxyspora paniculata*, *Polygala arillata*, *Berberis* sp. *Ribes* sp. etc. In addition, the area also provide diverse habitat for the faunal species.

Lapdang Reserve Forest is divided into three compartments. Compartment 1 is located in the lower belt, sharing the boundary with Nalung Reserved Forest in the western part, Tinchale Reserve Forest in the southern part, Reli Khola in the in the eastern part and Compartment 2 of Lhabdang RF in the northern part. The places namely Thulo Dharay, Pakhay Kharka, Bhote Kharka, Dhodray Kharka, Toribari, Musay Thapla, Piplay Dara, Gai Kharka etc. are located in the compartment 1 of Lapdang Reserved Forest (Fig 1, Table 1). Compartment 2 shares its boundary with Relly khola bodering Rangdang RF in the eastern part, Compartment 3 of Lhabdang RF in the northern part. Compartment 3 shares its eastern boundary in the upper part of Rally Khola boardaring Rangdang RF, and its northern boundary with Neythang, which is under Khangchenzunga National Park.

Lower belt of Lapdang Reserved Forest of the survey area, in and around Thulo Dharay, Pakhay Kharka, Bhote Kharka, Dhodray Kharka, Piplay Dara, Gai Kharka in between 1900-2100m elevation are highly covered with *Antidesma acuminatum*, *Castanopsis hystrix*, *Castanopsis indica*, *Castanopsis tribuloides*, *Engelhardtia spicata*, *Eurya acuminata*, *Pieris ovalifolia*, *Symplocos theifolia*, *Symplocos glomerata*, *Dichroa febrifuga*, *Edgeworthia gardenierii*, *Rubus niveus*, *Rubus ellipticus*, *Viburnum erubescens*, *Rubus paniculatus* etc. Area in and around Toribari, Musay Thapla etc. in between 2150m – 2700m, the area is efficiently covered with *Rhododendron grande*, *Rhododendron falconeri*, *Acer caudatum*, *Acer pectinatum*, *Actinodaphne sikkimensis*, *Brassaiopsis mitis*, *Cedrela febrifuga*, *Elaeocarpus lanceaefolius*, *Garuga pinnata*, *Glochidion acuminatum*, *Machilus odoratissimus*, *Michelia cathcartii*, *Michelia excels*, *Myrica esculenta*, *Nyssa sessiliflora*, *Rhus succedanea*, *Rhus succedanea* Linn. var. *acuminata*, *Daphne cannabina*, *Themnocalamus falconeri*, *Dichroa febrifuga* and so on. In the upper belt of the forest, above 2600m, which is the area below Neythang, is highly dominated with *Rhododendron falconeri* and *Yushania maling* with scattered *Acer pectinatum*, *Quercus lamellose*, *Tsuga dumosa*, *Betula utilis*, *Ribes* sp. etc. The population of Himalayan

Black Bear observed high in the forest as well as in its frinze areas, which was witnessed by high volume of its droppings and several footprints.

CONCLUSION AND RECOMMENDATIONS

The area is not much impacted by the natural as well as anthropogenic disturbance. The unsustainable extraction of plants especially for firewood and livestock feed by the local inhabitants are the general disturbances resulted in the building up considerable pressure on the survival of the species. Other major threats are obviously, the effect of drastic changes in climate, hence studies on the impact of climate change on the biodiversity of the area is recommended, which will be helpful in framing conservation and management strategies. The thick and lush forest of Lapdang Reserved forest holds diverse habitat for floral and faunal species, hence, is recommended to keep untouched in terms of tourism and any kind of construction works to preserve the rich biodiversity of the area.



Droppings and footprint of Himalayan Black Bear at Lhabdang Reserved Forest, West Sikkim



White Collared Black Bird



Great Barbet

FIELD ACTIVITIES OF THE TEAM AT LAPDANG RESERVE FOREST, WEST SIKKIM



Survey team along with village people, taking field observation
& Bhir Mauri (*Apis dorsata*) at Lapdang RF, West Sikkim



Laying of sample plot and collecting data & Measuring girth
(CBH) of the tree (*Quercus lamellosa*, CBH = 3.5m)

Lingmoo Reserve Forest, South Sikkim

Nimesh Chamling, Anjana Pradhan, Suraj Subba & Dorje Chewang Bhutia



An Overview of Lingmoo Reserve Forest

INTRODUCTION

As there is no compartment, the whole forest is regarded as a compartment. The forest is divided into two types namely 8B/C1 East Himalayan Sub Tropical Wet Hill Forest (900-1800 m asl) which is stretched along the river Teesta belt and receives an annual rainfall of about 2000mm (79 in). The ecoregion hosts a broad range of plant communities based on its complex topography, pedological characteristics and variations in rainfall. The main tree species of this region are *Alnusnepalensis*, *Ficusnemoralis*, *Exbucklandiapopulnea*, *Erythrina arborescens*, *Engelhardtiaspicata*, *Brassaiopsishispida* & *Elaeocarpus lanceaefolius*.

Similarly, 11B/C1b East Himalayan Wet Temperate Forest (1800-2400 m asl) is a transitional zone between subtropical mixed broad leaved to sub-temperate zone. Branches and tree bole are mainly covered with mosses, ferns and other epiphytes. The evergreen tree dominates the region and the undergrowth is mainly of dwarf species of bamboos. This forest type is the most widely distributed forest type in the State/division. Species ranges from *Alnusnepalensis*, *Magnolia cathcartii*, *Quercus spicata*, *Symplocos glomerata*, *Nyssa sessiliflora*, *Quercus lamellosa*, *Machilus edulis*, *Leucosceptrumcannum*.

SURVEY AREA

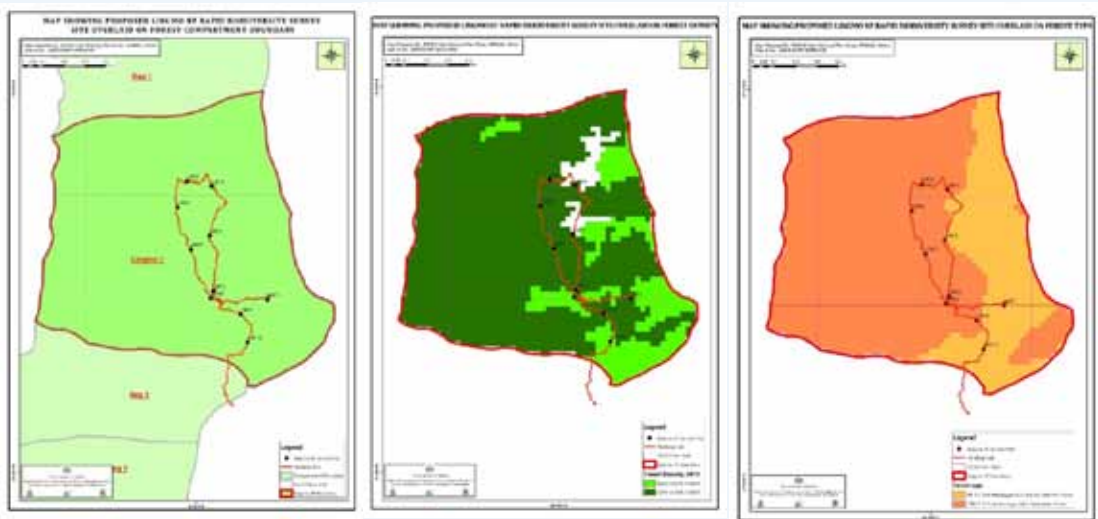
The current survey was carried out along the trekking route of Lingmoo Reserve Forest. The altitude of the surveyed path ranged from 1574-1978m asl lying between 27°20'26.5"N – 27°20'19.9"N latitude and 88°26'12.9"E – 88°26'09.3"E longitude. The slope angle of the surveyed area ranged from 30° to 40° and aspect facing towards N, E, NE and SE. The field visit was done in December 2017.



Enumeration of Plant Species



CHB Measurement



Survey Plots along Lingmoo RF covering the Compartment, Forest Density & Forest Types

FINDINGS AND DISCUSSION

During our field survey in Lingmoo Reserve Forest, we recorded a total of 45 floral species. Trees represented the highest number of species (20 species, 19 genera and 17 families). The forest hosts 1 bamboo species *Himalayacalamus hookerianus*. Similarly, herbs represented second highest number of species with (14 species, 14 genera and 12 families). Shrubs represented 3 species, 3 genera and 3 families. Total of 2 species, 2 genera and 2 families of ferns/ferns allies were recorded during the survey. Forest also hosts 5 species, 5 genera and 5 families of Epiphytes/Climbers. Fagaceae and Lauraceae family dominated in tree species and Polygonaceae family dominated in herb species, whereas there was no dominance in the category of orchids, Ferns and Ferns Allies, Climbers.

Similarly, during our field survey we recorded a total of 46 faunal species. Among these, birds were recorded the highest with 31 species, 19 genera and 15 families. The forest also home to the 4-mammalian species. According to the villagers Wild Boar and Himalayan Black Bear possess the highest population. They also informed us about the damage done to their properties by them. Nectariniidae, Phasinidae, Timaliidae were the major dominant family among birds, whereas Nymphalidae was the major dominant family in butterflies.

The Reserve Forest hosts some important timber tree species such as *Magnolia cathcartii*, *Acer campbellii*, *Exbucklandia populnea* which have a good market value and should be maintained under sustainable manner. Similarly, there are oak species such as *Lithocarpus elegans*, *Quercus lamellosa* which have a positive impact towards the forest ecosystem because of its water retention properties. Hence importance should be given to these species. Apart from this, there are also some other NTFP species like *Alnus nepalensis*, *Symplocos glomerata* and *Nyssa javanica* that can be generated as a fuelwood species. *Ficus neriifolia*, *Erythrina arborescens*, etc., can be preserved as a fodder species.

Lastly, I would like to add a small point regarding the boundary pillar in the reserve forest. There is a slight confusion among the villagers about the boundary pillars between the reserve forest and the wildlife sanctuary. Both these pillars are overlapping, so, if possible if the concern authority can investigate this matter properly can remove the confusion among the villagers.

Lingmoo Reserve Forest harbours a lot of valuable species such as medicinal plant, timber species, bamboo, etc. At the same time the forest is providing food, fodder, fruits and other items for the people living at the fringes of the reserve forest. So, the people are getting benefitted directly or indirectly from the forest. In this regard a proper conservation plan can be adopted for sustainable development of the forest for future.

Site characteristics along the sampling plots of Lingmoo Reserve Forest

Site Code	Range	Elevation(m)	Latitude (N)	Longitude (E)	Slope Angle	Slope Aspect	Canopy (%)
LRF1	Ravangla	1889	27°20'26.5"	88°26'12.9"	35	SE	30
LRF2	Ravangla	1929	27°20'28.0"	88°26'03.4"	30	NE	40
LRF3	Ravangla	1904	27°20'36.6"	88°26'02.9"	30	E	40
LRF4	Ravangla	1898	27°20'44.3"	88°26'03.4"	35	E	30
LRF5	Ravangla	1574	27°20'45.2"	88°25'59.0"	30	E	40
LRF6	Ravangla	1978	27°20'41.1"	88°25'57.3"	40	E	45
LRF7	Ravangla	1935	27°20'34.5"	88°25'59.6"	30	N	20
LRF8	Ravangla	1915	27°20'26.9"	88°26'03.0"	35	NE	60
LRF9	Ravangla	1931	27°20'24.3"	88°26'08.1"	30	N	65
LRF10	Ravangla	1913	27°20'19.9"	88°26'09.3"	30	E	55

Checklist of floral Species recorded in Lingmoo Reserve forest, South Sikkim

S. No	Botanical Name	Local Name	Family	IUCN Status
	TREE			
1	<i>Acer campbellii</i>	Kapasi	Sapindaceae	LC
2	<i>Acer palmatum</i>	Kapasi	Sapindaceae	LC
3	<i>Alnusnepalensis</i>	Uttis	Betulaceae	LC
4	<i>Beilschmiediasikkimensis King exHook.f.</i>	Tarsing	Lauraceae	NA
5	<i>Brassaiopsis hispida Seem.</i>	Phutta	Araliaceae	
6	<i>Cryptomeria japonica</i>	Dhuppi	Cupressaceae	NT
7	<i>ElaeocarpuslancaefoliusRoxb.</i>	Bhadrasey	Elaeocarpaceae	NA
8	<i>EngelhardtiaspicataLechen ex Blume</i>	Mauwa	Juglandaceae	LC
9	<i>Erythrina arborescensRoxb.</i>	Phaledo	Fabaceae	NA
10	<i>Eurya japonica Thunb.</i>	Jhingini	Theaceae	NA
11	<i>Exbucklandiapopulnea (R. Br. ex Griff.) R.W. Br.</i>	Pipli	Hamamelidaceae	NA
12	<i>Ficusneriifolia Sm.</i>	Dudilo	Moraceae	
13	<i>Leucosceptрумcannum Smith.</i>	Ghurpis	Labiatae	NA
14	<i>Lithocarpuselegans (Blume) Hatus. ex Soepadmo</i>	Arkawula	Fagaceae	NA
15	<i>Machilus edulis King ex Hook. f.</i>	Pomsi	Lauraceae	
16	<i>Magnolia cathcartii Hook. f. Thomson</i>	TiteChanp	Magnoliaceae	LC
17	<i>Nyssa javanica (Blume) Wangerin</i>	Lekchilauney	Cornaceae	
18	<i>Quercus lamellosa Smith.</i>	Buk/Bajranth	Fagaceae	NA
19	<i>Sloaneadasycarpa (Benth.) Hemsl.</i>	Gobre	Elaeocarpaceae	
20	<i>Symplocosglomerata King ex C. B. Clarke</i>	Kholme	Symplocaceae	NA

21	<i>Tetradiumfraxinifolium</i> (Hook. f.) T.G. Hartley		Rutaceae	
SHRUBS				
1	<i>Rubus</i> Sp.	Ainselu	Rosaceae	
2	<i>Viburnum erubescence</i> Wall. ex DC	Asare	Caprifoliaceae	NA
3	<i>Maesachisia</i> Buch. –Ham ex. D. Don	Bilauney	Myrsinaceae	
HERBS				
1	<i>Ardisiamacrocarpa</i> Wall.	Damai phal	Myrsinaceae	
2	<i>Arisaemasp</i>	Larua/Banko	Araceae	
3	<i>Begonia</i> sp.		Begoniaceae	
4	<i>Bidenspilosa</i> L.			NA
5	<i>Carex</i> sp.	Harkatto	Cyperaceae	
6	<i>Daphne cannabina</i> Wall.	Kaloargayle/Loktee	Thymelaeaceae	
7	<i>Dichroafebrifuga</i> Lour.	Basak	Hydrangeaceae	
8	<i>Elatostemaplatyphyllum</i> Weddell	Gagleto	Urticaceae	
9	<i>Eragrostis</i> sp.	Banso	Poaceae	
10	<i>Hedychium spicatum</i> Sm.		Zingiberaceae	
11	<i>Persicariasp</i>	Ratnaulo	Polygonaceae	
12	<i>Polygonum molle</i> D. Don	Thotney	Polygonaceae	NA
13	<i>Selaginella</i> sp.		Selaginellaceae	
14	<i>Strobilanthes</i> sp.	Kibughans	Acanthaceae	
EPIPHYTES, ORCHIDS, CLIMBERS & SUCCULENTS				
1	<i>Cissuselongata</i> Roxb.	Charcharey lahara	Vitaceae	
2	<i>Trichosanthes lepiniana</i> (Naudin) Cogn.	Indreni	Cucurbitaceae	
2	<i>Mucunamacrocarpa</i> Wall.	Baldengra	Leguminosae	
3	<i>Rhapidophoradecursiva</i> (Roxb.) Schott.	Kanchirna	Araceae	
4	<i>Rubiaccordifolia</i> Linn.	Majito	Rubiaceae	
5	<i>Smilax zeylanica</i> Linn.	Kukurdainey	Liliaceae	
Ferns and Ferns-allies				
1	<i>Gleichenia gigantean</i> Wall. ex Hook	Kalameyunew	Gleicheniaceae	
2	<i>Cyathea spinulosa</i> Wall. ex Hook.	Rukh uniyu	Cyatheaceae	
Bamboo				
1	<i>Himalayacalamushookerianus</i> (Munro) Stapleton	Pareng	Poaceae	

Checklist of fauna, Avi-fauna and Butterfly species recorded in Lingmoo Reserve forest, South Sikkim

Sl. No	Scientific Name	Common Name	Local Name	Family	IUCN Status
	Fauna				
1	<i>Muntiacus muntjak</i>	Barking Deer	DareyMirga	Cervidae	LC
2	<i>Prionailurus bengalensis</i>	Leopard cat	Ningalo	Felidae	LC
3	<i>Sus scrofa</i>	Wild Boar	Bodel	Suidae	LC
4	<i>Ursus thibetanus</i>	Himalayan Black Bear	Ursusthibetanus	Ursidae	LC
5	<i>Dremomys lokriah</i>	Orange-bellied Himalayan Squirrel	Lothurke	Sciuridae	LC
7	<i>Macaca mulatta</i>	Rhesus macaque	badhar	Cercopithecidae	LC
8	<i>Vulpes vulpes</i>	Red Fox	Sheyal	Canidae	LC
	Avi-fauna				
1	<i>Acridothera tristis</i>	Common Myna		Sturnidae	-
2	<i>Actinodura nepalensis</i>	Hoary Barwing		Timaliidae	
3	<i>Aegithalos louschistos</i>	Rufous-fronted Tit		Paridae	
4	<i>Aethopyga nepalensis</i>	Nepal Sunbird		Nectariniidae	
5	<i>Aethopyga spiraja</i>	Crimson Sunbird		Nectariniidae	
6	<i>Arborophila torqueola</i>	Common Hill Partridge		Phasianidae	
7	<i>Cissachinensis</i>	Common Green Magpie		Corvidae	
8	<i>Columba livia</i>	Common Pigeon		Columbidae	
9	<i>Corvus macrorhynchos</i>	Jungle Crow		Corvidae	
10	<i>Culicicapaceylonensis</i>	Grey Headed Canary Flycatcher		Muscicapidae	
11	<i>Dicrurus leucophaeus</i>	Ashy Drongo		Dicaeidae	
12	<i>Eumyias thalassinus</i>	Verditer Flycatcher		Muscicapidae	
13	<i>Fulvettavinipectus</i>	White Browed Fulvetta		Timaliidae	
14	<i>Garrulax leucolophus</i>	White Crested Laughing Thrush		Leiotherichidae	-
15	<i>Garrulax striatus</i>	Striated Laughing Thrush		Turdidae	
16	<i>Hypsipetes leucocephalus</i>	Black Bulbul		Pycnonotidae	
17	<i>Lanius stephonorotus</i>	Grey backed Shrike		Laniidae	
18	<i>Lophura leucomelanos</i>	Kalij Pheasant		Phasianidae	
19	<i>Megalaima virens</i>	Great Barbet		Megalaimidae	
20	<i>Myiophonus caeruleus</i>	Blue Whistling Laughing Thrush		Muscicapidae	
21	<i>Orthotomus atrogularis</i>	Common Tailor bird		Cisticolidae	
22	<i>Passer domesticus</i>	House Sparrow		Passeridae	

23	<i>Parusmonticulus</i>	Green Backed Tit		Paridae	
24	<i>Pericrocotus (flammeus) speciosu</i>	Scarlet Minivet		Campephagidae	
25	<i>Pycnonotuscafer</i>	Red Vented Bulbull		Pycnonotidae	
26	<i>Pycnonotusstriatus</i>	Straited Bulbull		Pycnonotidae	
27	<i>Rhipiduraaureola</i>	White browed Fantail		Rhipiduridae	
28	<i>Streptopeliaorientalis</i>	Oriental Turtle Dove		Columbidae	
29	<i>Eumyiasthalassinus</i>	Verditer Flycatcher		Muscicapidae	
30	<i>Yuhina flavicollis</i>	Whiskered Yuhina		Timaliidae	
31	<i>Yuhina gularis</i>	Striped Throated Yuhina		Sylviidae	
	BUTTERFLY				
1	<i>Argynnischildreni</i>	Large Silverstripe		Nymphalidae	
2	<i>Aglaiscaschmirensis</i>	Indiantortoise shell		Nymphalidae	
3	<i>Cethosiacyane</i>	Lacewing		Nymphalidae	
4	<i>Euremahecabe</i>	Grass Yellow		Pieridae	
5	<i>Heliophorus brahma</i>	Golden Sapphire		Lycaenidae	
6	<i>Notocryptaparalysos</i>	Common Banded Demon		Hesperiidae	
7	<i>Papilioparisparis</i>	Paris Peacock		Papilionidae	
8	<i>Pieris rapae</i>	cabbage white		Pieridae	
9	<i>Vanessa cardui</i>	Painted lady		Nymphalidae	
10	<i>Vanessa indica</i>	Indian Red Admiral		Nymphalidae	
11	<i>Zemerosflegyas</i>	Punchinello		Riodinidae	



Leucosceptrum cannum



Juglans regia



Quercus lamellosa



Acer campbellii



Ardisia macrocarpa



Trichosanthes lepiniana

Lungmu Reserve Forest, West Sikkim

Nimesh Chamling, Anjana Pradhan & Dorjee Chewang Bhutia



An Overview of Lungmu Reserve Forest

INTRODUCTION

The Lungmu Reserve Forest is divided into two compartments for better administration of the area. According to GIS map the forest is divided into four types viz. 11B/C1b East Himalayan Wet Temperate Forest, 12/C3a East Himalayan Moist Mixed Coniferous Forest, 14/C2 East Himalayan Sub Alpine Birch/Fir Forest and 3C/C1a(i) Very Moist Sal Bearing Forest. But according to our survey we came across only two types of forest types viz. 11B/C1b East Himalayan Wet Temperate Forest and 12/C3a East Himalayan Moist Mixed Coniferous Forest.

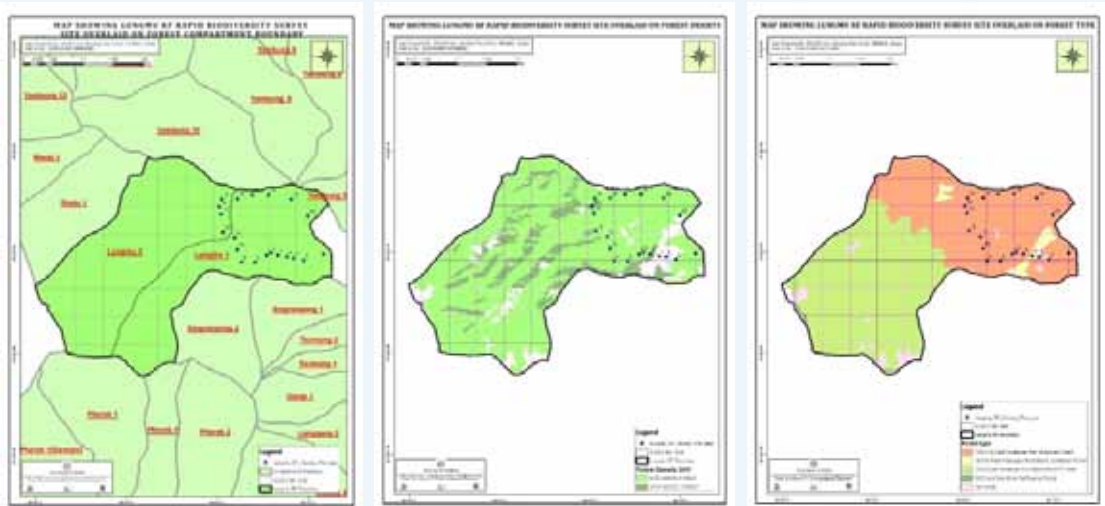
During our Survey we came across two forest types viz. 11B/C1b East Himalayan Wet Temperate Forest and 12/C3a East Himalayan Moist Mixed Coniferous Forest. The 11B/C1b East Himalayan Wet Temperate Forest (1800-2400m asl) is a transitional zone between subtropical mixed broad leaved to sub-temperate zone. Branches and tree bole are mainly covered with mosses, ferns and other epiphytes. The evergreen tree dominates the region and the undergrowth is mainly of dwarf species of bamboos. This forest type is the most widely distributed forest type in the State/division and mainly occupied by the species viz. *Alnus nipalensis*, *Eleocarpus lanceaefolia*, *Machilus edulis*, *Magnolia campbelli*, *Magnolia doltsopa*, *Quercus glauca*, *Quercus lamellosa*, *Symplocos lucida*, *Tetradium fraxinifolia*.

Similarly, we came across the 12/C3a East Himalayan Moist Mixed Coniferous Forest (1500-3300m asl) which mainly occurs in warm and moist climatic conditions which are diverse and species-rich with many endemic species. The main species composition of this forest is viz. *Betula utilis*, *Leucosceptrum cannum*, *Prunus nipalensis*, *Rhododendron hodgsonii*, *Rhododendron arboreum*, *Acer caudatum*, *Castanopsis hystrix*, *Lithocarpus sp.*

Apart from floral diversity, the forest is also home to many avi-faunal and faunal diversity. The forest shelter to many avi-faunal species viz. Blue Whistling Laughing Thrush, Kalij Pheasant, Striated Laughing Thrush, Verditer Flycatcher, Common Hill Partridge, Common Myna, Ashy Drongo, Black Bulbull, House Sparrow, Red Vented Bulbull, Striped Throated Yuhina, Whiskered Yuhina, etc. Similarly, the forest is also habitat to some of the faunal species viz. Barking Deer, Wild Boar, Himalayan Black Bear, etc.

Survey Area

The current survey was carried out along the sampling path of Lungmu Reserve Forest. The altitude of the surveyed path ranged from 2169-2759m asl lying between 27°21'04.2"-27°21'26.8"N latitude and 88°07'13.3"- 88°07'02.9"N longitude. The slope angle of the surveyed area ranged from 30° to 60° and aspect facing towards N, NE, E and S. The field visit was done in September 2017.



Survey Plots along Lungmu RF Covering Compartment, Forest Density & Forest Types



CBH Measurement



Enumeration of Plant Species

FINDINGS AND DISCUSSION

During our field survey in Lungmu Reserve Forest we recorded a total of 73 floral species. Trees represented with highest number of species (33 species, 31 genera and 28 family) followed by herbs, hosting second highest number of species with (24 species, 21 genera and 16 family). Similarly, Shrubs has taken the third berth with (8 Species, 6 Genus, 6 Family). A total of about 6 Species, 6 Genus, 6 Family of Epiphytes/Climber were recorded during our survey. Betulaceae, Fagaceae, Ericaceae, Rutaceae mainly dominated in tree family, while Asteraceae, Zingiberaceae, Polygonaceae, Urticaceae mainly dominated in herb family and Rosaceae dominated in shrub family. Similarly, we found two species of bamboo viz. *Himalayacalamus falconeri* and *Yushania maling*.

Apart from floral species, faunal species is also recorded, where a total of about 50 faunal species is been listed. Among these with 31 species, 28 Genus and 23 Family of avian-faunal is being recorded the highest. During our survey trail we could encounter some common avian species such as common Black Bulbull, Blue Whistling Laughing Thrush, Red Vented Bulbull, Verditer Flycatcher, Common Green Magpie, Common Myna, etc. While Nectariniidae, Timaliidae, Pycnonotidae family dominated in avain flora. Similarly, the forest also hosts 8 mammalian species viz. Himalayan Black Bear, Wild Boar, Barking Deer and Leopard Cat, Rhesus macaque, Red Fox, Orange-bellied Himalayan Squirrel. The Reserve Forest also hosts beautiful butterflies which we sighted during our survey viz. Paris Peacock, Large Silverstripe, Golden Sapphire, Indian Red Admiral. Nymphalidae family mainly dominated in butterfly.

Lungmu Reserve Forest comes under West Territorial Division and falls under Geyzing Range. The Reserve Forest is rich in terms of floral and faunal diversity. During our survey we could cover two types of forest viz. East Himalayan Wet Temperate Forest and East Himalayan Moist Mixed Forest. The Forest has lush green vegetation where we could see huge trees covered with mosses, ferns, epiphytes along their trunk and branches.

The lower portion of the forest covered during our survey was mostly covered by the tree species viz. *Zanthoxylum acanthopodium*, *Ficus neriifolia*, *Lithocarpus pachyphyllus*, *Symplocos theifolia*, *Tetradium fraxinifolia*, *Alnus nipalensis*, *Brassaiopsis hispida*, *Eleocarpus lanceaefolia*, *Eurya acuminata*, etc. Similarly, we could see these trees where mostly invaded by ferns, orchids, mosses. While the ground vegetation was mainly covered herbs, grasses viz. *Artemisia vulgaris*, *Carex* sp, *Digitaria* sp, *Heracleum nepalense*, *Polygonum mole*, *Swertia bimaculata*, etc.

The upper region of the forest is mainly covered by tree species viz. *Quercus glauca*, *Quercus lamellose*, *Rhodendron hodgsonii*, *Rhododendron arboreum*, *Michelia dolpsta*, *Magnolia campbelli*, *Ilexex sikkimensis*, *Acer caudatum*, *Machilus edulis*, etc. The species which we found at this level was taller in size and had huge canopy cover. While most of the trees were invaded by the ferns, mosses and epiphytes. The ground vegetation was mainly covered by ferns and

herbs species viz. *Urtica parviflora*, *Swertia bimaculata*, *Selaginella* sp, *Anaphalis* sp, etc.

The forest is also home to medicinal plant species viz. *Cinnamomum tamala*, *Heracleum nepalense*, *Polygonum mole*, *Rubus* sp., *Urtica dioica*, *Eleocarpus lanceaefolia*, *Ficus neriifolia*, *Leucosceptrum cannum*, *Machilus edulis*, *Rhododendron arboreum*, *Zanthoxylum acanthopodium*, *Gerardiana diversifolia*, *Rubus ellipticus*, *Herpetospermum pedunculatum*, *Trichosanthes lepiniana*, etc. These species have many useful medicinal uses, so we need to preserve and conserve these species for future generation.

During our survey in Lungmu Reserve Forest we came across two Sashastra Seema Bal (SSB) camp posted inside the Reserve Forest. The SSB Coy. Headquarter is situated at Doaban approximately 1.5 hours route from Chongri Village. So, the concern authority along with the SSB can work in hand by hand in protecting and conserving the biodiversity of the forest.

Site Characteristics of Lungmu Reserve Forest

Sl. No.	Site code	Elevation(m)	Latitude (N)	Longitude (E)	Slope Angle	Slope Aspect	Canopy (%)
1	LunRF	2221	27°21'04.2"	88°07'13.3"	50	N	45
2	LunRF	2386	27°21'00.4"	88°07'05.0"	35	N	35
3	LunRF	2477	27°21'02.0"	88°06'53.3"	45	N	55
4	LunRF	2548	27°21'02.6"	88°06'49.0"	45	E	55
5	LunRF	2640	27°21'03.6"	88°06'42.9"	45	N	55
6	LunRF	2719	27°21'04.9"	88°06'38.3"	30	NE	60
7	LunRF	2759	27°21'03.8"	88°06'35.5"	35	E	45
8	LunRF	2747	27°20'58.1"	88°06'26.4"	30	NE	40
9	LunRF	2712	27°20'59.9"	88°06'18.9"	45	N	55
10	LunRF	2628	27°21'07.3"	88°06'16.2"	35	NE	50
11	LunRF	2561	27°21'14.2"	88°06'14.4"	55	N	60
12	LunRF	2576	27°21'17.8"	88°06'06.9"	30	S	60
13	LunRF	2470	27°21'28.3"	88°06'05.7"	45	NE	55
14	LunRF	2393	27°21'32.6"	88°06'04.4"	45	E	60
15	LunRF	2329	27°21'37.3"	88°06'06.2"	55	E	50
16	LunRF	2258	27°21'37.4"	88°06'16.7"	55	N	80
17	LunRF	2220	27°21'39.6"	88°06'26.4"	45	N	70
18	LunRF	2133	27°21'39.5"	88°06'37.2"	45	E	45
19	LunRF	2284	27°21'36.9"	88°06'52.2"	60	S	70
20	LunRF	2169	27°21'26.8"	88°07'02.9"	30	E	40

NOTE: N, North; E, East; NE, NORTH-EAST; S, SOUTH

Checklist of Floral Species recorded in Lungmu Reserve Forest, West Sikkim

SL. NO	BOTANICAL NAME	LOCAL NAME	FAMILY	IUCN STATUS
	TREES			
1	<i>Acer caudatum</i>	Kapasey	Sapindaceae	
2	<i>Actinodaphne sikkimensis</i>	Sisi	Lauraceae	
3	<i>Alangium begoniaefolium</i>	Akhaney	Alangiaceae	
4	<i>Alnus eipalensis</i>	Uttis	Betulaceae	LC
5	<i>Beilschmiedia sikkimensis</i>	Tarsing	Lauraceae	NA
6	<i>Betula utilis</i>	Saur	Betulaceae	
7	<i>Brassaiopsis hispida</i>	Phutta	Araliaceae	NA
8	<i>Castanopsis hystrix</i>	Patley Katus	Fagaceae	NA
9	<i>Edgeworthia gardnerii</i>	Algeri/Kagate	Thymelaceae	
10	<i>Eleocarpus lanceaefolia</i>	Bhadrasey	Eleocarpaceae	NA
11	<i>Eurya acuminata</i>	Jhinguney	Theaceae	NA
12	<i>Ficus neriifolia</i> Sm.	Dudilo	Moraceae	
13	<i>Glochidion acuminatum</i> Müll.Arg.	Lati Kath	Phyllanthaceae	
14	<i>Ilex sikkimensis</i>	Lisey	Aquifoliaceae	
15	<i>Leucosceptrum cannum</i>	Ghurpis	Lamiaceae	NA
16	<i>Lithocarpus</i> sp	Bantey	Fagaceae	NA
17	<i>Machilus edulis</i>	Pomsi	Lauraceae	
18	<i>Magnolia campbelli</i>	Gogey Champ	Magnoliaceae	
19	<i>Mahonia sikkimensis</i>	Kesar	Berberidaceae	
20	<i>Meliosma wallichii</i>	Dabdabey	Sabiaceae	
21	<i>Michelia dolpsta</i>	Rani Champ	Magnoliaceae	
22	<i>Pieris ovalifolia</i>	Angeri	Ericaceae	
23	<i>Podophyllum hexandrum</i>	Panch Patey	Lardizabalaceae	
24	<i>Prunus nipalensis</i>	Arupatey	Rosaceae	
25	<i>Quercus glauca</i>	Phlant	Fagaceae	
26	<i>Quercus lamellosa</i>	Bajrath	Fagaceae	NA
27	<i>Rhododendron hodgsonii</i>	Korlinga	Ericaceae	
28	<i>Rhododendron arboreum</i>	Laligurans	Ericaceae	NA
29	<i>Rhus insignis</i>	Bhalayo	Anacardiaceae	
30	<i>Symplocos theifolia</i>	Kharaney	Symplocaceae	
31	<i>Tetradium fraxinifolia</i>	Khanakpa	Rutaceae	
32	<i>Zanthoxylum acanthopodium</i>	Bhaley Timboor	Rutaceae	
33	<i>Rapanea capitellata</i>	Seti Kath	Primulaceae	
SHRUBS				

1	<i>Osbeckia stellata</i> Buch.-Ham. ex Ker Gawl.	Chulesi Phool	Melastomataceae	NA
2	<i>Rubus ellipticus</i> Sm.	Aiselo	Rosaceae	
3	<i>Rubus gothicus</i> Frid. & Gelert ex E.H.L.Krause	Sanu Aiselo	Rosaceae	
4	<i>Vibrunum erubescence</i> Wall. ex DC	Asare	Caprifoliaceae	NA
HERBS				
1	<i>Anaphalis</i> sp.	Bukiful	Asteraceae	
2	<i>Arisaema</i> sp.	Larua/Banko	Araceae	
3	<i>Artemisia vulgaris</i> L.	Titey Pati	Asteraceae	
4	<i>Astilbe rivularis</i> Buch.-Ham. ex D.Don	Buro Okhati	Saxifragaceae	NA
5	<i>Carex</i> sp.	Harkatto	Cariceae	
6	<i>Centella asiatica</i> (L.) Urb.	Golpatta	Apiaceae	
7	<i>Cotoneaster</i> sp.		Rosaceae	
8	<i>Digitaria</i> sp.	Banso	Poaceae	
9	<i>Eupatorium adenophorum</i> Spreng.	Kali Jhar	Compositae	
10	<i>Gerardiana diversifolia</i> (Link) Friis	Bhangre Sisnu	Urticaceae	
11	<i>Hedychium gardnerianum</i> Sheppard ex Ker Gawl.	Sara	Zingiberaceae	
12	<i>Hedychium</i> sp.	Sara	Zingiberaceae	
13	<i>Heracleum nepalense</i> D. Don	Chimping	Apiaceae	NA
14	<i>Impetians</i> sp.	Impetians	Balsaminaceae	
15	<i>Persicaria</i> sp.	Ratnaolo	Polygonaceae	
16	<i>Pilea umbrosa</i> Blume	Gogleto	Urticaceae	NA
17	<i>Polygonum molle</i> D. Don	Thotney	Polygonaceae	NA
18	<i>Rubus</i> sp.	Bhui Aiselo	Rosaceae	
19	<i>Rumex nepalensis</i> Spreng.	Halhaley	Polygonaceae	
20	<i>Solanum aculeatissimum</i> Jacq.	Boksi Kara	Solanaceae	
21	<i>Swertia bimaculata</i> (Siebold & Zucc.) Hook. f. & Thomson ex C.B. Clarke	Bhale Chirauto	Gentianaceae	
22	<i>Urtica dioica</i> L.	Patley Sisnu	Urticaceae	
23	<i>Urtica parviflora</i> Roxb.	Kibu Ghans	Urticaceae	
EPIPHYTES & CLIMBER				
1	<i>Agapetes serpens</i> (Wight) Sleumer	Glass flower/ Chewre	Ericaceae	
2	<i>Clematis buchananiana</i> DC.	Pinasey lahara	Rununculaceae	
3	<i>Herpetospermum pedunculatum</i> (Ser.) C.B. Clarke	Ban karela	Cucurbitaceae	
4	<i>Neillia rubiflora</i> D.Don	Kirkireyjar	Rosaceae	
5	<i>Pleione hookeriana</i> (Lindl.) Rollisson	Orchid	Orchidaceae	
6	<i>Trichosanthes lepiniana</i> (Naudin) Cogn.	Indreni	Cucurbitaceae	
FERN & FERNS -ALLIES				

1	<i>Allantodia stoliczkae</i> (Bedd.) Ching	Kalo Unew	Athyriaceae	
2	<i>Gleichenia gigantean</i> Wall. ex Hook	Kalamey Unew	Gleicheniaceae	
3	<i>Selaginella</i> sp.		Selaginellaceae	
BAMBOO				
1	<i>Himalayacalamus falconeri</i> (Hook.f. ex Munro) Keng f.	Singane	Poaceae	
2	<i>Yushania maling</i> (Gamble) R.B.Majumdar & Karthik.	Malingo	Poaceae	

Checklist of Faunal, Avi-Faunal and Butterfly Species recorded in Lungmu Reserve Forest, West Sikkim

Fauna					
S.No	Scientific Name	Common Name	Local Name	Family	IUCN Status
1	<i>Muntiacus muntjak</i>	Barking Deer	Darey Mirga	Cervidae	LC
2	<i>Prionailurus bengalensis</i>	Leopard cat	Ningalo	Felidae	LC
3	<i>Sus scrofa</i>	Wild Boar	Bodel	Suidae	LC
4	<i>Ursus thibetanus</i>	Himalayan Black Bear	Ursus thibetanus	Ursidae	LC
5	<i>Dremomys lokriah</i>	Orange-bellied Himalayan Squirrel	Lothurke	Sciuridae	LC
6	<i>Paradoxurus hermaphroditus</i>	Asian palm civet		Viverridae	LC
7	<i>Macaca mulatta</i>	Rhesus macaque	badhar	Cercopithecidae	LC
8	<i>Vulpes vulpes</i>	Red Fox	Sheyal	Canidae	LC
Avi- fauna					
1	<i>Acridotheres tristis</i>	Common Myna	Ruppi	Sturnidae	
2	<i>Actinodura nepalensis</i>	Hoary Barwing		Timaliidae	
3	<i>Aegithalos louschistos</i>	Rufous-fronted Tit	Fista	Paridae	
4	<i>Aethopyga nepalensis</i>	Nepal Sunbird	Kalo balchi	Nectariniidae	
5	<i>Aethopyga spiraja</i>	Crimson Sunbird		Nectariniidae	
6	<i>Arborophila torqueola</i>	Common Hill Partridge	Peura	Phasianidae	
7	<i>Cissa chinensis</i>	Common Green Magpie	Doday Koilee	Corvidae	
8	<i>Columba livia</i>	Common Pigeon		Columbidae	
9	<i>Corvus macrorhyncus</i>	Jungle Crow	Khag	Corvidae	
10	<i>Culicicapa ceylonensis</i>	Grey Headed Canary Flycatcher		Muscicapidae	
11	<i>Dicrurus leucophaeus</i>	Ashy Drongo	Chibey	Dicaeidae	
12	<i>Eumyias thalassinus</i>	Verditer Flycatcher	Hareney	Muscicapidae	
13	<i>Fulvetta vinipectus</i>	White Browed Fulvetta		Timaliidae	
14	<i>Garrulax leucolophus</i>	White Crested Laughing Thrush	Kolkoley	Leiothrichidae	

15	<i>Garrulax striatus</i>	Striated Laughing Thrush	Kolkoley	Turdidae	
16	<i>Hypsipetes leucocephalus</i>	Black Bulbull	Jureli	Pycnonotidae	
17	<i>Lanius tephronotus</i>	Grey backed Shrike		Laniidae	
18	<i>Lophura leucomelanos</i>	Kalij Pheasant	Kalij	Phasianidae	
19	<i>Megalaima virens</i>	Great Barbet	Neual	Megalaimidae	
20	<i>Myiophonus caeruleus</i>	Blue Whistling Laughing Thrush	Kulchura	Muscicapidae	
21	<i>orthotomus atrogularis</i>	Common Tailor bird		Cisticolidae	
22	<i>Passer domesticus</i>	House Sparrow	Bhangera	Passeridae	
23	<i>Parus monticulus</i>	Green Backed Tit	Chichink Kotey	Paridae	
24	<i>Pericrocotus (flammeus) speciosu</i>	Scarlet Minivet	Rani Chara	Campephagidae	
25	<i>Pycnonotus cafer</i>	Red Vented Bulbull	Jureli	Pycnonotidae	
26	<i>Pycnonotus striatus</i>	Straited Bulbull	Jureli	Pycnonotidae	
27	<i>Rhipidura aureola</i>	White browed Fantail		Rhipiduridae	
28	<i>Stroptopelia orientalis</i>	Oriental Turtle Dove	Dhukur	Columbidae	
29	<i>Eumyias thalassinus</i>	Verditer Flycatcher	Hareney	Muscicapidae	
30	<i>Yuhina flavicollis</i>	Whiskered Yuhina	Megma	Timaliidae	
31	<i>Yuhina gularis</i>	Striped Throated Yuhina	Megma	Sylviidae	
BUTTERFLY					
1	<i>Argynnis childreni</i>	Large Silverstripe		Nymphalidae	
2	<i>Aglais caschmirensis</i>	Indiantortoise shell		Nymphalidae	
3	<i>Cethosia cyane</i>	Lacewing		Nymphalidae	
4	<i>Eurema hecabe</i>	Grass Yellow		Pieridae	
5	<i>Heliophorus brahma</i>	Golden Sapphire		Lycanidae	
6	<i>Notocrypta paralyos</i>	Common Banded Demon		Hesperiidae	
7	<i>Papilio paris paris</i>	Paris Peacock		Papilionidae	
8	<i>Pieris rapae</i>	cabbage white		Pieridae	
9	<i>Vanessa cardui</i>	Painted lady		Nymphalidae	
10	<i>Vanessa indica</i>	Indian Red Admiral		Nymphalidae	
11	<i>Zemeros flegyas</i>	Punchinello		Riodinidae	



Wilddog (Scat)



Forester



Dark Judy



Common Five Ring

Manghring Reserve Forest, South Sikkim

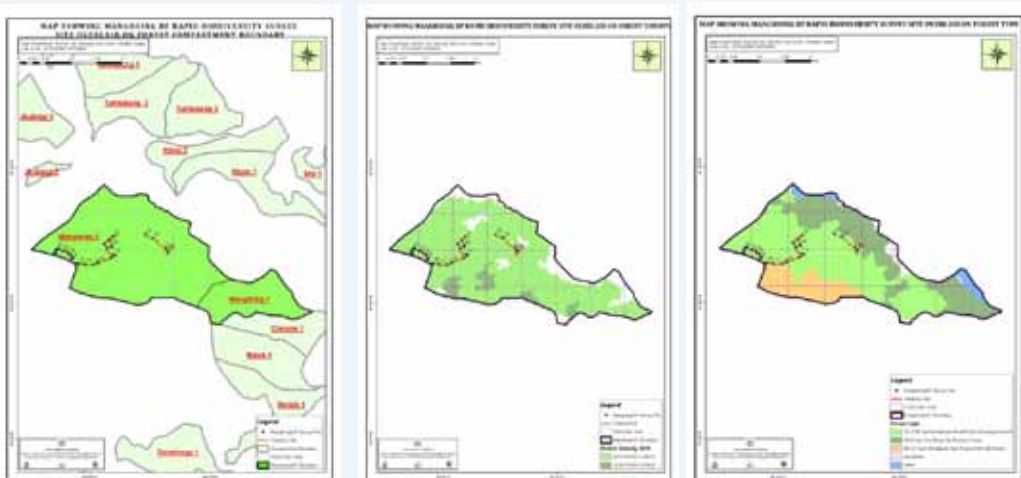
Sabita Dahal & Meena Tamang



STUDY AREA

A field trip for conducting Rapid Biodiversity Survey to Manghring Reserved Forest covering a sampling path from Bhalu Khop – Rangrang – Dwaray kholsa in South Sikkim, were carried out during the month of December 2017. The trip was aimed for inventory and monitoring of the biodiversity of the area.

The present survey area along Bhalu Khop – Rangrang – Dwaray kholsa sampling path in, the forest type of which is represented by sub-tropical mixed broad leaved. The elevation range covered during the survey was from 400m to 1250m, detail of which is represented by Figure 1, Table 1. The slope angle of the area ranged between mild (30 degree) to stiff (80 degree) slope and is facing towards NE aspect (Table)



Forest compartment boundary, forest density & forest types of Bhalu Khop – Rangrang – Dwaray kholsa sampling path, in Manghring RF

Site characteristics of the survey area along Bhalu Khop – Rangrang – Dwaray kholsa sampling path in Mangrhing RE, south Sikkim

Survey plots	Forest type	Altitude (m)	GPS Co-ordinates	Long.	Slope Angle (degree)	Slope Aspect	Canopy cover (%) / Forest density	Dominate taxa	Disturbance	Location name
Plot 1	Sub-tropical forest	1100	27.17021	88.48697	45	NE	60%, moderately dense	Tree	Nil	Bhalu Khop
Plot 2	Sub-tropical forest	1103	27.17023	88.48714	40	NE	70%, very dense	Tree	Nil	Bhalukhop
Plot 3	Sub-tropical forest	1089	27.17048	88.48718	70	NE	70%, very dense	Tree	Nil	Bhalukhop
Plot 4	Sub-tropical forest	1071	27.17083	88.48729	40	NE	75%, very dense	Tree	Nil	Bhalukhop
Plot 5	Sub-tropical forest	1057	27.17086	88.48764	35	NE	70%, very dense	Tree	Nil	Bhalukhop
Plot 6	Sub-tropical forest	1060	27.17056	88.48828	30	NE	70%, very dense	Tree	Nil	Bhalukhop
Plot 7	Sub-tropical forest	1091	27.17037	88.48885	30	NE	70%, very dense	Tree	Nil	Bhalukhop
Plot 8	Sub-tropical forest	1142	27.17015	88.48929	40	NE	75%, very dense	Tree	Nil	
Plot 9	Sub-tropical forest	1172	27.16963	88.48959	45	NE	70%, very dense	Tree	Nil	
Plot 10	Sub-tropical forest	1200	27.16926	88.48935	45	NE	70%, very dense	Tree	Nil	Rangrang
Plot 11	Sub-tropical forest	1232	27.16899	88.48984	40	NE	75%, very dense	Tree	Nil	Rangrang
Plot 12	Sub-tropical forest	1230	27.16899	88.49025	60	NE	70%, very dense	Tree	Nil	Rangrang
Plot 13	Sub-tropical forest	1211	27.16887	88.49118	80	NE	50%, moderately dense	Tree	Nil	Dharay vir
Plot 14	Sub-tropical forest	1199	27.16883	88.49233	50	NE	40%, moderately dense	Tree	Nil	Dharay vir

Plot 15	Sub-tropical forest	1152	27.16906	88.493	60 NE	50%, moderately dense	Tree	Nil	Dharay vir
Plot 16	Sub-tropical forest	1094	27.16963	88.49476	80 NE	70%, very dense	Tree	Nil	Kharpangay
Plot 17	Sub-tropical forest	1059	27.17005	88.49519	60 NE	20%, open	Tree	Landslide	Kharpangay
Plot 18	Sub-tropical forest	1046	27.17083	88.49427	50 NE	60%, moderately dense	Tree	Nil	Kharpangay
Plot 19	Sub-tropical forest	1029	27.17136	88.4939	60 NE	70%, very dense	Tree	Nil	Kharpangay
Plot 20	Sub-tropical forest	996	27.17109	88.49486	60 NE	75% very dense	Tree	Nil	Dwaray Kholsa
Plot 21	Sub-tropical forest	988	27.17227	88.49508	40 NE	70%, very dense	Tree	Nil	Dwaray kholsa
Plot 22	Sub-tropical forest	531	27.17492	88.50794	50 NE	50%, moderately dense	Tree	Nil	MPCA gate
Plot 23	Sub-tropical forest	503	27.17447	88.50904	60 NE	60%, moderately dense	Tree	Nil	Above MPCA gate
Plot 24	Sub-tropical forest	484	27.17307	88.51081	50 NE	70%, very dense	Tree	Nil	Above MPCA gate
Plot 25	Sub-tropical forest	492	27.17282	88.5112	40 NE	70%, very dense	Tree	Nil	Above MPCA gate



Entrance gate of Medicinal Plants Conservation Area (MPCA) at Mangrhring RF, South Sikkim

FINDINGS

FLORA

During the survey, a total of 25 plots were laid covering 0.25 ha area (Table & Figure). A general checklist of the floral species (Table) of the area (including the areas outside of the plots) were prepared of which, trees and small trees represented the highest number of species (62 species) followed by herbs (52 species). 29 species of climbers and epiphytes, 16 species of shrubs and shrublets, 26 and 5 species of bamboos and cane were recorded from the area during the present study. Location name, dominate taxa, elevation, GPS-co-ordinates, forest type, slope angle, Slope aspect, disturbances and forest density of the area in terms of canopy cover in and around the sample plots are provided in the Table.

Checklist of floral species in Manghring Reserved Forest, South Sikkim

Sl. No.	Botanical Name	Local Name	Family
	TREES AND SMALL TREES		
1	<i>Actinodaphne obovata</i> (Nees)Blume	Runchey	Lauraceae
2	<i>Albizia procera</i> (Roxb.) Benth.	Seto-siris	Mimosaceae
3	<i>Alnus nepalensis</i> D.Don.	Utis	Betulaceae
4	<i>Alstonia scholaris</i> (L.) R. Brown	Chhattiwan	Apocynaceae
5	<i>Bauhinia purpurea</i> L.	Taaki	Caesalpiniaceae
6	<i>Bauhinia variegata</i> Linn.	Koiralo	Caesalpiniaceae
7	<i>Betula alnoides</i> Buch-Ham ex D.Don	Saur	Betulaceae
8	<i>Bischofia javanica</i> Blume	Kaijal	Bischofiaceae
9	<i>Boehmeria rugulosa</i> Wedd.	Daar	Urticaceae
10	<i>Bombax ceiba</i> L.	Simal	Bombacaceae
11	<i>Brassaiopsis hainla</i> (Buch.-Ham.) Seem.	Chuletro	Araliaceae
12	<i>Bridelia retusa</i> (Linn.) Spreng	Gayo (Nep.)	Euphorbiaceae
13	<i>Callicarpa arborea</i> Roxb.	Guenlo	Verbenaceae
14	<i>Casia fistula</i> L.	Rajvriksha	Caesalpiniaceae
15	<i>Castonopsis indica</i> (Roxb.) Miq	Dhalne Katus	Fagaceae
16	<i>Celtis tetrandra</i> Roxb.	Khari	Ulmaceae
17	<i>Choero spondias axillaris</i> Roxb. Bruth & A.W.Hill	Lapsi	Anacardiaceae
18	<i>Chukrasia tbularis</i> A. Jass	Chekrasi	Meilaceae
19	<i>Delonix regia</i> (Hook.) Raf.	Golmaar	Fabaceae
20	<i>Delonix regia</i> (Hook.) Raf.	Golmaar	Fabaceae
21	<i>Diploknema butyracea</i> (Roxb.) H. J. Lam	Chiuri	Sapotaceae
22	<i>Duabanga grandiflora</i> (Roxb. ex DC.) Walp	Laampate	Sonneratiaceae
23	<i>Erythrina arborescens</i> Roxb.	Phaledo	Fabaceae

24	<i>Evodia fraxinifolia</i> Hook.	Khanakpa	Rutaceae
25	<i>Ficus drupacea</i> Thunberg	Baar	Moraceae
26	<i>Ficus semicordata</i> Buch-Ham.ex Smith.	Khasrey Khaney	Moraceae
27	<i>Fraxinus floribunda</i> Wall.	Lakuri	Oleaceae
28	<i>Garuga pinnata</i> Roxb.	Dabdabe	Burseraceae
29	<i>Glochidion velutinum</i> Wight.	Kaalikath	Euphorbiaceae
30	<i>Gmelina arborea</i> Roxb.	Khamari	Verbenaceae
31	<i>Gynocardia odorata</i> R . Br.	Gantey	Achariaceae
32	<i>Holarrhena antidysenterica</i> (Roxb. ex Flem.) Wall.		Apocynaceae
33	<i>Juglans regia</i> L.	Okhar	Juglandaceae
34	<i>Lagerstroemia parviflora</i> Roxb.	Budi Dhaiyanro	Lythraceae
35	<i>Leucosceptrum canum</i> Sm.	Ghurpis	Lamiaceae
36	<i>Lindera neesiana</i> Wall.ex Ness.	Timbur	Lauraceae
37	<i>Litsea monopetala</i> (Roxb.)Persoon.	Kutmero	Lauraceae
38	<i>Lyonia ovalifolia</i> (Wall.) Drude.	Angeri	Ericaceae
39	<i>Macaranga peltata</i> (Roxb.) Mull. Arg.	Malata	Euphorbiaceae
40	<i>Maesa chisia</i> Buch-Ham ex D.Don.	Bilauney	Myrsinaceae
41	<i>Mallotus philippensis</i> (Lam.) Muell.-Arg.	Sinduray	Euphorbiaceae
42	<i>Mallotus philippensis</i> (Lam.) Muell.-Arg.	Sinduray	Euphorbiaceae
43	<i>Morinda angustifolia</i> Roxb.	Harde kath	Rubiaceae
44	<i>Ostodes paniculata</i> Blume.	Bepari	Euphorbiaceae
45	<i>Pandanus furcatus</i> Roxb.	Tarika	Pandanaceae
46	<i>Pentapanax fragrans</i> Hara.	Chinday	Araliaceae
47	<i>Phyllanthus emblica</i> Linn.	Amala	Euphorbiaceae
48	<i>Prunus napaulensis</i> (Ser.) Steud.	Arupatey	Rosaceae
49	<i>Pyralia edulis</i> (Wall) A.DC.	Amphi	Santalaceae
50	<i>Rhus chinensis</i> Miller	Bhakamilo	Anacardiaceae
51	<i>Sachima wallichii</i> Korth.	Chilaunay	Theaceae
52	<i>Sapindus mukorossi</i> Gaertn.	Ritha	Sapindaceae
53	<i>Saurauia napaulensis</i> Dc.	Gogun	Saurauiaceae
54	<i>Shorea robusta</i> Gaertn.	Sal	Dipterocarpaceae
55	<i>Sphaeranthus indicus</i> Linn.	Bandray	Asteraceae
56	<i>Spondias magnifera</i> Willd.	Amaro	Anacardiaceae
57	<i>Symplocos theifolia</i> D. Don.	Kharanay	Symplocaceae
58	<i>Terminalia belerica</i> Gaertn. (Roxb.)	Barra	Combretaceae
59	<i>Terminalia chebula</i> Retz.	Harra	Combretaceae
60	<i>Terminalia myriocarpa</i> (Gaertn.) Roxb.	Paani Saaj	Combretaceae
61	<i>Viburnum erubescens</i> Wall. ex DC.	Asaray	Verbenaceae

62	<i>Zanthoxylum armatum</i> D.C.	Timbur	Rutaceae
	SHRUBS		
1	<i>Boehmeria platyphylla</i> D. Don.	Kamlay	Urticaceae
2	<i>Brugmansia suaveolens</i> (Hump. & Bonpl. ex Willd.) Bercht. & J. Presl	Dhokray	Solanaceae
3	<i>Clerodendron cordatum</i> D. Don		Verbenaceae
4	<i>Colebrookea oppositifolia</i> Smith.	Dhusray	Lamiaceae
5	<i>Dendrocnide sinuate</i> (Blime) Chew.	Morungay	Urticaceae
6	<i>Holmskioldia sanguinea</i> Retz.		Verbenaceae
7	<i>Lantana camara</i> Linn.	Kanika Kanda	Verbenaceae
8	<i>Leea compactiflora</i> Kurz.	Galeni	Vitaceae
9	<i>Oxyspora paniculata</i> (D. Don) DC.	Chulesi	Melostomataceae
10	<i>Phlogacanthus thyrsoformis</i> (Hard.) Mabberley	Titay	Acanthaceae
11	<i>Premna barbata</i> Wall.ex Schauer.	Ginari	Verveneaceae
12	<i>Rubus reticulatus</i> Walluch ex J. D. Hooker	Aiselu	Rubiaceae
13	<i>Trewia nudiflora</i> L.	Ramritha	Euphorbiaceae
14	<i>Vitex negundo</i> Linn.	Simali	Verbenaceae
15	<i>Woodfordia fruitcosa</i> Linn.	Dhayero	Lythraceae
16	<i>Zanthoxylum acanthopodium</i> D.C.	Bokay timbur	Rutaceae
	CLIMBERS / EPIPHYTES		
1	<i>Acacia pinnata</i> (L.)Willd.	Arari	Fabaceae
2	<i>Asparagusracemosus</i> Willd.	Kurilo	Liliaceae
3	<i>Bauhinia scandens</i> Linn.	Nagbale	Caesalpinaceae
4	<i>Bauhiniavahlia</i> Wight & Arn.	Bhorlo	Caesalpinaceae
5	<i>Cissampelos pareira</i> L.	Batulpatay	Menispermaceae
6	<i>Clematis buchananiana</i> DC.	Pinase Lahara	Ranunculaceae
7	<i>Dendrocalamus hamiltonii</i> Nees & Arn.ex Munro	Choya bans	Poaceae
8	<i>Dioscorea bulbifera</i> Linn.	Gittha	Dioscoreaceae
9	<i>Dioscorea pentaphylla</i> L.	Bantarul	Dioscoreaceae
10	<i>Dioscorea</i> sp.		Dioscoreaceae
11	<i>Entada scandens</i> Benth.	Pangroo	Mimosaceae
12	<i>Ficussarmentosa</i> Buch.	Duday lahara	Moraceae
13	<i>Marsdenia roylei</i> Wight	Bahauni Larha	Asclepiadaceae
14	<i>Mikania micrantha</i> Kunth	Chinese creeper	Asteraceae
15	<i>Momordica cochinchinensis</i> Spreng	Ban Kerala	Cucurbitaceae
16	<i>Mucunaimbricate</i> DC.	Kauso	Fabaceae
17	<i>Mucuna macrocaroa</i> Wall.	Baldhangro	Fabaceae
18	<i>Neprolepisauriculata</i> (L.) Trimen	Pani amala	Nephrolepidaceae

19	<i>Piper betleoids</i> C. DC.	Chaboo	Piperaceae
20	<i>Piper boehmeriaefolium</i> (Miq.) DC.	Jungali pan	Piperaceae
21	<i>Piper peepuloides</i> Roxb.	Pipla	Piperaceae
22	<i>Piper sylvaticum</i> Roxb.	Pipla	Piperaceae
23	<i>Smilax aspera</i> L.	Kukurdina	Liliaceae
24	<i>Smilax ovalifolia</i> Roxb.	Aulay Kukurdina	Liliaceae
25	<i>Spatholobus parviflorus</i> (DC.) Kuntze	Debre lahara	Fabaceae
26	<i>Stephania glabra</i> Roxb	Tambarkay	Menispermaceae
27	<i>Tetrastigma serrulaum</i> (Roxb.)Planchon	Charcharey laraha	Vitaceae
28	<i>Tinospora cordifolia</i> (Willd.) Hook. F. & Thomson	Gurjo	Menispermaceae
29	<i>Trichosanthes tricuspidata</i> Lour.	Indrani	Cucurbitaceae
	HERBS		
1	<i>Acacia pinnata</i> (Linn.)Willd.	Arari	Leguminosae
2	<i>Achyranthes aspara</i> Linn.	Apamarga / Datiwan	Amaranthaceae
3	<i>Aconogonum molle</i> (D.Don)Hara.	Thotnay	Polygonaceae
4.	<i>Adiantum capillus - veneris</i> Linn.	Pakhale unieu	Adiantaceae
5.	<i>Aeschynanthus parviflorus</i> (D.Don) Spreng.	Baklay patay	Gesneriaceae
6.	<i>Agave Americana</i> L.	Hattibar	Agavaceae
7.	<i>Ageratum conyzoides</i> Linn.	Illame	Asteraceae
8.	<i>Alternanthera sessilis</i> (L.) R.Br.ex DC.	Bhringi jhaar	Amaranthaceae
9.	<i>Anthogonium gracile</i> Wall.ex Lindl.	Bamboo orchid	Orchidaceae
10.	<i>Anagallis arvensis</i> L.	Armalay	Primulaceae
11.	<i>Aragya</i> sp.		Convolvulaceae
12.	<i>Arisaema speciosum</i> Wall.	Sapko makkai	Araceae
13.	<i>Artimisia vulgaris</i> Linn.	Titaypati	Asteraceae
14.	<i>Arundinaria</i> sp.	Musey kharuki	Poaceae
15.	<i>Begonia picta</i> Smith	Magar Kachay	Begoniaceae
16.	<i>Bidens pilosa</i> L.	Kuro	Asteraceae
17.	<i>Blumea balsamifera</i> (L.) DC .	Babari kapur	Asteraceae
18.	<i>Capillipedium</i> sp.	Thulo kharuki	Poaceae
19.	<i>Commelina benghalensis</i> Linn.	Kanay Jhar	Commelinaceae
20.	<i>Costus speciosus</i> . Sm.	Betlauri	Zingiberaceae
21.	<i>Crassocephalum crepidioides</i> (Benth.) Moore.	Anikalay Jhar	Asteraceae
22.	<i>Dendrobium densiflorum</i> Lindl.	Ghogay suna- khari	Orchidaceae
23.	<i>Dendrobium nobile</i> Lindl.	Sunakhari	Orchidaceae
24.	<i>Drymaria cordata</i> (L) Roemer & Schultes	Avijalo	Caryophyllaceae

25.	<i>Elephantopus scaber</i> L.	Buti jhar	Asteraceae
26.	<i>Equisetum diffusum</i> D.Don	Aankhle jhar	Equisetaceae
27.	<i>Eragrostis</i> sp	Chaptey banso	Poaceae
28.	<i>Eragrostis</i> sp	Ghodey banso	Poaceae
29.	<i>Eragrostis</i> sp.	Jangali banso	Poaceae
30.	<i>Eupatorium cannabinum</i> Linn.	Banmara	Asteraceae
31.	<i>Euphorbia hirta</i> L.	Dudhay jhar	Euphorbiaceae
32.	<i>Galinsoga parviflora</i> Cav.L.	Udasay	Asteraceae
33.	<i>Gonostegia hirta</i> (Blume ex Hassk.) Miq.	Chiplay	Urticaceae
34.	<i>Hedychium</i> sp.	Sara	Zingiberaceae
35.	<i>Hedychium spicatum</i> Smith	Gaisaroo	Zingiberaceae
36.	<i>Hedyotis scandens</i> Roxb.	Bakhrakanay	Rubiaceae
37.	<i>Imperata cylindrica</i>	Siru	Poaceae
38.	<i>Ischaemum rugosum</i> Salisb	Babyo	Poaceae
39.	<i>Jasminum</i> sp.		Oleaceae
40.	<i>Lycopodium clavatum</i> L.	Nagbeli	Lycopodiaceae
41.	<i>Mikania micrantha</i> Kuntha		Asteraceae
42.	<i>Mimosa pudica</i> L.	Buhari jhar	Mimosaceae
43.	<i>Monstera deliciosa</i> Liebm.	Kanchirna	Araceae
44.	<i>Nephrolepis auriculata</i> (L.) Trimen	Pani amala	Nephrolepidaceae
45.	<i>Neyraudia arundinaceae</i> (L.)	Ghungring	Poaceae
46.	<i>Phlogacanthus pubinervius</i> T.Anderson	Titay	Acanthaceae
47.	<i>Physalis divaricata</i> D. Don.	Phoksay	Solanaceae
48.	<i>Poa</i> sp	Phurkay	Poaceae
49.	<i>Setaria palmifolia</i> (J.Koenig) Stapf	Dhoti sara	Poaceae
50.	<i>Siegesbeckia orientalis</i> L.	Dudhe Jhaar	Asteraceae
51.	<i>Solanum khasiana</i> C .B Clark.	Boksi kara	Solanaceae
52.	<i>Thysanolaena latifolia</i> (Roxb.ex Hornem.) Honda	Amliso	Poaceae
	BAMBOO / CANE		
1.	<i>Costus speciosus</i> Koenig Sm.	Costaceae	Bethlauri
2.	<i>Dendrocalamus hamiltonii</i> Nees & Arn.ex Munro	Poaceae	Choya bans
3.	<i>Phylostachys aurea</i> Riviere & C.Rivire	Poaceae	Katha Bans
4.	<i>Plectocomia himalayana</i> Giff.	Arecaceae	Fyakray bet
5.	<i>Sinarundinaria intermedia</i> (Munro) C.S.Chao & Renvoize	Poaceae	Nigalo/Tite Nigalo

FAUNA

During the biodiversity survey in Manghring Reserved Forest, the existence of a total of 6 mammalian species, 25 bird species and 10 butterflies species were recorded through direct sightings and indirect evidences, which are listed in table.

Checklist of Faunal species, including Mammals, Avi-fauna and butterflies of Manghring RF and surrounding area in South Sikkim.

Sl. No	Common Name	Scientific Name	Family
1.	Barking Deer	<i>Muntiacus muntjak</i>	Crevidae
2.	Chinese Pangolian	<i>Manis pentadactyla</i>	Manidae
3.	Common Leopard	<i>Panther pardus</i>	Felidae
4.	Himalayan palm Civet	<i>Paguma larvata</i>	Viverridae
5.	Porcupine	<i>Hystrix sp.</i>	Erethizontidae
6.	Wild Boar	<i>Sus scrofa</i>	Suidae
AVI-FAUNAL SPECIES			
1.	Ashy Drongo	<i>Dicrurus leucophaeus</i>	Dicaeidae
2.	Black-crested Bulbul	<i>Pycnonotus flaviventris</i>	Pycnonotidae
3.	Blue-throated Barbet	<i>Megalaima asiatica</i>	Megalaimidae
4.	Blue Whistling Thrush	<i>Myophonus caeruleus</i>	Turdidae
5.	Common Myna	<i>Acridotheres tristis</i>	Sturnidae
6.	Common Pigeon	<i>Columba livia</i>	Columbidae
7.	Common Tailorbird	<i>Orthotomus sutorius</i>	Cisticolidae
8.	Common Green Magpie	<i>Cissa chinensis</i>	Corvidae
9.	Crimson Sunbird	<i>Aethopyga spiraja</i>	Nectariniidae
10.	Greater Yellownappe	<i>Chrysophlegma flavinucha</i>	Picidae
11.	Green Backed tit	<i>Parus monticulus</i>	Paridae
12.	Green-billed Malkoha	<i>Rhopodytes tristis</i>	Cuculidae
13.	Green tailed sunbird	<i>Aethopyga nipalensis</i>	Nectariniidae
14.	House Crow	<i>Corvus splendens</i>	Corvidae
15.	House Sparrow	<i>Passer domesticus</i>	Passeridae
16.	Grey-headed canary-flycatcher	<i>Culicicapa ceylonensis</i>	Stenostiridae
17.	Kalij Pheasant	<i>Lophura leucomelanos</i>	Phasianidae
18.	Orange-Headed thrush	<i>Zoothera citrine</i>	Turdidae
19.	Oriental white eye	<i>Zosterops palpebrosus</i>	Zosteropidae
20.	Red Junglefowl	<i>Gallus gallus</i>	Phasianidae
21.	Red-vented bulbul	<i>Pycnonotus cafer</i>	Pycnonotidae
22.	Scarlet Minivet	<i>Pericrocotus speciosus</i>	Campephagidae

23.	Velvet-fronted Nuthatch	<i>Sitta frontalis</i>	Certhiidae
24.	White capped Redstart	<i>Chaimarrornis leucocephalus</i>	Muscicapidae
25.	Grey-capped Pygmy Woodpecker	<i>Dendrocopos canicapillus</i>	Picidae
	BUTTERFLY		
1.	Dark Evening Brown	<i>Melanitis phedima</i>	Nymphalidae
2.	Common Tinsel	<i>Catapaecilma major</i>	Lycaenidae
3.	Dark Pierrot	<i>Tarucus ananda</i>	Lycaenids
4.	Common Jester	<i>Symbrenthia</i> sp.	Nymphalidae
5.	Common Grass Yellow	<i>Eurema hecabe</i>	Pieridae
6.	Dark Judy	<i>Abisara fylla</i>	Riodinidae
7.	Common Map	<i>Cyrestis</i> sp.	Nymphalidae
8.	Indian Tortiseshell	<i>Aglais caschmirensis</i>	Nymphalidae
9.	Chocolate Pansy	<i>Junonia iphita</i>	Nymphalidae
10.	Common Nawab	<i>Polyura athamas</i>	Nymphalidae



Diploknema butyracea (Chiuri)



Bombax ceiba (Simal)



Anthogonium gracile (Bamboo orchid)



Bauhinia vahlii (Bhorlo)

DISCUSSION

State Medicinal Plants Board (SMPB), Forest, Environment & Wildlife Management department (FEWMD) have demarcated four number Medicinal Plants Conservation Areas (MPCAs) in the state which has potential medicinal plants in diversity and usages in context of different ethnic cultures and traditions. Of the four MPCAs of Sikkim, one is at Manghring RF, named Manghring MPCA.

During the present survey, the area was found to be rich in terms of the diversity of the species. Forest density also observed very high in most of the areas, followed by moderately dense (Table I). Forest being subtropical broad leaved type, trees is the most predominant taxa in the area, followed by herbs, shrubs and shrublets, ferns, climbers and epiphytes. The area constitutes a diverse habitat for both flora and fauna of the subtropical belt. The important medicinal plant species preserved in the area in the form of MPCA are *Terminalia Chebula*, *Terminalia Beleriaca*, *Albizia odoratissima*, *Adhatoda vasica*, *Alnus nepalensis*, *Anthocephalus chinensis*, *Betula alnoides*, *Chukrasia tabularis*, *Colobrookea oppositifolia*, *Dioscorea bulbifera*, *Desmostachya bipinnata*, *Evodia fraxinifolia*, *Neprolepis auriculata*, *Pentapanax fragrans*, *Schima wallichii*, *Woodfordia fruticosa*, *Smilax ovalifolia*, *Tetrastigma serrulatum*, *Tinospora cordifolia*, *Vitex nigundo*, *Dioscorea bulbifera*, *Dioscorea Pentaphylla*, *Oroxylum indicum*, *Mucuna pruriens*, *Phyllanthus emblica* etc. The area is highly dominated with the sub tropical trees and small trees species namely *Schima wallichii*, *Ostodes paniculata*, *Rhus chinensis*, *Terminalia crenata*, *Fraxinus floribunda*, *Shorea robusta*, *Aphanamixis polystachya*, *Bischofia javanica*, *Bridelia retusa*, *Ficus semicordata*, *Firmiana colorata*, *Garuga pinnata*, *Gmelina arborea*, *Ailanthus integrifolia*, *Grewia optiva*, *Largerstroemia parviflora*, *Litsea monopeltata*, *Malatus philippensis*, *Neonauclea purpurea*, *Phoenix sylvestris*, *Phyllanthus emblica*, *Stercolia villosa*, *Syzygium cumini*, *Syzygium kurzii*, *Taxodium sp.*, *Tectona grandis*, *Terminalia belerica*, *Terminalia chebula*, *Terminalia crenata*, *Tetrameles nudiflora*, *Toona ciliata*, *Actinodaphne obovata*, *Albizia procera*, *Alnus nepalensis*, *Alstonia scholaris*, *Bauhinia purpurea*, *Bauhinia variegata*, *Betula alnoide*, *Bischofia javanica*, *Bombax ceiba*, *Callicarpa arborea*, *Chukrasia tbularis*, *Delonix regia*, *Diploknema butyracea*, *Duabanga grandiflora*, *Boehmaria platyphylla*, *Brugmansia suaveolens*, *Colebrookea oppositifolia*, *Clerodendron cordatum*, *Lantana camara*, *Oxysspora paniculata*, *Premna barbata*, *Woodfordia fruitcosa*, *Vitex negundo* etc. In addition, the area also provide diverse habitat for the faunal species.

Mangrhing Reserve Forest is divided into two compartments. Compartment 1 is located in and around Bhalu khop, Rangrang, Dharay vir, Dwaray kholsa, in and around MPCA gate (Fig 1, Table 1: Plots 1 - 25). Compartment 2 of Mangrhing RF shares its north werstern boundary with its compartment 1, in around Dwaray Kholsa, Kharpanay and some areas of Dharay Vir. In the southern part, it shares its boundary with Chesme RF.

CONCLUSION AND RECOMMENDATIONS

The Mangrhing Reserved Forest is not much impacted by the natural as well as anthropogenic disturbance. The unsustainable extraction of plants especially for firewood and livestock feed by the local inhabitants are the general disturbances resulted in the building up considerable pressure on the survival of the species. Other major threats are obviously, the effect of drastic changes in climate, hence studies on the impact of climate change on the biodiversity of the area is recommended, which will be helpful in framing conservation and management strategies.

Maniping Reserve Forest, West Sikkim

Nimesh Chamling, Anjana Pradhan & Dorjee Chewang Bhutia



An Overview of Maniping Reserve Forest

INTRODUCTION

The forest is divided into 3 compartments and 3 forest types mainly 11B/C1b East Himalayan Wet Temperate Forest (1800-2400 m asl) which is closed evergreen forest with large girth tree trunks. Branches and tree boles are mainly covered with mosses, ferns and other epiphytes. The RF is mainly dominated by *Quercus lamellosa*, *Magnolia campbellii*, *Symplocos glomerata*, *S. lucida*, *Lithocarpus pachyphyllus* and *Alnus nepalensis*.

Similarly, 12/C3a East Himalayan Moist Mixed Coniferous Forest (1500-3300m asl) occurs in warm and moist climatic conditions which are diverse and species rich with many endemic species. It is dominated by *Lithocarpus pachyphyllus*, *Rhododendron arboreum*, *Cryptomeria japonica*, *Leucosceptrum cannum*, *Machilus* sp, *Quercus lamellosa* and *Rhododendron arboreum*.

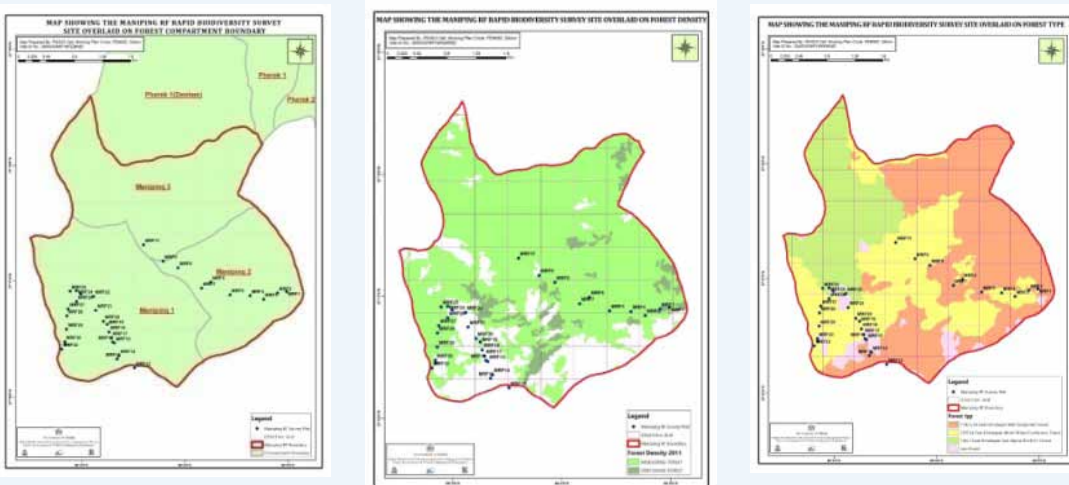
Whereas, 14/C2 East Himalayan Sub Alpine Birch/Fir Forest (2900-3500m asl) usually finds the characteristics of stunted tree growth due to the extremely harsh conditions prevailing in this climatic condition. High fir forest is much in dominance between 2900 and 3500m. Some broad-leaved species also accompany at the lower altitudes in this forest. Winters are usually below the freezing point accompanied by snowfalls. Similarly, Birch forests join the fir forests at an elevation of above 3000m. The forests are open with sporadic grasslands. The winters are so severe in the region that vegetative growth virtually stops in the winters. It is characterized by rhododendron, birch and fir species.

According to the Forest Guard and Forest guide, the forest is home to more than 30 species of birds. Bird species which we encountered during our survey were Kalij Pheasant, Ashy Drongo, Blue Whistling Laughing Thrush, Common Myna and Black Bulbul. Some of the commonly found birds in the forest are Red-vented Bulbul, Straited Bulbul, Striped-throated Yuhina, Common Hill Partridge and Rufous-fronted Tit.

Apart from avifauna, the forest is also inhabited by some mammalian species such as Barking Deer, Himalayan Black Bear, Wild Boar, etc. Through the locals living in the fringes of the forest, we came to know that the population of Himalayan Black Bear has gone up and it has become a major concern to them.

SURVEY AREA

The current survey was carried out along the sampling route of Maniping Reserve Forest. The altitude of the surveyed path ranged from 2423m to 3150m asl lying between 27°16'53.3"N – 27°16'24.5"N latitude and 88°03'15.7"E – 88°02'49.0"E longitude. The slope angle of the surveyed area ranged from 15° to 55° and aspect facing towards N, E, NE and S. The field visit was done in October 2017.



Sampling path of Maniping RF Covering Forest Compartment, Forest Density & Forest Types



Enumeration of Plant Species

FINDINGS AND DISCUSSION

A total 62 floral species were recorded during the survey. Herbs represented the highest number of species (21 species, 20 genera and 15 family). The forest hosts 2 bamboo species namely *Arundinariamaling* and *Sinarundinaria intermedia*. Similarly, trees represented second highest number of species with 18 species, 15 genera and 14 family. Shrubs represented 10 species, 10 genera and 9 family. Total of 4 species, 4 genera and 4 family of ferns/ferns allies were recorded during the survey. Forest also hosts 2 species, 2 genera and 2 family of Orchids and 5 species, 5 genera and 5 families of epiphyte/climber was found in the forest.

During the trail sampling, a total of 28 faunal species were recorded. Among these bird species were recorded the highest with 24 species, 20 genera and 16 families. The forest is also home to 4 mammalian species. According to the villagers, Wild Boar and Himalayan Black Bear possesses the highest population. They also informed us about the damage done to their properties by them.

Maniping Reserve Forest has been categorised into three forest types namely 11B/C1b East Himalayan Wet Temperate Forest, 12/C3a East Himalayan Moist Mixed Coniferous Forest and 14/C2 East Himalayan Sub Alpine Birch/Fir Forest. The forest is divided into three compartments. Among these, compartment 1 possesses the highest density forest cover compared to other compartments and this signifies that this area consists of high level of biodiversity presence.

Each forest types found in the forest has distinctive characteristics due to ecological factors such as climatic factors, edaphic factors, topographic factors and biotic factors. These factors play an important role in overall growth and development of forest. Looking at these factors, East Himalayan Wet Temperate Forest has characteristics of vigorous growth where annual rainfall is 1500-3000mm (51-118 in). The top most canopy layer in the forest is dominated by *Lithocarpus pachyphyllus*, *Quercus lamellosa*, *Magnolia campbellii*. The middle storey canopy is being dominated by *Symplocos lucida*, *Symplocos glomerate*, *Acer campbellii*, *Alnusnepalensis*. While, the lower storey is dominated by small trees and shrubs such as *Lyonia*

ovalifolia, *Leucosceptrumcannum*, *Osbeckia stellata*, *Viburnum erubescence*, *Rubusellipticus*. Ground vegetation is covered by *Polygonum molle*, *Polygonum runcinatum*, *Solanum khasianum*, *Bidenspilosa*. *Sinarundinaria intermedia* is the common bamboo species found in these forest type.

Similarly, East Himalayan Moist Mixed Coniferous Forest receives an annual rainfall of 200 cm, mostly falling between May to September during monsoon. Here too the top most canopy cover is occupied by *Lithocarpus pachyphyllus*, *Cryptomeria japonica*, *Quercus lamellosa*, *Rhododendron arboreum*, *Magnolia campbellii*. The middle storey canopy is covered by *Zanthoxylum acanthopodium*, *Symplocos lucida*, *Symplocos glomerata*. While the lower most layer is dominated by *Leucosceptrumcannum*, *Osbeckia stellata*, *Viburnum erubescence*, *Rubusellipticus*, *Ilex* sp. *Hemiphragmaheterophyllum*, *Eupatorium adenophorum*, *Swertia bimaculata*., etc was dominated the ground vegetation. The common bamboo species found here was *Arundinariamaling*.

While the East Himalayan Sub Alpine Birch/Fir Forest receives an annual rainfall of 50 cm and receives snowfall during winter season. The forest has fewer tree species and mostly dominated by grasslands and meadows. The common tree species found here are fir & birch. *Hemiphragmaheterophyllum*, *Gaultheria* sp., *Eragrostis* sp., etc were the common species which dominated the ground vegetation.

Similarly, the forest harbours many medicinal plants such as *Swertia bimaculata*, *Cynodondactylon*, *Solanum khasianum*, *Leucosceptrumcannum*, *Tetrataeniumnepalense*, *Rhododendron arboreum*. Apart from this, the forest also has the timber bearing species such as *Magnolia campbellii*, *Cryptomeria japonica*.

The Reserve Forest also host some important tree species such as *Lithocarpus pachyphyllus*, *Quercus lamellosa* which have a positive impact towards the forest ecosystem, as these species has water retention properties. Apart from this we also found *Tetrataeniumnepalense* in the forest which have many beneficial uses.

Maniping Reserve Forest, hosts many valuable species such as medicinal plants, timber, bamboo, etc. Forest is providing tangible services to the people in terms of fuelwood, fodder, timber, medicinal plants, fruits, tubers, etc and intangible goods such as clean air, clean water, and other ecosystem services. The people of the adjoining village are directly depended on forest and lots of benefits is being obtained from the forest.

Site Characteristics of Maniping Reserve Forest

Site Code	Range	Altitude(m)	Latitude (N)	Longitude (E)	Slope Angle	Slope-Aspect	Canopy Cover(%)
MRF1	Dentam	2423	27°16'53.3"	88°05'00.1"	20	N	40
MRF2	Dentam	2482	27°16'52.6"	88°04'54.9"	30	N	45
MRF3	Dentam	2546	27°16'49.5"	88°04'46.7"	35	N	10
MRF4	Dentam	2602	27°16'11.4"	88°04'38.9"	45	NW	80
MRF5	Dentam	2648	27°16'51.9"	88°04'27.2"	25	W	50
MRF6	Dentam	2707	27°16'58.6"	88°04'16.1"	20	N	55
MRF7	Dentam	2718	27°16'55.5"	88°04'10.7"	45	E	30
MRF8	Dentam	2716	27°17'06.1"	88°03'57.1"	15	E	10
MRF9	Dentam	2705	27°17'09.6"	88°03'48.4"	50	N	70
MRF10	Dentam	2763	27°16'53.3"	88°05'00.1"	55	N	10
MRF11	Dentam	2805	27°17'18.2"	88°03'37.2"	30	W	60
MRF12	Dentam	2225	27°16'14.5"	88°03'31.3"	20	SW	45
MRF13	Dentam	2302	27°16'19.2"	88°03'21.2"	30	N	40
MRF14	Dentam	2326	27°16'20.9"	88°03'22.3"	30	N	40
MRF15	Dentam	2492	27°16'27.5"	88°03'19.7"	45	N	35
MRF16	Dentam	2533	27°16'28.0"	88°03'18.7"	30	N	40
MRF17	Dentam	2570	27°16'30.2"	88°03'18.0"	35	N	50
MRF18	Dentam	2656	27°16'33.2"	88°03'16.7"	45	S	45
MRF19	Dentam	2761	27°16'37.2"	88°03'15.7"	30	N	45
MRF20	Dentam	2806	27°16'38.8"	88°03'13.4"	35	NE	55
MRF21	Dentam	2944	27°16'44.5"	88°03'09.1"	35	N	60
MRF22	Dentam	3017	27°16'51.3"	88°03'07.8"	45	N	40
MRF23	Dentam	3015	27°16'53.0"	88°03'00.4"	35	NE	30
MRF24	Dentam	3122	27°16'54.8"	88°02'57.9"	35	NE	5
MRF25	Dentam	3150	27°16'54.5"	88°02'54.3"	45	S	5
MRF26	Dentam	3066	27°16'49.1"	88°02'57.9"	35	N	35
MRF27	Dentam	3039	27°16'45.3"	88°02'53.0"	35	N	10
MRF28	Dentam	2972	27°16'41.7"	88°02'52.2"	45	N	5
MRF29	Dentam	2861	27°16'34.8"	88°02'52.0"	30	E	10
MRF30	Dentam	2781	27°16'28.3"	88°02'50.9"	45	E	10
MRF31	Dentam	2749	27°16'26.9"	88°02'51.3"	45	N	5
MRF32	Dentam	2732	27°16'24.5"	88°02'49.0"	40	S	5

NOTE: N, NORTH; NE, NORTH-EAST; NW, NORTH-WEST; W, WEST; E, EAST; SW, S, SOUTH; SW, SOUTH-WEST

Checklist of Floral Species recorded in Maniping Reserve Forest, West Sikkim

S.No	BOTANICAL NAME	LOCAL NAME	FAMILY	IUCN STATUS
TREES				
1	<i>Acer campbellii</i> Hook. & Thom. Ex Hiern.	Kapasey	Sapindaceae	LC
2	<i>Alnusnepalensis</i> D. Don	Utis	Betulaceae	LC
3	<i>Cryptomeria japonica</i> (Thunb. Ex Linn. F.) D. Don	Dhuppi	Taxodiaceae	
4	<i>Endospermum</i> sp.	setikath	Euphorbiaceae	
5	<i>Leucosceptrum cannum</i> Smith.	Ghurpis	Magnoliaceae	NA
6	<i>Lithocarpus pachyphyllus</i> (Kurz) Rehder	Bantey	Fagaceae	
7	<i>Lyonia ovalifolia</i> (Wall.) Drude	Angeri	Rosaceae	NA
8	<i>Machilusedulis</i>	Kawlo	Lauraceae	
9	<i>Magnolia campbellii</i> Hook.f. & Thom.	Ghogey champ	Magnoliaceae	
10	<i>Mahonia sikkimensis</i> Takeda	Kesar	Berberidaceae	NA
11	<i>Quercus lamellosa</i>	Bajranth/Buk	Fagaceae	NA
12	<i>Rhododendro</i> sp.		Ericaceae	
13	<i>Rhododendron arboreum</i> ssp. <i>arboreum</i> (CB Clarke) Ridley	Laligurans	Ericaceae	NA
14	<i>Rhododendron</i> sp.	Korlinga	Ericaceae	
15	<i>Symplocos glomerata</i> King, ex. C.B. Clarke	Kholme	Symplocaceae	NA
16	<i>Symplocos lucida</i> (Thunb.) Siebold & Zucc.	Kharaney	Symplocaceae	NA
17	<i>Zanthoxylum acanthopodium</i> DC	Boke timmur	Rutaceae	
SHRUBS				
1	<i>Berberisaristata</i> DC	Chutro	Berberidaceae	
2	<i>Ilex</i> sp.	Lise	Aquifoliaceae	
3	<i>Osbeckia stellata</i> Buch.-Ham. ex D. Don	Chulesi	Melastomataceae	NA
4	<i>Rosa</i> sp.		Rosaceae	
5	<i>Rubus ellipticus</i> Smith.	Aiselu	Rosaceae	
6	<i>Viburnum erubescence</i> Wall. ex DC	Asarey	Caprifoliaceae	NA
HERBS				
1	<i>Anaphalis</i> sp.	Bukiful	Asteraceae	
2	<i>Arisaemas</i> p	Laura/Banko	Araceae	
3	<i>Artemisia wallichiana</i> Besser	Titeypati	Asteraceae	
4	<i>Berberis</i> sp	Chutro	Berberidaceae	
5	<i>Bidens pilosa</i> Linn.	Kuro	Asteraceae	NA
6	<i>Carex</i> sp.	Harkatto	Cyperaceae	
7	<i>Cynodon dactylon</i> Linn.	Dubo	Poaceae	
8	<i>Elatostema platyphyllum</i> Weddell	Gagleto	Urticaceae	
9	<i>Eragrostis</i> sp.	Banso	Poaceae	

10	<i>Eupatorium adenophorum</i> Spreng.	Kali jhar	Asteraceae	
11	<i>Fragaria nubicola</i> Lindley ex Lacaita	Vui Aiselu	Rosaceae	NA
12	<i>Gaultheriasp</i>	Dhasingre	Ericaceae	
13	<i>Hemiphragma heterophyllum</i> Wall.	Lalgeri	Scrophulariaceae	
14	<i>Oxalis corniculata</i> Linn	Amilojhar	Oxalidaceae	
15	<i>Persicaria capitata</i> (Buch.-Ham. ex D. Don) H. Gross	Ratnaulo	Polygonaceae	
16	<i>Polygonum molle</i> D. Don	Thotney	Polygonaceae	NA
17	<i>Polygonum runcinatum</i> Buch. – Ham. ex D. Don	Ratnaulo	Polygonaceae	
18	<i>Solanum khasianum</i> CB Clarke	Boksikara	Solanaceae	
19	<i>Swertia bimaculata</i> Hooker & Thomson ex C.B. Clarke	Bhaley Chirowto	Gentianaceae	NA
20	<i>Tetrataenium nepalense</i>	Chimping	Apiaceae	
21	<i>Viola sp</i>		Violaceae	
ORCHIDS				
	<i>Cymbidium sp.</i>	Sunakhari	Orchidaceae	
	<i>Pleione sp</i>		Orchidaceae	
EPIPHYTES & CLIMBERS				
1	<i>Agapetes serpens</i> (Wright) Sleumer		Ericaceae	
2	<i>Cissus elongata</i> Roxb.	Charcharey lahara	Vitaceae	
3	<i>Clematis buchananiana</i> DC	Pinasey lahara	Ranunculaceae	
4	<i>Rhapidiphora decursiva</i> (Roxb.) Schott.	Kanchirno	Araceae	NA
5	<i>Rubia manjith</i> Roxb. ex Fleming	Majito	Rubiaceae	
FERN & FERN -ALLIES				
1	<i>Gleichenia gigantean</i> Wall. ex Hook	Kalamey	Gleicheniaceae	
2	<i>Nephrolepis cordifolia</i> (Linn.) C. Presl.	Paniamala	Davalliaceae	NA
3	<i>Selaginellasp</i>		Selaginellaceae	
4	<i>Strobilanthes sp.</i>	Kibughans	Acanthaceae	
BAMBOO				
1	<i>Arundinaria maling</i> Gamble	Malingo	Poaceae	
2	<i>Sinarundinaria intermedia</i>	Nigalo/Titenigalo	Poaceae	

Checklist of Fauna, Avi-Fauna & Butterfly Species recorded in Maniping Reserve, West Sikkim

S. NO	ZOOLOGICAL NAME	COMMON NAME	LOCAL NAME	FAMILY	IUCN STATUS
FAUNA					
1	<i>Dremomys lokriah</i>	Orange-bellied Himalayan squirrel	Lothurke	Sciuridae	LC
2	<i>Macaca mulatta</i>	Rhesus macaque	badhar	Cercopithecidae	LC
3	<i>Muntiacus muntjak</i>	Barking Deer	DareyMirga	Cervidae	LC
4	<i>Paradoxurus hermaphroditus</i>	Asian palm civet		Viverridae	LC
5	<i>Prionailurus bengalensis</i>	Leopard cat	Ningalo	Felidae	LC
6	<i>Sus scrofa</i>	Wild Boar	Bodel	Suidae	LC
7	<i>Ursus thibetanus</i>	Himalayan Black Bear	Ursusthibetanus	Ursidae	LC
8	<i>Vulpes vulpes</i>	Red Fox	Sheyal	Canidae	LC
AVI-FAUNA					
1	<i>Acridotheres tristis</i>	Common Myna	Ruppi	Sturnidae	
2	<i>Actinodura nepalensis</i>	Hoary Barwing		Timaliidae	
3	<i>Aegithalos louschistos</i>	Rufous-fronted Tit	Fista	Paridae	
4	<i>Aethopyga nepalensis</i>	Nepal Sunbird	Kalobalchi	Nectariniidae	
5	<i>Arborophila torqueola</i>	Common Hill Partridge	Peura	Phasianidae	
6	<i>Cissa chinensis</i>	Common Green Magpie		Corvidae	
7	<i>Corvus macrorhyncus</i>	Jungle Crow	Khag	Corvidae	
8	<i>Culicicapa ceylonensis</i>	Grey Headed Canary Flycatcher		Muscicapidae	
9	<i>Dicrurus leucophaeus</i>	Ashy Drongo	Chibey	Dicaeidae	
10	<i>Eumyias thalassinus</i>	Verditer Flycatcher	Hareney	Muscicapidae	
11	<i>Garrulax leucolophus</i>	White Crested Laughing Thrush		Leiothrichidae	
12	<i>Garrulax striatus</i>	Striated Laughing Thrush	Kolkoley	Turdidae	
13	<i>Hypsipetes leucocephalus</i>	Black Bulbull	Jureli	Pycnonotidae	
14	<i>Lophura leucomelanos</i>	Kalij Pheasant	Kalij	Phasianidae	
15	<i>Megalaima virens</i>	Great Barbet	Neual	Megalaimidae	
16	<i>Myiophonus caeruleus</i>	Blue Whistling Laughing Thrush		Muscicapidae	
17	<i>Passer domesticus</i>	House Sparrow	Bhangera	Passeridae	
18	<i>Pycnonotus cafer</i>	Red Vented Bulbull	Jureli	Pycnonotidae	
19	<i>Pycnonotus striatus</i>	Straited Bulbull	Jureli	Pycnonotidae	
20	<i>Stroptopelia orientalis</i>	Oriental Turtle Dove	Dhukur	Columbidae	
21	<i>Yuhina flavicollis</i>	Whiskered Yuhina	Megma	Timaliidae	
22	<i>Yuhina gularis</i>	Striped Throated Yuhina	Megma	Sylviidae	

BUTTERFLY					
1	<i>Argynnischildreni</i>	Large Silverstripe		Nymphalidae	
2	<i>Aglaiscaschmirensis</i>	Indiantortoise shell		Nymphalidae	
3	<i>Cethosiacyane</i>	Lacewing		Nymphalidae	
4	<i>Euremahecabe</i>	Grass Yellow		Pieridae	
5	<i>Heliophorus brahma</i>	Golden Sapphire		Lycaenidae	
6	<i>Notocryptaparalysos</i>	Common Banded Demon		Hesperiidae	
7	<i>Papilioparisparis</i>	Paris Peacock		Papilionidae	
8	<i>Pieris rapae</i>	cabbage white		Pieridae	
9	<i>Vanessa cardui</i>	Painted lady		Nymphalidae	
10	<i>Vanessa indica</i>	Indian Red Admiral		Nymphalidae	
11	<i>Zemerosflegyas</i>	Punchinello		Riodinidae	



Pieris rapae



Aglais caschmirensis



Fulvetta vinipectus



Lophura leucomelanos



Redstart (Female)



Wild dog (Scat)

Mendong Reserve Forest, South Sikkim

Sanjyoti Subba, Sanchi Subba & Sumitra Nepal

INTRODUCTION

Mendong Reserve forest is located in the south district, lying between latitude 27°22'26.5"N to 27°22.59.5"N and longitude 88°25'23.8"E to 88°25'55.2"E and its elevation ranges from 1778 - 2071 m asl. The study is represented of sub-tropical & wet temperate forest of Mendong Reserve Forest, South Sikkim. It is a biologically diverse, undisturbed, virgin reserve forest and famous for its *Oak* species such as *Castanopsis hystrix*, *Castanopsis indica*, *Castanopsis tribuloides*, *Lithocarpus fenestratus* & *Quercus lamellosa*, etc., and many other main vegetation of the reserve forest is represented by *Juglans regia*, *Erythrina arborescens*, *Betula* sp., *Choerospondias axillaris*, *Cryptomeria japonica*, *Exbucklandia populnea*, *Hovenia dulcis*, *Macaranga pustulata*, *Machilus* sp., *Tetradium fraxinifolia*, etc., were dominated in the forest area. The common small tree species of the area includes *Symplocos lucida* & *Symplocos glomerata*, etc.

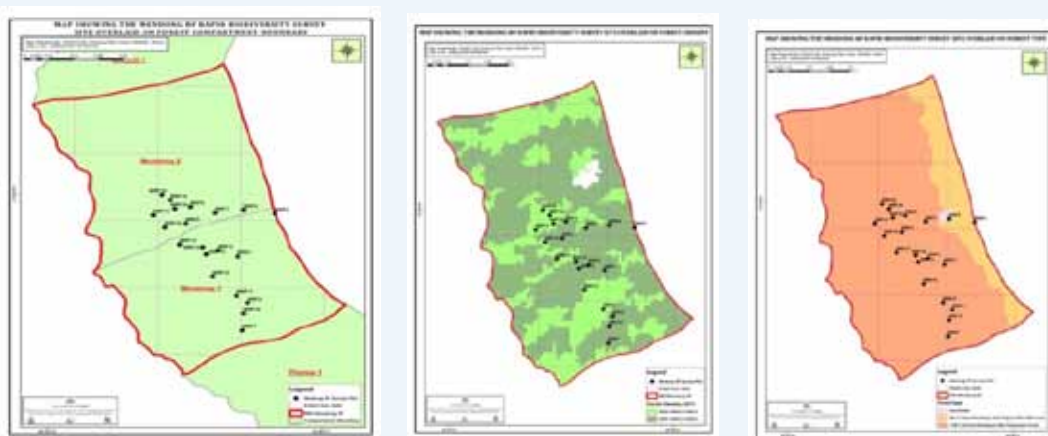
The shrub species like *Osbeckia stellata*, *Strobilanthus wallichii*, *Daphne cannabina*, *Ardisia macrocarpa*, *Viburnum erubescence*, *Rubus ellipticus*, *Oxyspora paniculata*, *Dichroa febrifuga*, *Rubus niveus*, etc., form the dense shrubberies in the forest. The ground floor is covered by herbaceous plant species such as *Biden pilosa*, *Pilea umbrosa*, *Drymaria cordata*, *Oxalis*

corniculata, *Hedychium spicatum*, *Persicaria capitata*, *Fragaria nubicola*, *Swertia bimaculata*, *Centella asiatica*, *Viola* sp., *Hydrocotyle javanica*, *Rohdea nepalensis*, etc. The area also harbors many climber species such as *Rubia cordifolia*, *Tetrastigma serrulatum*, and *Smilax* sp., other fern & fern-allies, mosses and lichens too.

The beauty and diversity of floral species in Sikkim is further enhanced by the diversity of faunal species too. The reserve forest is home to many faunal species, viz., Himalayan Black bear, Wild Boar, Barking Deer, Flying squirrel, Wild dog, and Red fox etc. Due to dense forest provides shelter as well as abundant fruits/feed and as such are good indicator of faunal presence and richness. Mendong Reserve Forest is habitat of Himalayan Black bear.

STUDY AREA

Mendong Reserve forest is located in the south district and its elevation ranges from 1778 - 2071 m asl, sharing its border with Sokpay RF (north), Thunia RF (south), Maenam Wildlife Sanctuary (East) and Paiyong RF (west). This reserve forests is very rich in floral and faunal diversity. The reserve forest showing the aspects of E, N, SE and NE with the slope angle falling between 30 to 70 degree inclinations. The field survey was conducted during December 2017.



Forest compartment boundary, forest density & forest types along the sampling plots of Mendong Reserve Forest, South Sikkim



Laying sampling plots & inventorised the plant species



Wet Temperate Forest & Survey team with forest field staff & EDC president of Mendong Reserve Forest, South Sikkim

FINDINGS AND DISCUSSION

The study identified a total of 106 species in the Mendong Reserve in 20 sampling plots, covering an area of 0.2 ha. Of which 32 tree species belonging to 27 genera and 19 families were recorded. Similarly, 8 species of shrubs belonging to 8 genera and 5 families, 42 herb species (32 genera & 20 families), 12 climbers & epiphytes (10 genera & 10 families) and 12 fern and fern-allies (12 genera & 9 families) were inventoried in entire the sampling plots. Diversity of vegetation was found most in case of the ground flora in comparison to tree and shrubs, which are listed in the below table.

In the forest density (dense) forest, randomly laid (1-10 & 13-14) sampling plots and other remaining sampling plots were randomly laid for moderate dense forest. However, in the forest types, the sampling plots (8-9) were randomly laid in the sub-tropical forest and other remaining was in the wet temperate forest. Along the sub-tropical region, the tree species widely distributed are *Alnus nepalensis*, *Juglans regia*, *Macaranga denticulata*, *M. pustulata*, *Choerospondias axillaris*, etc.

The wet temperate mixed forest comprises of evergreen tree species viz., *Castanopsis hystrix*, *Castanopsis indica*, *Castanopsis tribuloides*, *Lithocarpus fenestratus* & *Quercus lamellosa* which is a biologically diverse reserve forest which are completely covered by the moss and the large numbers of epiphytes especially orchid were recorded along the sampling plot. The ground is densely covered by the herbs, ferns & fern-allies, climber, lianas, etc. Whereas the humus depth content is very high and the ground always remains moist. Forest compartment boundary, randomly laid 1-4 and 10-15 random sampling plots for compartment 1 and other remaining sampling plots such as 5-9 and 16-20 for compartment 2. One bamboo species (flowering stages) were recorded along the sampling plots.

SIGNIFICANCE OF THE RESERVE FOREST

1. *Schizostachyum munroi* (Gopay Bans) -Habitat
2. *Angiopteris indica* , *Histiopteris incise*, *Monachosorum henryi* was encountered



Schizostachyum munroi (Gopay Bans)



Angiopteris indica (G. Forster) Hoffmann (Marattiaceae)

Schizostachyum munroi (Gopay Bans) was encountered in Mendong Reserve Forest, South Sikkim. *S. munroi* is commonly used for making flute by local people in Sikkim.

Angiopteris indica species is ethno botanically important species found in reserve forest, found growing at elevation 1894 m asl with mixed tree species under the canopy of *Magnolia* species and with the common shrub species viz., *Viburnum erubescence*, *Polygonum molle*, *Dichroa febrifuga* & *Rubus* sp., etc. This fern species is medicinally used for treatment of diarrhoea and headache by the local people especially by the Lepcha tribes in Dzongu, North Sikkim. Since the early days in Dzongu, the rhizome part is used to make bread and consumed by the local Lepcha tribes.



Histiopteris incisae



Monachosorum henryi

Site Characteristics of the sampling plots of Mendong Reserve Forest, South Sikkim

Site Code	Forest types	Altitude (m) asl	Coordinates		Slope Angle (°)	Slope Aspect	Humus depth (cm)	Disturbance	
			Lat	Long				Anthropogenic	Natural
MRF1	Wet temperate forest	2035	27°22'26.5"	88°25'43.0"	70	SE	2		Natural
MRF2	Wet temperate forest	2010	27°22'.33.1"	88°25.44.2"	60	N	1		Natural
MRF3	Wet temperate forest	1958	27°22'44.4"	88°25.42.2"	50	SE	0.5		Natural
MRF4	Wet temperate forest	1971	27°22'45.9"	88°25'37.9"	40	E	1	Fodder collection	
MRF5	Wet temperate forest	1993	27°22'52.5"	88°25'30.9"	40	S	1	Fuel wood	
MRF6	Wet temperate forest	1995	27°22'56.5"	88°25'32.0"	60	E	1		Natural
MRF7	Wet temperate forest	1944	27°22'55.0"	88°25'37.4"	60	S	0.5		Natural
MRF8	Sub-tropical forest	1894	27°22'55.6"	88°25'43.6"	50	E	1		Natural

MRF9	Sub-tropical forest	1778	27°22'55.5"	88°25'55.2"	50	N	1		Natural
MRF10	Wet temperate forest	2048	27°22'30.6"	88°25'43.3"	50	E	0.5		Natural
MRF11	Wet temperate forest	2053	27°22'34.9"	88°25'41.8"	30	E	0.5		Natural
MRF12	Wet temperate forest	2060	27°22'39.6"	88°25'36.7"	60	N	1		Natural
MRF13	Wet temperate forest	2057	27°22'45.0"	88°25'35.3"	60	S	0.5		Natural
MRF14	Wet temperate forest	2052	27°22'46.7"	88°25'34.6"	70	N	1		Natural
MRF15	Wet temperate forest	2059	27°22'47.4"	88°25'29.5"	70	E	0.5		Natural
MRF16	Wet temperate forest	2056	27°22'51.6"	88°25'26.3"	40	N	0.5		Natural
MRF17	Wet temperate forest	2071	27°22'54.6"	88°25'23.8"	40	N	0.5		Natural
MRF18	Wet temperate forest	2065	27°22'59.5"	88°25'25.8"	45	N	1		Natural
MRF19	Wet temperate forest	2041	27°22'58.2"	88°25'27.6"	45	NE	1		Natural
MRF20	Wet temperate forest	2040	27°22'56.1"	88°25'28.6"	30	E	1		Natural

Checklist of floral species of Mendong Reserve forest in South Sikkim

	BOTANICAL NAME	LOCAL NAME	FAMILY	Altitudinal Ranges	IUCN Status
	TREE				
1	<i>Alnus nepalensis</i> Don.	Utis	Betulaceae	200-2800	LC
2	<i>Beilschmiedia sikkimensis</i> King ex Hook. f.	Tarsing	Lauraceae	300-2400	NA
3	<i>Brassaiopsis mitis</i> C.B.Clarke		Araliaceae		
4	<i>Castanopsis hystrix</i> Hook. & Thomson ex. A. DC.	Patley katush	Fagaceae	1600-1600	NA
5	<i>Castanopsis tribuloides</i> (Smith) A. DC	musre Katush	Fagaceae	450-2300	NA
6	<i>Castanopsis indica</i> (Roxb. ex Lindl.) A.DC.	Dalney katus	Fagaceae	1500-1500	NA
7	<i>Cryptomeria japonica</i> (Thunberg ex. Linn. F.) D. Don	Dhupi	Taxodiaceae	1100-2500	NT
8	<i>Choerospondias axillaris</i> (Roxb.) B.L.Burt & A.W.Hill	Lapsi	Anacardiaceae	900-2500	NA
9	<i>Daphniphyllum himalayense</i> (Benth.)	Lal Chandan	Euphorbiaceae	1200-2500	NA
10	<i>Echinocarpus dasycarpus</i> Benth.	Gobre	Elaeocarpaceae		
11	<i>Elaeocarpus lanceifolius</i> Roxb.	Bhadrasay	Elaeocarpaceae	1800-2500	NA
12	<i>Engelhardtia spicata</i> Lechen ex Blume.	Mauwa	Juglandaceae	500-2100	LC
13	<i>Eurya acuminata</i> DC.	Jhingni	Theaceae	700-3000	NA

14	<i>Exbucklandia populnea</i> (R. Br. Ex Griff) R. W. Br	Piplee	Hamamelidaceae	1200-2000	NA
15	<i>Juglans regia</i> Linn.	Okhar	Juglandaceae	500-1800	LC
16	<i>Lithocarpus pachyphyllus</i> (Kurz) Rehder		Fagaceae		
17	<i>Lyonia ovalifolia</i> var. <i>ovalifolia</i>	Angeri	Ericaceae	200-3400	NA
18	<i>Macaranga denticulata</i> (Blume) Müll.Arg.	Malata	Euphorbiaceae	100-1300	NA
19	<i>Machilus</i> sp.	Kawlo	Lauraceae	1700-2000	
20	<i>Maesa</i> sp.	Bilauney	Myrtaceae		
21	<i>Magnolia velutina</i> DC.	Phusrey champ	Magnoliaceae	1500-2400	NA
22	<i>Magnolia doltsopa</i> (Buch.-Ham. ex DC.) Figlar	Ranichamp	Magnoliaceae	1500-2400	
23	<i>Meliosma arnottiana</i> (Wight) Walp.	Dabdabey	Sabiaceae	500-2000	NA
24	<i>Nyssa javanica</i> (Blume) Wangerin	Lek chilauney	Cornaceae	100-2500	NA
25	<i>Persea odoratissima</i> (Nees) Kosterm.	Kawlo	Lauraceae	1500-2100	NA
26	<i>Pyralia edulis</i> (Wall.) A. DC.	Amphi	Santalaceae	1700-1700	NA
27	<i>Quercus lamellosa</i> Sm.	Buk	Fagaceae	1600-2800	NA
28	<i>Rhus chinensis</i> Mill.	Bhakimlo	Anacardiaceae		NA
29	<i>Rhus succedanea</i> Linn.	Rani bhalayo	Anacardiaceae		NA
30	<i>Symplocos glomerata</i> King ex C.B. Clarke	Kholme	Symplocaceae	1200-2700	NA
31	<i>Symplocos lucida</i> (Thunb.) Siebold & Zucc	Kharane	Symplocaceae	1500-3000	NA
32	<i>Tetradium fraxinifolium</i> (Hook. f.) T.G. Hartley	Khanakpa	Rutaceae	1200-2500	NA
SHRUB					
1	<i>Ardisia macrocarpa</i> Wall.	Damaiphal	Myrsinaceae	1500-2400	NA
2	<i>Daphne cannabina</i> Wall	Kalo argeli	Thymeleaceae	1900-2700	NA
3	<i>Dichroa febrifuga</i> Lour.	Basak	Hydrangaceae	200-2000	NA
4	<i>Osbeckia stellata</i> Buch.-Ham. ex D. Don	Chulesi	Melastomataceae	200-2300	NA
5	<i>Oxyspora paniculata</i> (D. Don) DC	Chulesee	Melastomataceae	500-2000	NA
6	<i>Rubus ellipticus</i> Sm.	Aiselu	Rosaceae	1000-2600	NA
7	<i>Strobilanthus wallichii</i> Nees.	Kibu	Thymeleaceae	2700-3600	NA
8	<i>Viburnum erubescence</i> Wall. ex D	Asarey	Adoxaceae	1400-3950	NA
HERB					
1	<i>Anaphalis triplinervis</i> (Sims) Sims ex C. B. Clarke		Compositae		
2	<i>Arisaema intermedium</i> Blume	Larua/Banko	Araceae	2600-3400	NA
3	<i>Artemisia vulgaris</i> L.	Titey pate	Compositae	1500-3800	NA
4	<i>Astilbe rivularis</i> Buch.-Ham. ex D. Don	Budi okhati	Saxifragaceae	900-3200	NA
5	<i>Ageratina adenophorum</i> Spreng.	Gagleto	Poaceae	1500-2500	
6	<i>Begonia rubella</i> Buch.-Ham. ex D. Don	Magarkachi	Begoniaceae	1000-1900	NA
7	<i>Begonia</i> sp.	Magarkachi	Begoniaceae		
8	<i>Bidens pilosa</i> Linn.	Kuro	Asteraceae	200-1900	NA

9	<i>Carex</i> sp.	Harkatto	Cyperaceae	1500-2000	
10	<i>Carex baccans</i> Nees	Harkatto	Cyperaceae	200-2700	LC
11	<i>Commelina benghalensis</i> Linn.	Kaney jhar	Commelinaceae	2300-2300	
12	<i>Craniotome furcata</i> (Link) Kuntze		Lamiaceae	900-3200	NA
13	<i>Cyathula capitata</i> Moq.		Amaranthaceae	1700-2300	NA
14	<i>Cyperus eragrostis</i> Lam	Harkatto	Cyperaceae	200-1000	LC
15	<i>Cyperus scariosus</i> R.Br.	Harkatto	Cyperaceae	200-1500	NA
16	<i>Digitaria</i> sp.	Banso	Poaceae		
17	<i>Elatostema platyphyllum</i> Weddell.	Gagleto	Urticaceae	700-1900	NA
18	<i>Elatostema sessile</i> J.R.Forst. & G.Forst.	Galato	Urticaceae	1000-1700	NA
19	<i>Eragrostis</i> sp.				
20	<i>Fragaria nubicola</i> Lindley ex Lacaita	Vui Aiselu	Rosaceae	2500-3900	NA
21	<i>Gerardiana diversifolia</i> (Link) Friis	Bhangre sisnu	Urticaceae	300-2800	NA
22	<i>Globba sessiliflora</i> Sims	Sara	Zingiberaceae	1700-2300	LC
23	<i>Hedychium spicatum</i> Smith	Sara	Zingiberaceae	1800-2800	NA
24	<i>Hemiphragma heterophyllum</i> Wall.		Plantaginaceae	2600-4100	NA
25	<i>Heracleum wallichii</i> DC	Chimphing	Apiaceae	1900-2700	NA
26	<i>Impatiens arguta</i> Hook.f. & Thomson	Mujuro	Balsaminaceae	1800-3200	NA
27	<i>Impatiens dolichoceras</i> Pritz. ex Diels	Mujuro	Balsaminaceae	1200-2100	NA
28	<i>Impatiens latiflora</i> Hook.f. & Thomson	Mujuro	Balsaminaceae	1200-2100	NA
29	<i>Impatiens</i> sp.		Balsaminaceae		
30	<i>Impatiens stenantha</i> Hook.f.	Mujuro	Balsaminaceae	2400-3000	NA
31	<i>Laportea terminalis</i> Wight.	Patle sisnu	Urticaceae	1900-3300	NA
32	<i>Oxalis corniculata</i> Linn	Amilo jhar	Oxalidaceae	1500-2500	NA
33	<i>Persicaria capitata</i> (Buch.Ham.ex D.Don) Gross	Ratneulo	Polygonaceae	1200-2200	NA
34	<i>Persicaria nepalensis</i> (Meisn.) Miyabe	Ratneulo	Polygonaceae	1200-3500	NA
35	<i>Pilea umbrosa</i> Wall. ex Blume	Chipley ghans	Urticaceae	1200-2500	NA
36	<i>Polygonatum</i> sp.		Asparagaceae		
37	<i>Polygonum molle</i> D. Don	Thotney	Polygonaceae	1200-3400	NA
38	<i>Rohdea nepalensis</i> (Raf.) N.Tanaka	Janglee Nakima	Asparagaceae	1500-2000	NA
39	<i>Rubus niveus</i> Thunb.		Rosaceae	500-2800	NA
40	<i>Rumex nepalensis</i> Sprengel	Halhalley	Polygonaceae	1000-4300	NA
41	<i>Selinum</i> sp.		Apiaceae		
42	<i>Swertia bimaculata</i> (Siebold & Zucc.) Hook. f. & Thomson ex C.B. Clarke	Chirito	Gentianaceae	200-3500	NA
	CLIMBER & EPIPHYTES				
1	<i>Clematis</i> sp.		Ranunculaceae		

2	<i>Crawfordia speciosa</i> C.B.Clarke		Gentianaceae	1900-2600	NA
3	<i>Herpetospermum pedunculatum</i> (Seringe.) C.B. Clarke	Ban karela	Cucurbitaceae	2300-2500	NA
4	<i>Piper boechmeriaefolium</i> (Miq.) DC.	Chambo	Piperaceae	1000-2700	NA
5	<i>Rhaphidophora decursive</i> (Roxb.) Scott	Kanchirna	Araceae	2000	NA
6	<i>Rhaphidophora</i> sp.	Kanchirna	Araceae		
7	<i>Rubia cordifolia</i> L	Manjith	Rubiaceae	300-2800	NA
8	<i>Smilax</i> sp	Kukur diney	Smilacaceae		
9	<i>Smilax zeylanica</i> Linn	Kukur daimey	Liliaceae	600-1700	NA
10	<i>Stephania</i> sp.	Tamarkey	Menispermaceae	1500-2300	NA
11	<i>Tetragium serrulatum</i> (Roxb.) Planch	Charchary Lahara	Vitaceae	1800-2500	NA
12	<i>Trichosanthes lepiniana</i> (Naudin) Cogn.	Inderani	Cucurbitaceae	700-2000	NA
FERNS & FERN-ALLIES					
1	<i>Asplenium lacinatedum</i> D.Don		Aspleniaceae	1000-2500	NA
2	<i>Angiopteris indica</i> (G. Forster) Hoffmann		Marattiaceae		
3	<i>Dicranopteris</i> sp.	Sottar	Gleicheniaceae		
4	<i>Diplazium</i> sp.	Sauney ningro	Athyriaceae		
5	<i>Diplopterygium giganteum</i> Wall. ex Hook		Gleicheniaceae	800-2800	NA
6	<i>Huperzia</i> sp.		Lycopodiaceae		
7	<i>Lycopodium japonicum</i> Thunb.	Nagbelli	Lycopodiaceae		
8	<i>Plagiogyria pycnophylla</i> (Kunze) Mett		Plagiogyriaceae		
9	<i>Selaginella</i> sp.		Selaginellaceae	2500	NA
10	<i>Monachosorum henryi</i> H. Christ		Dennstaedtiaceae	1800-2600	NA
11	<i>Histiopteris incisa</i> (Thunb.) J. Sm.		Dennstaedtiaceae		
12	<i>Drynaria propinqua</i> (wall. ex mett.) J. Sm.		Polypodiaceae	1600-2400	NA

FAUNA

During the survey, 5 species of fauna were recorded from Mendong Reserve Forest. Further, a total of 21 bird species belonging to 14 families were recorded. The family-wise bird species composition were recorded for Turdidae & Corvidae (3 species each) followed by Dicaeidae, Paridae, Phasinidae (2 species each) from this particular transect. The other remaining family represented by single species showed in table.

Checklist of fauna & avifauna species were encountered at Mendong Reserve Forest.

Sl. No	Scientific Name	Family	Common Name	Local Name	Evidences (Direct & indirect)
	FAUNA				
	<i>Muntiacus muntjak</i>	Cervidae	Barking deer	Mirga	Pellet
	<i>Ursus thibetanus</i>	Carnivora	Himalayan Black bear	Bhalu	Scat
	<i>Cuon alpinus</i>	Carnivora	Wild dog	Ban kukur	Scat
	<i>Sus scrofa</i>	Suidae	Wild Boar	Bodyal	Scat
	<i>Canis sp</i>	Carnivora	Common Jackal	Syall	Scat
	AVI-FAUNA				
	<i>Aegoithalos louschistos</i>	Paridae	Rufous-fronted Tit	Fista	Direct Sighting
	<i>Cettia major</i>	Sylviidar	Chestnut Crowned Warbler	Fista	Direct Sighting
	<i>Fulvetta vinipectus</i>	Paridae	Coal Tit	Fista	Direct Sighting
	<i>Corvus macrorhyncus</i>	Corvidae	Jungle Crow	Khag	Direct Sighting
	<i>Cuculus canorus</i>	Cuculidae	Eurassian	Cuckoo	Direct Sighting
	<i>Dicrurus leucophaeus</i>	Dicaeidae	Ashy Drongo	Chibey	Direct Sighting
	<i>Dicrurus macrocercus</i>	Dicaeidae	Black Drongo	Chibey	Direct Sighting
	<i>Garrulax leucolophus</i>	Turdidae	White-crested Laughingthrush	Kolkoley	Direct Sighting
	<i>Garrulax ocellatus</i>	Turdidae	Spotted Laughing Thrush	Kolkoley	Direct Sighting
	<i>Gypaetus barbatus</i>	Accipitridae	Lammergeier	Chill	Direct Sighting
	<i>Lophura leucomelana</i>	Phasinidae	Kalij pheasant	Kalij	Direct Sighting
	<i>Megalaima virens</i>	Megalaimidae	Great Barbet	Neual	Direct Sighting
	<i>Myophonus caeruleus</i>	Turdidae	Blue Whistling Thrush	Kalchura	Direct Sighting
	<i>Passer rutilans</i>	Passeridae	Russet Sparrow	Bhangera	Direct Sighting
	<i>Pycnonotus cafer</i>	Pycnonotidae	Red Vented Bulbull	Jureli	Direct Sighting
	<i>Streptopelia orientails</i>	Columbidae	Oriental Turtle Dove	Dhukur	Direct Sighting
	<i>Urocissa ornata</i>	Corvidae	Yellow Billed Blue Magpie	Lampucharey	Direct Sighting
	<i>Corvus macrorhyncus</i>	Corvidae	Large billed Crow	Kag	Direct Sighting

	<i>Arborophila torqueola</i>	Phasinidae	Hill Partridge	Peura	Direct Sighting
	<i>Aethopyga ignicauda</i>	Nectariniidae	Fire-tailed sunbird	Balchi	Direct Sighting
	<i>Cissa chinensis</i>	Corvidae	Common Green Magpie	Lampucharey	Direct Sighting

CONSERVATION RECOMMENDATION AND CONCLUSIONS

According to the survey, the area is natural, undisturbed and virgin forest. More field exploration in unexplored area to check the availability of species. Hence, it is concluded that the area is rich biological diversity and less anthropogenic foot print in the forest.

Nambu Reserve Forest, West Sikkim

Sanjyoti Subba, Sanchi Subba & Sumitra Nepal



Overview of Reserve Forest

INTRODUCTION

Nambu Reserve Forest can be categorized into three types of forest viz., sub-tropical, wet temperate forest to moist mixed coniferous forest in West Sikkim. It is a biologically diverse reserve forest, the main vegetation of the reserve forest is represented by *Schima wallichii*, *Duabanga sonneratiodes*, *Jambosa formosa*, *Juglans regia*, *Erythrina arborescens*, *Betula* sp., *Choerospondias axillaris*, *Cryptomeria japonica*, *Exbucklandia populnea*, *Hovenia dulcis*, *Macaranga pustulata*, *Machilus* sp., *Tetradium fraxinifolia*, etc., were dominated in the forest area. The forest is dominated by *Oak* species such as *Castanopsis hystrix*, *Castanopsis indica*, *Castanopsis tribuloides*, *Lithocarpus fenestratus* & *Quercus lamellosa*, etc., and The common small tree species viz., *Symplocos lucida* & *Symplocos glomerata*, etc.

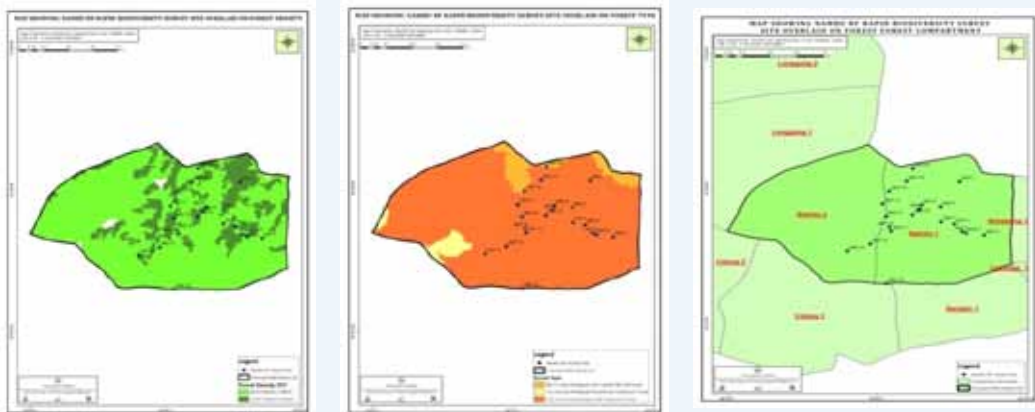
The forest form the dense shrubberies of *Osbeckia stellata*, *Strobilanthus wallichii*,

Daphne cannabina, *Ardisia macrocarpa*, *Viburnum erubescence*, *Rubus ellipticus*, *Oxyspora paniculata*, *Dichroa febrifuga*, *Dobinea vulgaris*, *Viburnum cylindricum*, etc., in the forest. The ground floor is covered by herbaceous plant species such as *Biden pilosa*, *Pilea umbrosa*, *Drymaria cordata*, *Oxalis corniculata*, *Hedychium spicatum*, *Persicaria capitata*, *Fragaria nubicola*, *Swertia bimaculata*, *Centella asiatica*, , *Viola* sp., *Hydrocotyle javanica*, *Rubus calycinus*, *Myriactis nepalensis*, *Lysionotus serratus*, *Isodon* sp., *Persicaria chinensis*, *Persicaria nepalensis*, *Himalaiella deltoidea*, *Cyathula capitata*, *Craniotome furcata*, *Codonopsis gracilis*, *Rohdea nepalensis*, *Rubus niveus*, *Swertia bimaculata*, etc. The area also harbors many climber species such as *Clematis* sp., *Rubia cordifolia*, *Tetrastigma serrulatum*, *Smilax* sp., other ferns and fern-allies, mosses, and lichens too.

Similarly, the reserve forest is home to many faunal, avi-faunal and butterfly species, viz., Himalayan Black bear, Wild Boar, Barking Deer, Flying squirrel, Wild dog, and Red fox etc.. As per the forest density like moderate and dense forest provides shelter for faunal species. It is a good indicator of faunal presence and richness in the forest. Nambu Reserve Forest is habitat of Himalayan Black bear.

STUDY AREA

Nambu Reserve forest is located in the west district, lying between latitude 27°17'16.0"N to 27°18'14.0"N and longitude 88°09'00.9"E to 88°09'55.8"E, its elevation ranges from 1964 - 2191 m asl, sharing its border with Lunggang RF (north), Bangtim RF (south), Cidang RF (west) and Sengbeng RF (east) over the Nambu khola in the Western Sikkim. This reserve forests are very rich in floral and faunal diversity. The reserve forest showing the aspects of E, N and NE with the slope angle falling between 5 to 70 degree inclinations. The field survey was conducted during November 2017.



Forest compartment boundary, forest density & forest types along the sampling plots of Nambu Reserve Forest, West Sikkim



Laying sampling plots & Measuring CBH at Nambu Reserve Forest, West



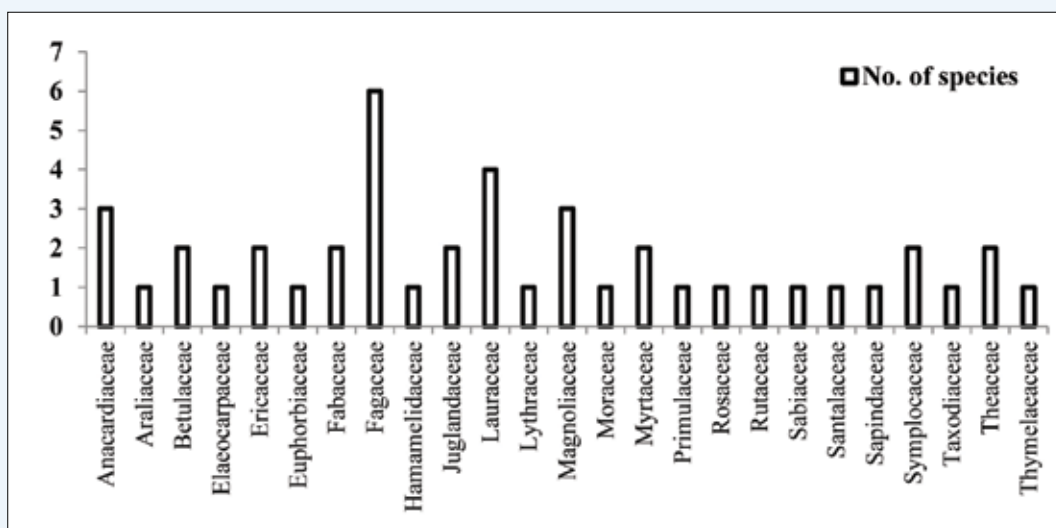
Inventory of plant species at Nambu Reserve Forest, West Sikkim

FINDINGS AND DISCUSSION

The study revealed a total of 128 species were recorded in 20 sampling plots, covering an area 0.2 ha, of Nambu Reserve Forest, West Sikkim. Of which 44 tree species belonging to 37 genera and 25 families were recorded. The tree species in the forest was dominated by the Fagaceae (6 species each) followed by Lauraceae (4 species), Anacardiaceae & Magnoliaceae (3 species each), respectively. Similarly, 10 species of shrubs belonging to 9 genera and 8 families, 52 herb species (41 genera & 23 families), 13 climbers & epiphytes (11 genera & 11 families) and 9 ferns and fern-allies (9 genera & 8 families) were inventoried in entire the sampling plots. Diversity of vegetation was found most in case of the ground flora in comparison to tree and shrubs.

Distribution of floral species recorded in Nambu Reserve Forest, West Sikkim.

Habit	Species	Genera	Family
Tree	44	37	25
Shrub/Scrub	10	9	8
Herb	52	41	23
Fern/Fern-allies	9	9	8
Climber/Epiphyte	13	11	11
Total	128	107	75



Family-Wise species composition of Nambu Reserve Forest, West Sikkim

SIGNIFICANCE OF THE RESERVE FOREST

1. Over 15 orchid species diversity
2. Maximum number of butterflies were recorded
3. *Piper pedicellatum* – Habitat (In India, this species is only found in Arunachal Pradesh & Sikkim)

ORCHID

15 Orchids species belonging to 11 genera were recorded during the survey period of which some of the species that had fully blooming and some other was in vegetative stage were recorded. The conservation of epiphytic plants especially the orchid play an important role for the forest ecology and preserving the diversity of epiphytes makes evergreen forest and healthy ecosystem.

Checklist of orchid species of Nambu Reserve Forest, West Sikkim

Sl. No	Botanical Name
	<i>Agrostophyllum callosum</i> Rchb.f
	<i>Bulbophyllum</i> sp.
	<i>Coelogyne fuscescens</i> Lindl.
	<i>Coelogyne</i> sp.
	<i>Cymbidium cochleare</i> Lindl.
	<i>Cymbidium erythraeum</i> Lindl.
	<i>Dendrobium longicornu</i> Lindl.
	<i>Eria coronaria</i> (Lindl.) Rehb.f.
	<i>Gastrochilus acutifolius</i> (Lindl.) Kunze
	<i>Gastrochilus inconspicuus</i> (Hook.f.) Kuntze
	<i>Liparis</i> sp.
	<i>Otochilus fuscus</i> Lindl.
	<i>Pleione humilis</i> (Sm.) D. Don
	<i>Pleione praecox</i> (pink) (Smith) D. Don
	<i>Vanda</i> sp.

Piper pedicellatum species was recorded in Nambu Reserve Forest at 1980 m asl, latitude 27°18'14.0"N & Longitude 88°09'13.3" E, along the sampling plot . In India, this species is only found in Arunachal Pradesh & Sikkim. Significance of this species revealed that the leaves and stems are good vegetables and the fruits and leaves are used to treat internal body pain, fevers and colds by tribal communities in Arunachal Pradesh. *Piper pedicellatum* is a promising non-timber forest product which helps in enhancing forest productivity in moist tropical and sub-tropical forest areas. This species is unexplored in Sikkim but good demand in Arunachal Pradesh.



Piper pedicellatum (Fruiting stages & Habitat) *Cymbidium erythraeum* Lindl



Ophiorrhiza mungos



Persicaria chinensis

FRUITING STAGE OF CLIMBER SPECIES



Trichosanthes lepiniana (Naudin) Cogn



Dactylicapnos scandens (D. Don) Hutch

Site Characteristics of the sampling plots of Nambu Reserve Forest, West Sikkim

Site Code	Forest types	Altitude (m) asl	Coordinates	Slope Angle (°)	Slope Aspect	Humus depth (cm)	Disturbance
			Lat (N) Long (E)				Anthropogenic Natural
NRF1	Wet Temperate forest	1964	27°18'07.9" N 88°09'32.0" E	30	E	2	Natural
NRF2	Wet Temperate forest	2065	27°17'56.7" N 88°09'24.2" SE	30	SE	1	Natural
NRF3	Wet Temperate forest	2166	27°17'49.4" N 88°09'29.7" NE	30	NE	2	Natural
NRF4	Wet Temperate forest	2160	27°17'44.2" N 88°09'41.6" E	50	E	1	Natural
NRF5	Wet Temperate forest	2182	27°17'45.3" N 88°09'34.3" NE	60	NE	1	Natural
NRF6	Wet Temperate forest	2190	27°17'45.9" N 88°09'32.7" N	50	N	1	Natural
NRF7	Wet Temperate forest	2157	27°17'50.5" N 88°09'24.4" NE	60	NE	0.5	Natural
NRF8	Wet Temperate forest	2150	27°17'57.6" N 88°09'16.6" SW	60	SW	2	Natural
NRF9	Wet Temperate forest	2169	27°17'55.8" N 88°09'15.6" NE	30	NE	0.5	Fodder collection
NRF10	Wet Temperate forest	2163	27°17'53.6" N 88°09'12.9" NE	60	NE	1	Natural
NRF11	Wet Temperate forest	2165	27°17'46.4" N 88°09'04.3" N	60	N	1	Natural
NRF12	Wet Temperate forest	2191	27°17'40.8" N 88°09'55.8" S	60	S	1	Natural
NRF13	Wet Temperate forest	2170	27°17'37.6" N 88°09'46.6" W	50	W	1	Natural
NRF14	Wet Temperate forest	2153	27°17'48.2" N 88°09'03.6" SE	60	SE	2	Natural
NRF15	Wet Temperate forest	2128	27°17'53.0" N 88°09'02.4" NE	60	NE	1	Natural
NRF16	Wet Temperate forest	2097	27°17'16.0" N 88°09'01.5" NE	60	NE	3	Natural
NRF17	Wet Temperate forest	2039	27°17'58.2" N 88°09'00.9" E	40	E	1	Natural
NRF18	Wet Temperate forest	1999	27°18'03.8" N 88°09'03.7" SW	60	SW	2	Natural
NRF19	Wet Temperate forest	1988	27°18'08.3" N 88°09'10.7" N	60	N	2	Natural
NRF20	Sub-tropical Forest	1980	27°18'14.0" N 88°09'13.3" SW	50	SW	2	Natural

Checklist of floral species of Nambu Reserve forest in West Sikkim

SL. No	BOTANICAL NAME	LOCAL NAME	FAMILY	Altitudinal ranges (m) asl	IUCN status
	TREE				
1	<i>Acer campbellii</i> Hook.f. & Thomson ex Hiern	Kapasey	Sapindaceae	1800-2700	LC
2	<i>Actinodaphne sikkimensis</i> Meisn	Sisi	Lauraceae	1700-1700	NA
3	<i>Albizia procera</i> Benth.	Seto siris	Fabaceae		
4	<i>Alnus nepalensis</i> Don.	Utis	Betulaceae	200-2800	LC
5	<i>Beilschmiedia sikkimensis</i> King ex Hook. f.	Tarsing	Lauraceae	300-2400	NA
6	<i>Brassaiopsis mitis</i> C.B.Clarke		Araliaceae		
7	<i>Betula cylindrostachya</i> Lindl. ex Wall.	Saur	Betulaceae	1400-2800	LC
8	<i>Castanopsis hystrix</i> Hook. & Thomson ex. A. DC.	Patley katush	Fagaceae	1600-1600	NA
9	<i>Castanopsis tribuloides</i> (Smith) A. DC	musre Katush	Fagaceae	450-2300	NA
10	<i>Castanopsis indica</i> (Roxb. ex Lindl.) A.DC.	Dalney katus	Fagaceae	1500-1500	NA
11	<i>Choerospondias axillaris</i> (Roxb.) B.L.Burtt & A.W.Hill	Lapsi	Anacardiaceae	900-2500	NA
12	<i>Cryptomeria japonica</i> (Thunberg ex. Linn. F.) D. Don	Dhupi	Taxodiaceae	1100-2500	NT
13	<i>Duabanga grandiflora</i> (DC.) Walp.	Lampate	Lythraceae		
14	<i>Elaeocarpus lanceifolius</i> Roxb.	Bhadrasay	Elaeocarpaceae	1800-2500	NA
15	<i>Engelhardtia spicata</i> Lechen ex Blume.	Mauwa	Juglandaceae	500-2100	LC
16	<i>Erythrina arborescens</i> Roxb.	Phalado	Fabaceae	400-2100	NA
17	<i>Eurya acuminata</i> DC.	Jhingni	Theaceae	700-3000	NA
18	<i>Exbucklandia populnea</i> (R. Br. Ex Griff) R. W. Br	Piplee	Hamamelidaceae	1200-2000	NA
19	<i>Ficus nemarolis</i> Wall.	Dudhilo	Moraceae		
20	<i>Hovenia dulcis</i> Thunb.	Bangi	Thymelaeaceae		
21	<i>Jambosa formosa</i> (Wall.) G. Don.	Ambakey	Myrtaceae		
22	<i>Juglans regia</i> L.	Okhar	Juglandaceae	500-1800	LC
23	<i>Lithocarpus fenestratus</i> (Roxb.) Rehde	Arkowlo	Fagaceae		
24	<i>Lithocarpus pachyphyllus</i> (Kurz) Rehder		Fagaceae		
25	<i>Lyonia ovalifolia</i> var. <i>ovalifolia</i>	Angeri	Ericaceae	200-3400	NA
26	<i>Macaranga denticulata</i> (Blume) Müll.Arg.	Malata	Euphorbiaceae	100-1300	NA
27	<i>Machilus</i> sp.	Kawlo	Lauraceae	1700-2000	
28	<i>Maesa</i> sp.	Bilauney	Myrtaceae		
29	<i>Magnolia cathcartii</i> (Hook. f. & Thomson) Noot.	Titey champ	Magnoliaceae	1400-2700	LC
30	<i>Magnolia velutina</i> DC.	Phusrey champ	Magnoliaceae		
31	<i>Magnolia doltsopa</i> (Buch.-Ham. ex DC.) Figlar	Ranichamp	Magnoliaceae	1500-2400	
32	<i>Meliosma arnottiana</i> (Wight) Walp.	Dabdabey	Sabiaceae		

33	<i>Myrsine semiserrata</i> Wall	Phalame	Primulaceae	500-2700	NA
34	<i>Persea odoratissima</i> (Nees) Kosterm.	Kawlo	Lauraceae	1500-2100	NA
35	<i>Prunus bracteopadus</i> Koehne	Arupatey	Rosaceae	1700-2000	NA
36	<i>Pyralaria edulis</i> (Wall.) A. DC.	Amphi	Santalaceae	1700-1700	NA
37	<i>Quercus lamellosa</i> Sm.	Buk	Fagaceae	1600-2800	NA
38	<i>Rhododendron arboreum</i> Sm.	Guras	Ericaceae	1800-3000	NA
39	<i>Rhuschinensis</i> Mill.	Bhakimlo	Anacardiaceae		NA
40	<i>Rhus succedanea</i> Linn.	Rani bhalayo	Anacardiaceae		NA
41	<i>Schima wallichii</i> Choisy	Chilaune	Theaceae	800-1800	NA
42	<i>Symplocos glomerata</i> King ex C.B. Clarke	Kholme	Symplocaceae	1200-2700	NA
43	<i>Symplocos lucida</i> (Thunb.) Siebold & Zucc	Kharane	Symplocaceae	1500-3000	NA
44	<i>Tetradium fraxinifolium</i> (Hook. f.) T.G. Hartley	Khanakpa	Rutaceae	1200-2500	NA
SHRUB					
1	<i>Ardisia macrocarpa</i> Wall.	Damai phal	Myrsinaceae	1500-2400	NA
2	<i>Daphne cannabina</i> Wall	Kalo argeli	Thymeleaceae	1900-2700	NA
3	<i>Dichroa febrifuga</i> Lour.	Basak	Hydrangaceae	200-2000	NA
4	<i>Dobinea vulgaris</i> Buch.-Ham. ex D. Don		Anacardiaceae		
5	<i>Osbeckia stellata</i> Buch.-Ham.ex D. Don	Chulesi	Melastomataceae	200-2300	NA
6	<i>Oxyspora paniculata</i> (D.Don) DC	Chulesee	Melastomataceae	500-2000	NA
7	<i>Rubus ellipticus</i> Sm.	Aiselu	Rosaceae	1000-2600	NA
8	<i>Strobilanthus wallichii</i> Nees.	Kibu	Thymeleaceae	2700-3600	NA
9	<i>Viburnum cylindricum</i> Buch.-Ham. ex D. Don		Adoxaceae		
10	<i>Viburnum erubescence</i> Wall. ex D	Asarey	Adoxaceae	1400-3950	NA
HERB					
1	<i>Anaphalis triplinervis</i> (Sims) Sims ex C. B. Clarke		Compositae		
2	<i>Arisaema intermedium</i> Blume	Larua/Banko	Araceae	2600-3400	NA
3	<i>Artemisia vulgaris</i> L.	Titey pate	Compositae	1500-3800	NA
4	<i>Astilbe rivularis</i> Buch.-Ham. ex D. Don	Budi okhati	Saxifragaceae	900-3200	NA
5	<i>Begonia rubella</i> Buch.-Ham. ex D. Don	Magarkachi	Begoniaceae	1000-1900	NA
6	<i>Begonia</i> sp.	Magarkachi	Begoniaceae		
7	<i>Bidens pilosa</i> Linn.	Kuro	Asteraceae	200-1900	NA
8	<i>Carex</i> sp.	Harkatto	Cyperaceae	1500-2000	
9	<i>Carex baccans</i> Nees	Harkatto	Cyperaceae	200-2700	LC
10	<i>Codonopsis gracilis</i> Hook.f. & Thomson		Campanulaceae		
11	<i>Commelina benghalensis</i> Linn.	Kaney jhar	Commelinaceae	2300-2300	
12	<i>Craniotome furcata</i> (Link) Kuntze		Lamiaceae	900-3200	NA
13	<i>Cyathula capitata</i> Moq.		Amaranthaceae	1700-2300	NA
14	<i>Cyperus eragrostis</i> Lam	Harkatto	Cyperaceae	200-1000	LC

15	<i>Cyperus scariosus</i> R.Br.	Harkatto	Cyperaceae	200-1500	NA
16	<i>Digitaria</i> sp.	Banso	Poaceae		
17	<i>Elatostema platyphyllum</i> Weddell.	Gagleto	Urticaceae	700-1900	NA
18	<i>Elatostema sessile</i> J.R.Forst. & G.Forst.	Galato	Urticaceae	1000-1700	NA
19	<i>Eragrostis</i> sp.		Poaceae	1500-2500	
20	<i>Eupatorium adenophorum</i> Spreng.	Kalijhar	Asteraceae		
21	<i>Fragaria nubicola</i> Lindley ex Lacaíta	Vui Aiselu	Rosaceae	2500-3900	NA
22	<i>Gerardiana diversifolia</i> (Link) Friis	Bhangre sisnu	Urticaceae	300-2800	NA
23	<i>Globba sessiliflora</i> Sims	Sara	Zingiberaceae	1700-2300	LC
24	<i>Hedychium spicatum</i> Smith	Sara	Zingiberaceae	1800-2800	NA
25	<i>Hemiphragma heterophyllum</i> Wall.		Plantaginaceae	2600-4100	NA
26	<i>Heracleum wallichii</i> DC	Chimphing	Apiaceae	1900-2700	NA
27	<i>Himalaiella deltoidea</i> (DC.) Raab-Straube		Compositae		
28	<i>Impatiens arguta</i> Hook.f. & Thomson	Mujuro	Balsaminaceae	1800-3200	NA
29	<i>Impatiens dolichoceras</i> Pritz. ex Diels	Mujuro	Balsaminaceae	1200-2100	NA
30	<i>Impatiens latiflora</i> Hook.f. & Thomson	Mujuro	Balsaminaceae	1200-2100	NA
31	<i>Impatiens</i> sp.		Balsaminaceae		
32	<i>Impatiens stenantha</i> Hook.f.	Mujuro	Balsaminaceae	2400-3000	NA
33	<i>Isodon</i> sp.		Lamiaceae		
34	<i>Laportea terminalis</i> Wight.	Patle sisnu	Urticaceae	1600-2600	NA
35	<i>Lysionotus serratus</i> D. Don		Gesneriaceae	300-2800	NA
36	<i>Myriactis nepalensis</i> Less.		Compositae	700-3700	NA
37	<i>Nepeta</i> sp.		Lamiaceae		
38	<i>Ophiorrhiza mungos</i> L.		Rubiaceae		NA
39	<i>Oxalis corniculata</i> Linn	Amilo jhar	Oxalidaceae	1400-1900	NA
40	<i>Persicaria capitata</i> (Buch.Ham.ex D.Don) Gross	Ratneulo	Polygonaceae	1500-2300	NA
41	<i>Persicaria chinensis</i> (L.) H. Gross		Polygonaceae	2800	NA
42	<i>Persicaria nepalensis</i> (Meisn.) Miyabe	Ratneulo	Polygonaceae	1200-3500	NA
43	<i>Pilea umbrosa</i> Wall. ex Blume	Chipleý ghans	Urticaceae	1200-2500	NA
44	<i>Polygonatum</i> sp.		Asparagaceae	2500	
45	<i>Polygonum molle</i> D. Don	Thotney	Polygonaceae	1200-3400	NA
46	<i>Rohdea nepalensis</i> (Raf.) N.Tanaka	Janglee Nakima	Asparagaceae	1500-2000	NA
47	<i>Rubus calycinus</i> Wall. ex D. Don		Rosaceae	1200-3000	NA
48	<i>Rubus niveus</i> Thunb.		Rosaceae	500-2800	NA
49	<i>Rumex nepalensis</i> Sprengel	Halhalley	Polygonaceae	1000-4300	NA
50	<i>Selinum</i> sp.		Apiaceae		
51	<i>Swertia bimaculata</i> (Siebold & Zucc.) Hook. f. & Thomson ex C.B. Clarke	Chirito	Gentianaceae	200-3500	NA
CLIMBER & EPIPHYTES					

1	<i>Clematis</i> sp.		Ranunculaceae		
2	<i>Crawfordia speciosa</i> C.B. Clarke		Gentianaceae	1900-2600	
3	<i>Dactylicapnos scandens</i> (D. Don) Hutch		Papaveraceae		
4	<i>Herpetospermum pedunculatum</i> (Seringe.) C.B. Clarke	Ban karela	Cucurbitaceae	2300-2500	NA
5	<i>Piper boechmeriaefolium</i> (Miq.) DC.	Chambo	Piperaceae	1000-2400	NA
6	<i>Rhaphidophora decursive</i> (Roxb.) Scott	Kanchirna	Araceae	2000	NA
7	<i>Rhaphidophora</i> sp.	Kanchirna	Araceae		
8	<i>Rubia cordifolia</i> L	Manjith	Rubiaceae	300-2800	NA
9	<i>Smilax</i> sp	Kukur diney	Smilacaceae		
10	<i>Smilax zeylanica</i> Linn.	Kukur dainey	Liliaceae		
11	<i>Stephania</i> sp.	Tamarkey	Menispermaceae	1500-2300	NA
12	<i>Tetragium serrulatum</i> (Roxb.) Planch	Charchary Lahara	Vitaceae	1800-2500	NA
13	<i>Trichosanthes lepiniana</i> (Naudin) Cogn.	Inderani	Cucurbitaceae	700-2000	NA
FERN & FERN-ALLIES					
1	<i>Asplenium lacinatedum</i> D. Don		Aspleniaceae	1000-2500	NA
2	<i>Cyathea</i> sp.		Cyatheaceae		
3	<i>Dicranopteris</i> sp.	Sottar	Gleicheniaceae		NA
4	<i>Diplazium</i> sp.	Sauney ningro	Athyriaceae	1700-2500	NA
5	<i>Gleichenia gigantean</i> Wall. ex Hook		Gleicheniaceae		
6	<i>Huperzia</i> sp.		Lycopodiaceae		
7	<i>Lycopodium japonicum</i> Thunb.	Nagbelli	Lycopodiaceae		
8	<i>Plagiogyria pycnophylla</i> (Kunze) Mett		Plagiogyriaceae		
9	<i>Selaginella</i> sp.		Selaginellaceae	2500	NA

FAUNA

During the survey, 4 species of fauna were recorded along the sampling plots. Further, a total of 21 bird species belonging to 14 families were recorded. The family-wise bird species composition were recorded for Turdidae & Corvidae (3 species each) followed by Dicaeidae, Paridae, Phasinidae (2 species each) from this particular transect. The other remaining family represented by single species.

Checklist of fauna & avifauna species were encountered at Nambu Reserve Forest, West Sikkim

Sl. No	Scientific Name	Family	Common Name	Local Name	Evidences (Direct & Indirect)
FAUNA					
1.	<i>Muntiacus muntjak</i>	Cervidae	Barking deer	Mirga	Pellet
2.	<i>Ursus thibetanus</i>	Carnivora	Himalayan Black bear	Bhalu	Scat
3.	<i>Cuon alpinus</i>	Carnivora	Wild dog	Ban kukur	Scat
4.	<i>Canis sp</i>	Carnivora	Common Jackal	Syall	Scat
AVI-FAUNA					
1	<i>Aegoithalos louschistos</i>	Paridae	Rufous-fronted Tit	Fista	Direct Sighting
2	<i>Cettia major</i>	Sylviidar	Chestnut Crowned Warbler	Fista	Direct Sighting
3	<i>Fulvetta vinipectus</i>	Paridae	Coal Tit	Fista	Direct Sighting
4	<i>Corvus macrorhyncus</i>	Corvidae	Jungle Crow	Khag	Direct Sighting
5	<i>Cuculus canorus</i>	Cuculidae	Eurassian	Cuckoo	Direct Sighting
6	<i>Dendrocopos darjellensis</i>	Picidae	Darjeeling Woodpecker	Laachey	Direct Sighting
7	<i>Dicrurus leucophaeus</i>	Dicaeidae	Ashy Drongo	Chibey	Direct Sighting
8	<i>Dicrurus macrocercus</i>	Dicaeidae	Black Drongo	Chibey	Direct Sighting
9	<i>Garrulax leucolophus</i>	Turdidae	White-crested Laughingthrush	Kolkoley	Direct Sighting
10	<i>Garrulax ocellatus</i>	Turdidae	Spotted Laughing Thrush	Kolkoley	Direct Sighting
11	<i>Gypaetus barbatus</i>	Accipitridae	Lammergeier	Chill	Direct Sighting
12	<i>Lophura leucomelana</i>	Phasinidae	Kalij pheasant	Kalij	Direct Sighting
13	<i>Megalaima virens</i>	Megalaimidae	Great Barbet	Neual	Direct Sighting
14	<i>Myophonus caeruleus</i>	Turdidae	Blue Whistling Thrush	Kalchura	Direct Sighting
15	<i>Passer rutilans</i>	Passeridae	Russet Sparrow	Bhangera	Direct Sighting
16	<i>Pycnonotus cafer</i>	Pycnonotidae	Red Vented Bulbull	Jureli	Direct Sighting
17	<i>Streptopelia orientalis</i>	Columbidae	Oriental Turtle Dove	Dhukur	Direct Sighting
18	<i>Urocissa ornata</i>	Corvidae	Yellow Billed Blue Magpie	Lampucharey	Direct Sighting
19	<i>Corvus macrorhyncus</i>	Corvidae	Large billed Crow	Kag	Direct Sighting
20	<i>Arborophila torqueola</i>	Phasinidae	Hill Partridge	Peura	Direct Sighting
21	<i>Aethopyga ignicauda</i>	Nectariniidae	Fire-tailed sunbird	Balchi	Direct Sighting
BUTTERFLY					
	<i>Argynnischildreni</i>	Nymphalidae	Large Silverstripe		Direct Sighting
	<i>Aglaiscaschmirensis</i>	Nymphalidae	Indiantortoise shell		Direct Sighting
	<i>Cethosiacyane</i>	Nymphalidae	Lacewing		Direct Sighting
	<i>Euremahecabe</i>	Pieridae	Grass Yellow		Direct Sighting
	<i>Heliophorus brahma</i>	Lycaenidae	Golden Sapphire		Direct Sighting
	<i>Chersonesia risa</i>	Nymphalidae	Common Maplet		Photo Captured
			Glassy Tiger		Photo Captured

CONSERVATION RECOMMENDATIONS AND CONCLUSION

Conservation of biodiversity is significant role for the conservation of butterflies. The butterflies occurs, globally around 20,000 – 30,000 species, out of these 1500 species occur in India and approximately 700 butterfly species are found in the state of Sikkim. The present study revealed in the reserve forest, the six (7) species of butterflies were encountered in the forest. Butterflies play significant role in the forest. It is important to understand the habitat of butterflies and its host plant species. As per the rapid biodiversity survey, it is conclude that the Nambu Reserve Forest is natural less anthropogenic pressure.



Common Maplet



Glassy Tiger

Parakha Reserve Forest, East Sikkim

Anjana Pradhan, Nimesh Chamling and Dorjee Chewang Bhutia



Dendrobium chrysanthum

INTRODUCTION

Parakha Reserve Forest is classified as 8B/C1 East Himalayan Subtropical Wet Hill forest and 11B/C1b East Himalayan Wet Temperate forest. The topography of the forest is a hilly area with flat lands in patches and small streams passing through the forest. The floral diversity of the reserve forest is broadly a dense mixed vegetation of wet-temperate forest type with mainly oak and magnolia species.

The RF is located in East Sikkim under the jurisdiction of Pathing Block under Pathing Range. It lies in the compartments “Parakha 1” and “Parakha 2” of the Barapathing Parakha Beat. Compartment “Parakha 1” is located in the southern part of the forest sharing its border with Machong RF in the south and Barapathing RF in the east. Compartment “Parakha 2” is located in the northern part sharing its border with Barapathing RF in the north-east and Thekabong RF in the west. The altitude of the forest ranges from 1826m to 2500m above sea level covering an area of 2.37sq.km (236.77ha).



An overview of Parakha Reserve Forest

SURVEY AREA

The Rapid Biodiversity Survey was conducted along the altitudinal range from 1826m to 2371m asl covering an area of 0.23 ha lying between 27°15'22.1"N – 27°15'53.6"N latitude and 88°40'07.6"E – 88°40'25.0"E longitude. A total of 23 plots were laid covering the compartments, Parakha 1 and 2. The slope angle of the area ranged from 10 degrees to 55 degrees facing North-West, West, North, South, South-East and South-West. The survey was carried out during the month of September 2017.



Survey plots along Parakha Reserve Forest covering the Forest compartments, forest density and forest type

Site characteristics of the sampling plots along Parakha Reserve Forest in East Sikkim

Site Code	Range	Forest Type	Altitude (m)	Latitude (N)	Longitude (E)	Slope Angle (°)	Slope Aspect	Canopy Cover (%)
PRF 01	Pathing	Dense wet-temperate forest	2315	27°16'04.3"	88°40'32.8"	45	NW	85
PRF 02	Pathing	Dense wet-temperate forest	2357	27°16'19.5"	88°40'44.3"	30	W	90
PRF 03	Pathing	Dense wet-temperate forest	2371	27°15'53.6"	88°40'25.0"	30	W	85
PRF 04	Pathing	Dense wet-temperate forest	2331	27°16'09.9"	88°40'17.3"	45	N	90
PRF 05	Pathing	Dense wet-temperate forest	2279	27°16'01.2"	88°40'18.0"	45	N	85
PRF 06	Pathing	Dense wet-temperate forest	2227	27°15'53.1"	88°40'19.9"	45	N	70
PRF 07	Pathing	Dense wet-temperate forest	2117	27°15'48.5"	88°40'14.7"	55	N	95
PRF 08	Pathing	Dense wet-temperate forest	2014	27°15'39.8"	88°40'15.8"	45	N	70
PRF 09	Pathing	Dense wet-temperate forest	1947	27°15'31.0"	88°40'14.3"	45	S	55
PRF 10	Pathing	Moderate dense temperate	1826	27°15'22.1"	88°40'07.6"	45	N	45
PRF 11	Pathing	Moderate dense temperate	1947	27°15'18.4"	88°40'12.6"	30	N	30
PRF 12	Pathing	Dense wet-temperate forest	1976	27°15'14.9"	88°40'20.2"	35	SE	55
PRF 13	Pathing	Moderate dense temperate	1976	27°15'08.2"	88°40'29.2"	45	E	50
PRF 14	Pathing	Dense wet-temperate forest	1991	27°15'03.7"	88°40'38.4"	20	NW	55
PRF 15	Pathing	Moderate dense temperate	2069	27°14'52.0"	88°40'49.5"	10	E	35
PRF 16	Pathing	Moderate dense temperate	2067	27°14'47.4"	88°40'52.0"	25	SW	40
PRF 17	Pathing	Moderate dense temperate	2114	27°15'00.3"	88°40'46.4"	35	N	30
PRF 18	Pathing	Moderate dense temperate	2130	27°15'10.4"	88°40'43.6"	30	S	30
PRF 19	Pathing	Moderate dense temperate	2130	27°15'17.1"	88°40'39.4"	25	SE	35
PRF 20	Pathing	Moderate dense temperate	2168	27°15'27.5"	88°40'39.2"	45	W	45
PRF 21	Pathing	Moderate dense temperate	2244	27°15'38.0"	88°40'35.7"	45	SE	50
PRF 22	Pathing	Dense wet-temperate forest	2208	27°15'30.8"	88°40'33.4"	30	W	55
PRF 23	Pathing	Moderate dense temperate	2123	27°16'21.9"	88°40'28.7"	35	N	45

FINDINGS AND DISCUSSION

A total of 144 floral species belonging to 60 families were recorded during the survey. The highest number of species was documented from the family Rosaceae representing tree species of *Prunus bracteopadus* and *Prunus wallichii*, shrubs of *Rubus parviflorus* and *R. ellipticus*, herbs of *Rubus calycinus*, *Neillia rubiflora* and *Fragaria nubicola*. The family Compositae represented *Adenostemma lavenia*, *Ageratina adenophora*, *Anaphalis margaritacea*, *A. contorta*, *A. triplinervis* and *Artemisia vulgaris*. This was followed by the family Fagaceae representing oak species of *Castanopsis tribuloides*, *Castanopsis hystrix*, *Lithocarpus elegans*, *Quercus glauca* and *Q. lamellosa*. Herbs represented the highest number of species with 57 in number belonging to 44 genera in 22 families. Thirty-four tree species were recorded belonging to 23 genera in 17 families with 6 unidentified species. Ferns represented 19 species belonging to 16 genera in 12 families. Likewise, 18 epiphytic orchids and climbers were recorded belonging to 13 genera in 9 families. While 14 shrub species were recorded belonging to 12 genera in 9 families.

In the faunal diversity, a total of 17 bird species were recorded belonging to 16 genera and 11 families out of which 10 were confirmed based on direct sighting and indirect signs. Seven mammal species were recorded out of which 6 were confirmed through indirect signs. Amongst the butterflies, 15 species were recorded out of which 12 species were sighted and recorded.

The floral diversity of Parakha RF is a dense mixed vegetation of mainly wet-temperate type and a moderate subtropical type. However, as per our survey, the forest is broadly a dense temperate forest type covering both the compartments with mainly Oak and Machilus species inhabiting the area. Since the rainfall is much heavier, the vegetation is also more lush and dense.

According to the survey of the sampling trail and the encounter of the compartment pillars, the altitudes of compartment 1 & 2 ranges between 1826m – 2244m and 1947m – 2371m, respectively. Compartment “Parakha 1” is located in the southern part of the forest sharing its border with Machong RF in the south and Barapathing RF in the east. Chitto khola and Chattrey khola passes through compartment 1 while Richu khola passes through the border of compartment 2 in the west. Kedi and Assam Lingzey trekking trails also passes through compartment 1. Compartment “Parakha 2” is located in the northern part sharing its border with Barapathing RF in the north-east and Thekabong RF in the west.

The top canopy of the forest cover is dominated by evergreen oak species such as *Lithocarpus elegans*, *Castanopsis hystrix*, *Castanopsis tribuloides* and *Quercus lamellosa* (1947m – 2371m) and other trees like *Elaeocarpus lanceifolius* and *Exbucklandia populnea* forming a dense cover. *Acer campbellii*, *Machilus* sp., *Magnolia cathartii*, *Michelia doltsopa*, *Macaranga denticulata*, *Symplocos lucida*, *S. glomerata* and *Ficus neriifolia* form the middle storey of the forest while small trees like *Alangium chinense*, *Tetradium fraxinifolium* and *Lyonia ovalifolia* **along with saplings and shrubs like** *Viburnum erubescens*, *Rubus ellipticus*, *Mahonia napaulensis* and *Daphne* sp. form the lower storey. Other common trees in the area are *Eurya acuminata*, *Garuga pinnata* and *Zanthoxylum acanthopodium*. Saplings and seedlings of *Acer campbellii*, *Quercus* sp., *Symplocos lucida*, *Symplocos glomerata*, *Machilus* sp., *Magnolia* sp. and *Michelia* sp. are widely dispersed indicating good regeneration of the species in the forest. Plantations of Titey chanp have been made by JICA at certain areas (Bijanbari and Ramitey at 1826m and 1947m,

respectively) providing further regenerations of the species for increasing the conservation.

Being a wet-temperate forest, the ground vegetation is a dominion of various herbaceous plants and ferns. Undergrowth is shrubby and consists of deciduous species of *Cotoneaster*, *Ilex* and *Gaultheria* species. The forest floor is swamped with herbs such as *Anaphalis margaritacea*, *A. triplinervis*, *A. contorta*, *Giardinia diversifolia*, *Lycopodium japonicum*, *Lecanthus peduncularis*, *Ageratina adenophora*, *Rumex nepalensis*, *Persicaria runcinata*, *P. nepalensis*, *Polygonum molle*, *Eragrostis* and *Begonia* species. Usually *Hedychium spicatum* is seen to be growing as a perennial ground herb but here, it was found to be growing as an epiphyte on the barks of lithocarpus.

Many edible and non-edible ferns are also available in the forest. Epiphytic climbers such as *Agapetes serpens*, *Raphidophora decursiva* and *Tetrastigma* species are regularly seen covering the barks of trees along with mosses, epiphytic ferns and orchids of *Cymbidium* species. Other generally found climbers are *Rubia manjith*, *Mucuna macrocarpa*, *Rubia cordifolia*, *Herpetospermum pedunculatum*, *Piper boehmerifolium* and *Cissus elongata*. The forest also harbours bamboo species like *Yushania maling* and *Himalayacalamus hookerianus*. Numerous medicinal plants such as *Swertia chirayita*, *S. bimaculata*, *Houttuynia cordata*, *Acorus calamus*, *Centella asiatica* and *Ageratina adenophora* inhabit the forest as well.



***Osbeckia stellata* vegetation and open forest**

During the survey, we also recorded faunal and avi-faunal species based on direct sightings and indirect signs. Some sighted birds in the forest were Common Myna, Hill Partridge, Common Green Magpie, Jungle Crow, Himalayan Tree Pie, Black Eagle, Oriental Turtle Dove and Drongo. Other reported birds of the forest are Yellow Wagtail, White-rumped Munia, Blue Whistling Thrush, White-crested Laughingthrush, Shrike, Green-tailed Sunbird, Common Tailor bird and Black Bulbul. Digging signs of Wild Boar was seen along the forest trail that confirmed its presence. The foot mark of Barking Deer also indicated its presence in the forest. Other reported mammal species in the forest are monkey, bear, fox and porcupine are reported in the forest. Apart from them, beautiful butterflies such as Common Crow, Common Fivering, Dark Judy, Fringed Redeye, Hedge Blue, Punchinello, Restricted Demon, Indian Tortoise Shell, Painted Lady, Golden Sapphire, Himalayan Fivering, Common Grass Yellow, Tailed Punch and Indian Admiral were also observed and recorded.



Encounter of compartment pillar



Measuring CBH of a tree



Plantation area of *Machilus* and *Macaranga* at Bijanbari



Recording floral species in a plot

SIGNIFICANCE OF PARAKHA RESERVE FOREST

An important factor of the forest is the plantation of various tree species of Rani chanp and Titey chanp at certain areas made by SBFP/JICA. As per our observation, many such saplings and seedlings have been disturbed, so, if possible the concerned authority should replace the damaged seedlings with the new ones and proper fencing of the plantation area can be taken up. Some patches of the forest are still open to grazing forming a grassland meadow. Such areas can be maintained and taken care of by providing plantations of important species.

Over 20 species of medicinal values used as herbal were recorded from the forest such as *Swertia chirayita*, *S. bimaclata*, *Houttuynia cordata*, *Acorus calamus*, *Centella asiatica* and *Ageratina adenophora*, *Hedychium spicatum*, *Arisaema tortosum*, *Garuga pinnata*, *Girardinia diversifolia*, *Hydrocotyle*, *Rumex nepalensis*, etc. Hence, a better strategy plan must be adopted for conserving these species for future generations. *Hedychium spicatum* which is generally seen growing as a perennial herb on the ground was found to be growing as an epiphyte on the barks of lithocarpus. It is reported to treat liver disorders, vomiting and stomach ailments. The species is vulnerable at some places, so proper conservation strategy is required

to protect its biomass for medicinal purpose. The bark juice of *Garuga pinnata* (Dubdabey in nepali) is applied to treat dislocated bones and to heal wounds and the root bark is used for curing skin disease.

Khedi and Assam Lingzey trekking trails passes through this forest making the area important for tourism.



Hedychium spicatum growing as epiphyte

Checklist of floral species recorded in Parakha Reserve Forest, East Sikkim

Sl. No	Botanical Name	Local Name	Family
TREES			
1	<i>Acer campbelli</i> Hook.f. & Thomson ex Hiern	Kapasey	Sapindaceae
2	<i>Alangium chinense</i> (Lour.) Harms	Akhaney	Cornaceae
3	<i>Beilschmiedia sikkimensis</i> King ex Hook.f.	Tarsing	Lauraceae
4	<i>Castanopsis tribuloides</i> (Smith) A. DC.	Musrey katush	Fagaceae
5	<i>Castanopsis hystrix</i> Hook.f. & Thomson ex A. DC.	Patley katus	Fagaceae
6	<i>Elaeocarpus lanceifolius</i> Roxb.	Bhadrase	Elaeocarpaceae
7	<i>Erythrina arborescens</i> Roxb.	Phaledo	Leguminosae
8	<i>Eurya acuminata</i> DC.	Jhinganey	Pentaphragmalaceae
9	<i>Exbucklandia populnea</i> (R.Br. ex Griff.) R.W.Br.	Piplee	Hamamelidaceae
10	<i>Ficus neriifolia</i> Sm.	Dudhilo	Moraceae
11	<i>Garuga pinnata</i> Roxb.	Dabdabe	Burseraceae
12	<i>Leucoscepterum canum</i> Sm.	Ghurpis	<i>Lamiaceae</i>
13	<i>Lithocarpus elegans</i> (Blume) Hatus. ex Soepadmo	Arkaulo katus	Fagaceae
14	<i>Lyonia ovalifolia</i> (Wall.) Drude	Angeri	Ericaceae
15	<i>Macaranga</i> sp.	Malato	Euphorbiaceae
16	<i>Macaranga denticulata</i> (Blume) Müll.Arg.	Malato	Euphorbiaceae
17	<i>Machilus</i> sp.	Pamsi Kawlo	Lauraceae
18	<i>Magnolia cathcartii</i> (Hook.f. & Thomson) Noot.	Tite chanp	Magnoliaceae
19	<i>Michelia doltsopa</i> Buch.-Ham. ex Dc.	Rani Chanp	Magnoliaceae
20	<i>Prunus bracteopadus</i> Koehne	Arupatey	Rosaceae
21	<i>Prunus wallichii</i> Steud.	Lali	Rosaceae
22	<i>Quercus glauca</i> Thunb.	Phalant	Fagaceae

23	<i>Quercus lamellosa</i> Sm.	Buk/Ba-jranth	Fagaceae
24	<i>Rhododendron arboreum</i> Sm.	Lali gurans	Ericaceae
25	<i>Symplocos glomerata</i> King ex C.B. Clarke	Kholmey	Symplocaceae
26	<i>Symplocos lucida</i> (Thunb.) Siebold & Zucc.	Kharanay	Symplocaceae
27	<i>Tetradium fraxinifolium</i> (Hook. f.) T.G. Hartley	Khanakpa	Rutaceae
28	Unidentified	Dumri	
29	Unidentified	Chiphi	
30	Unidentified	Dhotre	
31	Unidentified	Halunday bori	
32	Unidentified	Phunchey	
33	Unidentified	Ragatey	
34	<i>Zanthoxylum acanthopodium</i> DC.	Boke tim-mur	Rutaceae
SHRUBS			
1	<i>Actinodaphne sikkimensis</i> Meisn.	Sissi	Lauraceae
2	<i>Cotoneaster</i> sp.		Rosaceae
3	<i>Daphne papyracea</i> Wall. ex G. Don	Argeli	Thymelaeaceae
4	<i>Gaultheria nummularioides</i> D. Don	Kaali Gedee, Bhuin Ghangaru, Bibee Phal, Bhuin Kaafal	Ericaceae
5	<i>Hydrangea heteromalla</i> D. Don		Hydrangeaceae
6	<i>Ilex</i> sp.		Aquifoliaceae
7	<i>Maesa chisia</i> Buch.-Ham. ex D. Don	Bilauney	Berberidaceae
8	<i>Mahonia napaulensis</i> DC.	Kesari	Berberidaceae
9	<i>Osbeckia nepalensis</i> Hook. f.	Lotejhar	Melastomataceae
10	<i>Osbeckia stellata</i> Buch.-Ham. ex Ker Gawl.	Lotejhar/Ratochulsi	Melastomataceae
11	<i>Oxyspora paniculata</i> (D. Don) DC.	Chulesee	Melastomataceae

12	<i>Rubus parviflorus</i>	Aiselu	Rosaceae
13	<i>Rubus ellipticus</i> Sm.	Aiselu	Rosaceae
14	<i>Viburnum erubescens</i> Wall.	Asare	Adoxaceae
HERBS			
1	<i>Acorus calamus</i> L.	Bojho	Acoraceae
2	<i>Adenostemma lavenia</i> (L.) Kuntze		Compositae
3	<i>Ageratina adenophora</i> (Spreng.) R.M.King&H.Rob.	Kali jhar	Compositae
4	<i>Anaphalis margaritacea</i> (L.) Benth. &Hook.f.	Bukiphool	Compositae
5	<i>Anaphalis contorta</i> (D.Don) Hook.f.	Bukiphool	Compositae
6	<i>Anaphalis triplinervis</i> (Sims) Sims ex C.B.Clarke	Bukiphool	Compositae
7	<i>Arisaema concinnum</i> Schott	Banko	Araceae
8	<i>Arisaema</i> sp.	Banko	Araceae
9	<i>Arisaema tortuosum</i> (Wall.) Schott	Banko/ sap kophool	Araceae
10	<i>Artemisia vulgaris</i> L.	Titepati	Compositae
11	<i>Begonia</i> sp.		Begoniaceae
12	<i>Begonia tessaricarpa</i> C.B. Clarke	Magar Kajay	Begoniaceae
13	<i>Begonia josephi</i> A.DC.		Begoniaceae
14	<i>Bidens pilosa</i> L.	Tikhe kuro	Compositae
15	<i>Carex</i> sp.	Harkatto	Cyperaceae
16	<i>Cassia leschenaultiana</i>		Leguminosae
17	<i>Centella asiatica</i> (L.) Urb.	Golpatta	Apiaceae
18	<i>Chamaecrista nictitans</i> subsp. patel- laria (Collad.) H.S.Irwin&Barneby		Leguminosae
19	<i>Codonopsis</i> sp.		Campanulaceae
20	<i>Colocasia esculenta</i> (L.) Schott	Tarul mane	Araceae
21	<i>Commelina</i> sp.		Commelinaceae
22	<i>Craniotome furcata</i> (Link) Kuntze		Lamiaceae
23	<i>Crassocephalum crepidioides</i> (Benth.) S.Moore		Asteraceae
24	<i>Cyanotis</i> sp.		Commelinaceae
25	<i>Cynodon dactylon</i> (L.) Pers.	Dubo	Poaceae

26	<i>Dichroa febrifuga</i> Lour.	Bhaasak, Bansuli, GanhaaunePaat, Aseru, Banasuk	Hydrangeaceae
27	<i>Elatostema platyphyllum</i> Wedd.	Sano gagleto	Urticaceae
28	<i>Eragrostis</i> sp.	Banso	Poaceae
29	<i>Eragrostis</i> sp.	Chitrey banso	Poaceae
30	<i>Fragaria nubicola</i> (Lindl. ex Hook.f.) Lacaita	Bhui ainselu	Rosaceae
31	<i>Geranium</i> sp.		
32	<i>Girardinia diversifolia</i> (Link) Friis	Bhangray sisnu	Urticaceae
33	<i>Hedychium spicatum</i> Sm.	Seto saro	Zingiberaceae
34	<i>Henckelia urticifolia</i> (Buch.-Ham. ex D.Don) A.Dietr		Gesneriaceae
35	<i>Houttuynia cordata</i> Thunb.	Padey / GandeyJhar	Saururaceae
36	<i>Hydrocotyle himalaica</i> P.K.Mukh.	Ghoda Tapre	Apiaceae
37	<i>Hydrocotyle javanica</i> Thunb.		Apiaceae
38	<i>Impatiens</i> sp.		Balsaminaceae
39	<i>Lecanthus peduncularis</i> (Wall. ex Royle) Wedd.		Urticaceae
40	<i>Lobelia nummularia</i> Lam.	Tilikosyo	Campanulaceae
41	<i>Neillia rubiflora</i> D.Don	Kirkirey jhar	Rosaceae
42	<i>Persicaria runcinata</i> (Buch. – Ham. ex D.Don.) Masam.	Ratnaulo	Polygonaceae
43	<i>Persicaria nepalensis</i> (Meisn.) Miyabe	Ratnaulo	Polygonaceae
44	<i>Pilea umbrosa</i> Wall. ex Blume	Chiplej jhar	Urticaceae
45	<i>Polygonum molle</i> D. Don	Thotney	Polygonaceae
46	<i>Rubus calycinus</i> Wall. ex D.Don	Bhui ainselu	Rosaceae
47	<i>Rumex nepalensis</i> Spreng.	Halhalley	Polygonaceae
48	<i>Solanum aculeatissimum</i> Jacq.	Boksi kara	Solanaceae

49	<i>Swertia chirayita</i> (Roxb. ex Fleming) H. Karst.	Chirowto	Gentianaceae
50	<i>Swertia bimaculata</i> (Siebold & Zucc.) Hook. f. & Thomson ex C.B. Clarke	Bhaley Chirowto	Gentianaceae
51	<i>Trifolium repens</i> L.	Seto Behuli	Leguminosae
52	Unidentified	Dhusrey Jhar	
53	Unidentified	Katike	
54	Unidentified	Dumdume saag	
55	<i>Urena lobata</i>	Naalukuro/ Dalle Kuro	Malvaceae
56	<i>Urtica parviflora</i> Roxb.	Patley sisnu	Urticaceae
57	<i>Viola</i> sp.		Violaceae
BAMBOO			
1	<i>Arundinaria maling</i> Gamble	Malingo	Poaceae
2	<i>Arundinaria hookeriana</i> Munro	Pareng	Poaceae
FERNS AND FERN-ALLIES			
1	<i>Belvisia henryi</i> (Hieron. ex C. Chr.) Raymond		Polypodiaceae
2	<i>Cyathea chinensis</i> Copel.	Rukh uniu	Cyatheaceae
3	<i>Diplazium dilatatum</i> Blume	Lek Chipley Ningro	Athyriaceae
4	<i>Diplazium himalayense</i> Panigrahi	Dante ningro	Athyriaceae
5	<i>Dryopsis apiciflora</i> (Wall. ex Mett.) Holttum & P.J. Edwards		Dryopteridaceae
6	<i>Dryopteris juxtaposita</i> Christ		Dryopteridaceae
7	<i>Dryopteris redactopinnata</i> S.K. Basu & Panigrahi		Dryopteridaceae
8	<i>Gleichenia longissima</i> Blume	Kalamey uniu	Gleicheniaceae
9	<i>Histiopteris incisa</i> (Thunb.) J. Sm.	Sottar	Dennstaedtiaceae
10	<i>Lycopodium japonicum</i> Thunb.	Nagbeli	Lycopodiaceae
11	<i>Monachosorum henryi</i> H. Christ.		Dennstaedtiaceae

12	<i>Nephrolepis cordifolia</i> (L.) C. Presl	Paniamla	Nephrolepidaceae
13	<i>Oleandra wallichii</i> (Hook.) C. Presl		Oleandraceae
14	<i>Peranema paleolulata</i> (Pic. Serm.) Fraser-Jenk.		Dryopteridaceae
15	<i>Plagiogyria pycnophylla</i>		Plagiogyriaceae
16	<i>Pteridium revolutum</i> (Blume) Nakai	Sottar / Tharo uniu	Dennstaedtiaceae
17	<i>Pteris wallichiana</i> J. Agardh	Chatey uniu	Pteridaceae
18	<i>Selaginella</i> sp.		Selaginellaceae
19		Kale ningro	
ORCHIDS/EPIPHYTES/CLIMBERS			
1	<i>Agapetes serpens</i> (Wight) Sleumer		Ericaceae
2	<i>Anthogonium gracile</i> Wall. ex Lindl.		Orchidaceae
3	<i>Cissus elongata</i> Roxb.	Charcharey lahara	Vitaceae
4	<i>Coelogyne cristata</i> Lindl.	Sunakhari	Orchidaceae
5	<i>Dendrobium chrysanthum</i> Wall. ex Lindl.	Sunakhari	Orchidaceae
6	<i>Herpetospermum pedunculatum</i> (Ser.) C.B. Clarke	Ban karela	Cucurbitaceae
7	<i>Loranthus</i> sp.		Loranthaceae
8	<i>Mucuna macrocarpa</i> Wall.	Baldengra lahara	Leguminosae
9	<i>Piper boehmeriifolium</i> (Miq.) Wall. ex C. DC.	Chambo / Panpatta	Piperaceae
10	<i>Rhaphidophora decursiva</i> (Roxb.) Schott	Kanchirna	Araceae
11	<i>Rubia cordifolia</i> Linn.	Majito	Rubiaceae
12	<i>Tetrastigma</i> sp.	Charcharey lahara	Vitaceae
13	<i>Tetrastigma serrulatum</i> (Roxb.) Planch.	Charcharey lahara	Vitaceae
14	<i>Trichosanthes lepiniana</i> (Naudin) Cogn.	Indreni	Cucurbitaceae
15	Unidentified	Pani lahara	
16	Unidentified	Khorsane	

17	Unidentified	Rukh maney	
18	Unidentified	Pipla	



Crassocephalum crepidioides



Anthogonium gracile



Arisaema tortosum (Fruiting)



Cassia leschenaultiana



Carex sp.



Henckelia urticifolia

Checklist of faunal and avi-faunal species recorded in Parakha Reserve Forest

Sl. No	Bird Species	Common Name	Local Name	Family	Evidences	IUCN Status
1	<i>Acridotheres tristis</i>	Common Myna	Ruppi	Sturnidae	Sighted	LC
2	<i>Aethopyga nipalensis</i>	Green-tailed Sunbird	KaloBalchi	Nectariniidae	Call	LC
3	<i>Arborophila torqueola</i>	Common Hill Partridge	Peura	Phasianidae	Sighted	LC
4	<i>Cissa chinensis</i>	Common Green Magpie	DodayKoilee	Corvidae	Sighted	LC
5	<i>Corvus macrorhynchus</i>	Jungle Crow	Kag	Corvidae	Sighted	NA
6	<i>Dendrocitta formosae</i>	Himalayan Tree Pie	Kokoley	Corvidae	Sighted	LC
7	<i>Dicrurus leucophaeus</i>	Ashy Drongo	Chibey	Dicruridae	Sighted	LC
8	<i>Garrulax affinis</i>	Black-faced Laughingthrush	Bhakura	Turdidae	Reported	LC
9	<i>Garrulax leucolophus</i>	White-crested Laughingthrush	Kolkoley	Turdidae	Reported	LC
10	<i>Hypsipetes leucocephalus</i>	Black Bulbull	Jureli	Pycnonotidae	Call	LC
11	<i>Ictinaetus malayensis</i>	Black Eagle	Cheel	Accipitridae	Sighted	LC
12	<i>Lanius tephronotus</i>	Grey backed Shrike		Laniidae	Reported	LC
13	<i>Lonchur astriata</i>	White-rumped Munia		Estrildidae	Reported	LC
14	<i>Motacilla flava</i>	Yellow Wagtail		Motacillidae	Reported	LC
15	<i>Myophonus caeruleus</i>	Blue Whistling Thrush	Kalchura	Turdidae	Reported	NA
16	<i>Orthotomus atrogularis</i>	Common Tailor Bird		Cisticolidae	Reported	LC
17	<i>Streptopelia orientalis</i>	Oriental Turtle Dove	Dhukur	Columbidae	Sighted	LC

BUTTERFLY SPECIES

1	<i>Aglaiscas chmirensis</i>	Indian Tortoiseshell	Nymphalidae	Sighted	NA
2	<i>Abis arafylla</i> Westwood	Dark Judy	Riodinidae	Sighted	NA
3	<i>Celastrina</i> sp.	Hedge Blue	Lycaenidae	Sighted	NA
4	<i>Colia scroceus</i>	Clouded Yellow	Pieridae	Reported	NA
5	<i>Dodona eugenes</i>	Tailed Punch	Riodinidae	Sighted	LC
6	<i>Euploea core</i> Cramer	Indian Common Crow	Nymphalidae	Sighted	LC
7	<i>Eurema hecabe hecabe</i>	Common Grass Yellow	Pieridae	Reported	NA
8	<i>Heliophorus brahma</i>	Golden Sapphire	Lycaenidae	Sighted	NA
9	<i>Matapa cresta</i> Evans	Fringed Redeye	Hesperiidae	Sighted	NA

10	<i>Notocrypta curvifascia</i>	Restricted Demon		Hesperiidae	Sighted	NA
11	<i>Vanessa cardui</i>	Painted Lady		Nymphalidae	Sighted	NA
12	<i>Vanessa indica</i>	Indian Red Admiral		Nymphalidae	Reported	NA
13	<i>Ypthima baldus</i> Fabricius	Common Fivering		Nymphalidae	Sighted	NA
14	<i>Ypthi masakra</i>	Himalayan Fivering		Nymphalidae	Sighted	NA
15	<i>Zemeros flegyas</i> Cramer	Punchinello		Riodinidae	Sighted	NA

FAUNA

1	<i>Muntiacus muntjak</i>	Barking Deer	Mirga	Cervidae	Pellet	LC
2	<i>Jalapura</i> sp.			Chamaeleonidae	Sighted	
3			Chitwa		Reported	LC
4	<i>Macaca</i> sp.	Monkey	Badar	Cebidae	Scat	LC
5	<i>Vulpes</i> sp.	Fox	Syaal	Canidae	Scat	LC
6	<i>Hylopetes</i> sp.	Flying Squirrel	Squirrel	Sciuridae	Sighted	LC
7	<i>Sus scrofa</i>	Wild Boar	Badel	Suidae	Digging sign	LC
8	<i>Ursus thibetanus</i>	Himalayan Black Bear	Bhalu	Ursidae	Digging sign	VU

Note: VU: Vulnerable, LC: Least Concern, NA: Not Assessed



Jalapura sp.



Common Fivering



Dark Judy



Hedge Blue

Payong Reserve Forest, South Sikkim

Sanjyoti Subba, Sanchi Subba & Sumitra Nepal



Overview of Reserve Forest

INTRODUCTION

Payong Reserve Forest is a biologically diverse reserve forest and famous for its high timber value species as *Castanopsis hystrix*, *Castanopsis indica*, *Castanopsis tribuloides*, *Lithocarpus fenestratus* & *Quercus lamellosa*, etc., and many other main vegetation of the reserve forest is represented by *Juglans regia*, *Erythrina arborescens*, *Betula* sp., *Cryptomeria japonica*, *Exbucklandia populnea*, *Hovenia dulcis*, *Macaranga pustulata*, *Machilus* sp., *Tetradium fraxinifolia*, etc., were dominated in the forest.

The common small tree species of the area includes *Symplocos lucida* & *Symplocos glomerata*, etc. The study area is completely covered by shrubs and shrublets species like *Osbeckia stellata*, *Strobilanthus wallichii*, *Daphne cannabina*, *Ardisia macrocarpa*, *Viburnum erubescence*, *Rubus ellipticus*, *Oxyspora paniculata*, *Dichroa febrifuga*, *Rubus niveus*, *Polygonum molle* etc., form the dense in the forest. The ground floor is mostly covered by herbaceous plant species such as *Gerardiana diversifolia*, *Biden pilosa*, *Pilea umbrosa*, *Drymaria cordata*, *Oxalis corniculata*, *Hedychium spicatum*, *Persicaria capitata*, *Fragaria nubicola*, *Swertia bimaculata*, *Centella asiatica*, *Viola* sp., *Hydrocotyle javanica*, *Rohdea nepalensis*, etc. The area also harbors many climber species such as *Rubia cordifolia*, *Tetrastigma serrulatum*, and *Smilax* sp., other ferns & fern-allies, mosses and lichens too.

The beauty and diversity of plant species in Sikkim is further enhanced by the diversity of fauna species too. The reserve forest is home to many faunal species, viz., Himalayan Black bear, Wild Boar, Barking Deer, Flying squirrel, Wild dog, and Red fox etc. Due to dense forest provides shelter as well as abundant fruits/feed and as such are good indicator of faunal presence and species richness. Payong Reserve Forest is habitat of Himalayan Black bear.



Forest compartment boundary, forest density & forest types along the sampling plots of Payong Reserve Forest, South Sikkim

STUDY AREA

Payong Reserve forest is located in the south district and its elevation ranges from 1778 to 2071 m asl, sharing its border with Payong RF is the north and Kau village in the south over the Kau Khola in the South Sikkim. This reserve forests is very rich in floral and faunal diversity. The reserve forest showing the aspects of E, N, SE and NE with the slope angle falling between 30 to 70 degree inclinations. The field survey was conducted during December 2017.

FINDINGS AND DISCUSSION

The study identified a total of 106 species in 23 sampling plots, covering an area 0.23 ha in Payong Reserve Forest. Of which 29 tree species belonging to 27 genera and 19 families were recorded. Similarly, 8 species of shrubs belonging to 8 genera and 5 families, 42 herb species (32 genera & 20 families), 12 climbers & epiphytes (10 genera & 10 families) and 12 ferns and fern-allies (12 genera & 9 families) were inventoried in entire the sampling plots. Diversity of vegetation was found most in case of the ground flora in comparison to tree and shrubs, which are listed in the below table.

In the forest density (dense) forest, randomly laid (1-10 & 13-14) sampling plots and other remaining sampling plots were randomly laid for moderate dense forest. However, in the forest types, the sampling plots (8-9) were randomly laid in the sub-tropical forest and other remaining was in the wet temperate forest. Forest compartment boundary, randomly laid 1-4 and 10-15 random sampling plots for compartment 1 and other remaining sampling plots such as 5-9 and 16-20 for compartment 2. One bamboo species (flowering stages) were recorded along the sampling plots.

SIGNIFICANCE OF THE RESERVE FOREST

1. High timber value species as *Castanopsis hystrix*, *Castanopsis indica*, *Castanopsis tribuloides*, *Lithocarpus fenestratus* & *Quercus lamellosa*, were recorded.
2. Himalayan Black Bear-Habitat
3. The forest floor was covered by *Gerardiana diversifolia* herb species.

The survey area of the forest was covered by *Gerardiana diversifolia* herb species. *G. diversifolia* is a plant which is use in fibre for making nets, rope, bag and many more.

Site Characteristics of the sampling plots of Payong Reserve Forest, South Sikkim

Site Code	Forest types	Altitude (m) asl	Coordinates	Slope Angle (°)	Slope Aspect	Humus depth (cm)	Disturbance	
			Lat(N)				Anthropogenic	Natural
PRF1	Temperate	1886	27°36'85.7"	50	SE	2		Natural
PRF2	Temperate	1898	27°36'83.7"	60	N	1		Natural
PRF3	Temperate	1906	27°36'81.8"	40	SE	0.5		Natural
PRF4	Temperate	1923	27°36'76.9"	50	E	1	Fodder collection	
PRF5	Temperate	1921	27°36'73.2"	30	S	1	Fuel wood	
PRF6	Temperate	1914	27°36'68.8"	25	E	1		Natural
PRF7	Temperate	1937	27°36'67.2"	60	S	0.5		Natural
PRF8	Temperate	1936	27°36'64.6"	60	E	1		Natural
PRF9	Temperate	1932	27°36'58.2"	40	N	1		Natural
PRF10	Temperate	1940	27°36'56.6"	50	E	0.5		Natural
PRF11	Temperate	1946	27°36'49.6"	30	E	0.5		Natural
PRF12	Temperate	1944	27°36'46.1"	25	N	1		Natural
PRF13	Temperate	1957	27°36'43.1"	60	S	0.5		Natural
PRF14	Temperate	1987	27°36'40.9"	35	N	1		Natural
PRF15	Temperate	1993	27°36'37.6"	40	E	0.5		Natural
PRF16	Temperate	2012	27°36'36.3"	40	N	0.5		Natural
PRF17	Temperate	2024	27°36'39.5"	40	N	0.5		Natural
PRF18	Temperate	2030	27°36'41.7"	30	N	1		Natural
PRF19	Temperate	2034	27°36'44.3"	50	NE	1		Natural
PRF20	Temperate	2056	27°36'46.5"	50	E	1		Natural
PRF21	Temperate	2050	27°36'50.1"	65	E	0.5		Natural
PRF22	Temperate	2065	27°36'56.9"	65	N	1		Natural
PRF23	Temperate	2070	27°36'76.9"	65	S	0.5		Natural

Checklist of floral species of Payong Reserve forest, South Sikkim

	BOTANICAL NAME	LOCAL NAME	FAMILY	Altitudinal Ranges (m) asl	IUCN Status
Sl. No	TREE				
1	<i>Alnus nepalensis</i> Don.	Utis	Betulaceae	200-2800	LC
2	<i>Beilschmiedia sikkimensis</i> King ex Hook. f.	Tarsing	Lauraceae	300-2400	NA
3	<i>Brassaiopsis mitis</i> C.B.Clarke		Araliaceae		
4	<i>Castanopsis hystrix</i> Hook. & Thomson ex. A. DC.	Patley katush	Fagaceae	1600-1600	NA
5	<i>Castanopsis tribuloides</i> (Smith) A. DC	musre Katush	Fagaceae	450-2300	NA
6	<i>Castanopsis indica</i> (Roxb. ex Lindl.) A.DC.	Dalney katus	Fagaceae	1500-1500	NA
7	<i>Cryptomeria japonica</i> (Thunberg ex. Linn. F.) D. Don	Dhupi	Taxodiaceae	1100-2500	NT
8	<i>Choerospondias axillaris</i> (Roxb.) B.L.Burt & A.W.Hill	Lapsi	Anacardiaceae	900-2500	NA
9	<i>Daphniphyllum himalayense</i> (Benth.)	Lal Chandan	Euphorbiaceae	1200-2500	NA
10	<i>Echinocarpus dasycarpus</i> Benth.	Gobre	Elaeocarpaceae		
11	<i>Elaeocarpus lanceifolius</i> Roxb.	Bhadrasay	Elaeocarpaceae	1800-2500	NA
12	<i>Engelhardtia spicata</i> Lechen ex Blume.	Mauwa	Juglandaceae	500-2100	LC
13	<i>Eurya acuminata</i> DC.	Jhingni	Theaceae	700-3000	NA
14	<i>Exbucklandia populnea</i> (R. Br. Ex Griff) R. W. Br	Piplee	Hamamelidaceae	1200-2000	NA
15	<i>Juglans regia</i> Linn.	Okhar	Juglandaceae	500-1800	LC
16	<i>Lithocarpus pachyphyllus</i> (Kurz) Rehder		Fagaceae		
17	<i>Lyonia ovalifolia</i> var. <i>ovalifolia</i>	Angeri	Ericaceae	200-3400	NA
18	<i>Macaranga denticulata</i> (Blume) Müll.Arg.	Malata	Euphorbiaceae	100-1300	NA
19	<i>Machilus</i> sp.	Kawlo	Lauraceae	1700-2000	
20	<i>Maesa</i> sp.	Bilauney	Myrtaceae		
21	<i>Meliosma arnottiana</i> (Wight) Walp.	Dabdabey	Sabiaceae	500-2000	NA
22	<i>Nyssa javanica</i> (Blume) Wangerin	Lek chilauney	Cornaceae	100-2500	NA

23	<i>Persea odoratissima</i> (Nees) Kosterm.	Kawlo	Lauraceae	1500-2100	NA
24	<i>Pyrularia edulis</i> (Wall.) A. DC.	Amphi	Santalaceae	1700-1700	NA
25	<i>Quercus lamellosa</i> Sm.	Buk	Fagaceae	1600-2800	NA
26	<i>Rhuschinensis</i> Mill.	Bhakimlo	Anacardiaceae		NA
27	<i>Rhus succedanea</i> Linn.	Rani bhalayo	Anacardiaceae		NA
28	<i>Symplocos glomerata</i> King ex C.B. Clarke	Kholme	Symplocaceae	1200-2700	NA
29	<i>Symplocos lucida</i> (Thunb.) Siebold & Zucc	Kharane	Symplocaceae	1500-3000	NA
SHRUB					
1	<i>Ardisia macrocarpa</i> Wall.	Damaiphal	Myrsinaceae	1500-2400	NA
2	<i>Daphne cannabina</i> Wall	Kalo argeli	Thymeleaceae	1900-2700	NA
3	<i>Dichroa febrifuga</i> Lour.	Basak	Hydrangeaceae	200-2000	NA
4	<i>Osbeckia stellata</i> Buch.-Ham.ex D. Don	Chulesi	Melastomataceae	200-2300	NA
5	<i>Oxyspora paniculata</i> (D.Don) DC	Chulesee	Melastomataceae	500-2000	NA
6	<i>Rubus ellipticus</i> Sm.	Aiselu	Rosaceae	1000-2600	NA
7	<i>Strobilanthus wallichii</i> Nees.	Kibu	Thymeleaceae	2700-3600	NA
8	<i>Viburnum erubescence</i> Wall. ex D	Asarey	Adoxaceae	1400-3950	NA
HERB					
1	<i>Ageratina adenophorum</i> Spreng.	Gagleto	Poaceae	1500-2500	
2	<i>Begonia rubella</i> Buch.-Ham. ex D. Don	Magarkachi	Begoniaceae	1000-1900	NA
3	<i>Begonia</i> sp.	Magarkachi	Begoniaceae		
4	<i>Bidens pilosa</i> Linn.	Kuro	Asteraceae	200-1900	NA
5	<i>Carex</i> sp.	Harkatto	Cyperaceae	1500-2000	
6	<i>Carex baccans</i> Nees	Harkatto	Cyperaceae	200-2700	LC
7	<i>Commelina benghalensis</i> Linn.	Kaney jhar	Commelinaceae	2300-2300	
8	<i>Craniotome furcata</i> (Link) Kuntze		Lamiaceae	900-3200	NA

9	<i>Cyathula capitata</i> Moq.		Amaranthaceae	1700-2300	NA
10	<i>Cyperus eragrostis</i> Lam	Harkatto	Cyperaceae	200-1000	LC
11	<i>Cyperus scariosus</i> R.Br.	Harkatto	Cyperaceae	200-1500	NA
12	<i>Digitaria</i> sp.	Banso	Poaceae		
13	<i>Elatostema platyphyllum</i> Weddell.	Gagleto	Urticaceae	700-1900	NA
14	<i>Elatostema sessile</i> J.R.Forst. & G.Forst.	Galato	Urticaceae	1000-1700	NA
15	<i>Eragrostis</i> sp.				
16	<i>Fragaria nubicola</i> Lindley ex Lacaita	Vui Aiselu	Rosaceae	2500-3900	NA
17	<i>Gerardiana diversifolia</i> (Link) Friis	Bhangre sisnu	Urticaceae	300-2800	NA
18	<i>Hedychium spicatum</i> Smith	Sara	Zingiberaceae	1800-2800	NA
19	<i>Hemiphragma heterophyllum</i> Wall.		Plantaginaceae	2600-4100	NA
20	<i>Impatiens arguta</i> Hook.f. & Thomson	Mujuro	Balsaminaceae	1800-3200	NA
21	<i>Impatiens dolichoceras</i> Pritz. ex Diels	Mujuro	Balsaminaceae	1200-2100	NA
22	<i>Impatiens latiflora</i> Hook.f. & Thomson	Mujuro	Balsaminaceae	1200-2100	NA
23	<i>Impatiens</i> sp.		Balsaminaceae		
24	<i>Impatiens stenantha</i> Hook.f.	Mujuro	Balsaminaceae	2400-3000	NA
25	<i>Oxalis corniculata</i> Linn	Amilo jhar	Oxalidaceae	1500-2500	NA
26	<i>Persicaria capitata</i> (Buch.Ham.ex D.Don) Gross	Ratneulo	Polygonaceae	1200-2200	NA
27	<i>Persicaria nepalensis</i> (Meisn.) Miyabe	Ratneulo	Polygonaceae	1200-3500	NA
28	<i>Pilea umbrosa</i> Wall. ex Blume	Chipley ghans	Urticaceae	1200-2500	NA
29	<i>Polygonatum</i> sp.		Asparagaceae		
30	<i>Polygonum molle</i> D. Don	Thotney	Polygonaceae	1200-3400	NA
31	<i>Rohdea nepalensis</i> (Raf.) N.Tanaka	Janglee Nakima	Asparagaceae	1500-2000	NA
32	<i>Rumex nepalensis</i> Sprengel	Halhalley	Polygonaceae	1000-4300	NA
33	<i>Selinum</i> sp.		Apiaceae		

34	<i>Swertia bimaculata</i> (Siebold & Zucc.) Hook. f. & Thomson ex C.B. Clarke	Chirito	Gentiana-ceae	200-3500	NA
CLIMBER & EPIPHYTES					
1	<i>Clematis</i> sp.		Ranuncula-ceae		
2	<i>Crawfurdia speciosa</i> C.B. Clarke		Gentiana-ceae	1900-2600	NA
3	<i>Herpetospermum pedunculatum</i> (Seringe.) C.B. Clarke	Ban karela	Cucurbita-ceae	2300-2500	NA
4	<i>Piper boechmeriaefolium</i> (Miq.) DC.	Chambo	Piperaceae	1000-2700	NA
5	<i>Piper</i> sp.				
6	<i>Rhaphidophora decursive</i> (Roxb.) Scott	Kanchirna	Araceae	2000	NA
7	<i>Rhaphidophora</i> sp.	Kanchirna	Araceae		
8	<i>Rubia cordifolia</i> L	Manjith	Rubiaceae	300-2800	NA
9	<i>Stephania</i> sp.	Tamarkey	Menisper-maceae	1500-2300	NA
10	<i>Tetrastigma serrulatum</i> (Roxb.) Planch	Charchary Lahara	Vitaceae	1800-2500	NA
FERN & FERN-ALLIES					
1	<i>Asplenium lacinatedum</i> D. Don		Aspleniaceae	1000-2500	NA
2	<i>Angiopteris indica</i> (G. Forster) Hoffmann		Marattiaceae		
3	<i>Dicranopteris</i> sp.	Sottar	Gleichenia-ceae		
4	<i>Diplazium</i> sp.	Sauney ningro	Athyriaceae		
5	<i>Diplopterygium giganteum</i> Wall. ex Hook		Gleichenia-ceae	800-2800	NA
6	<i>Huperzia</i> sp.		Lycopodia-ceae		
7	<i>Lycopodium japonicum</i> Thunb.	Nagbelli	Lycopodia-ceae		
8	<i>Plagiogyria pycnophylla</i> (Kunze) Mett		Plagiogyri-aceae		
9	<i>Selaginella</i> sp.		Selaginel-laceae	2500	NA
10	<i>Drynaria propinqua</i> (wall. ex mett.) J. Sm.		Polypodia-ceae	1600-2400	NA

FAUNA

During the survey, 5 faunal species were encountered from Payong Reserve Forest. Further, a total of 14 bird species belonging were recorded.

Checklist of fauna & avifauna species were encountered at Payong Reserve Forest, South Sikkim.

Sl. No	Scientific Name	Family	Common Name	Local Name	Evidence (Direct & Indirect)
	FAUNA				
	<i>Muntiacus muntjak</i>	Cervidae	Barking deer	Mirga	Pellets
	<i>Ursus thibetanus</i>	Carnivora	Himalayan Black bear	Bhalu	Scat
	<i>Cuon alpinus</i>	Carnivora	Wild dog	Ban kukur	Scat
	<i>Sus scrofa</i>	Suidae	Wild Boar	Bodyal	Scat
5.	<i>Canis sp</i>	Carnivora	Common Jackal	Syall	Scat
	AVIFAUNA				
	<i>Aegithalos louschistos</i>	Paridae	Rufous-fronted Tit	Fista	Direct Sighting
	<i>Aethopyga ignicauda</i>	Nectariniidae	Fire-tailed sunbird	Balchi	Direct Sighting
	<i>Arborophila torqueola</i>	Phasinidae	Hill Partridge	Peura	Direct Sighting
	<i>Cettia major</i>	Sylviidae	Chestnut Crowned Warbler	Fista	Direct Sighting
	<i>Cissa chinensis</i>	Corvidae	Common Green Magpie	Lampucharey	Direct Sighting
	<i>Corvus macrorhyncus</i>	Corvidae	Jungle Crow	Khag	Direct Sighting
	<i>Corvus macrorhyncus</i>	Corvidae	Large billed Crow	Kag	Direct Sighting
	<i>Cuculus canorus</i>	Cuculidae	Eurassian	Cuckoo	Direct Sighting
	<i>Dicrurus leucophaeus</i>	Dicaeidae	Ashy Drongo	Chibey	Direct Sighting
	<i>Dicrurus macrocercus</i>	Dicaeidae	Black Drongo	Chibey	Direct Sighting
	<i>Fulvetta vinipectus</i>	Paridae	Coal Tit	Fista	Direct Sighting
	<i>Garrulax leucolophus</i>	Turdidae	White-crested Laughingthrush	Kolkoley	Direct Sighting
	<i>Garrulax ocellatus</i>	Turdidae	Spotted Laughing Thrush	Kolkoley	Direct Sighting
	<i>Gypaetus barbatus</i>	Accipitridae	Lammergeier	Chill	Direct Sighting

CONCLUSION

The reserve forest is natural, undisturbed and virgin forest. The area is less anthropogenic footprint and has a rich biodiversity.

Rangdang Reserved Forest, South Sikkim

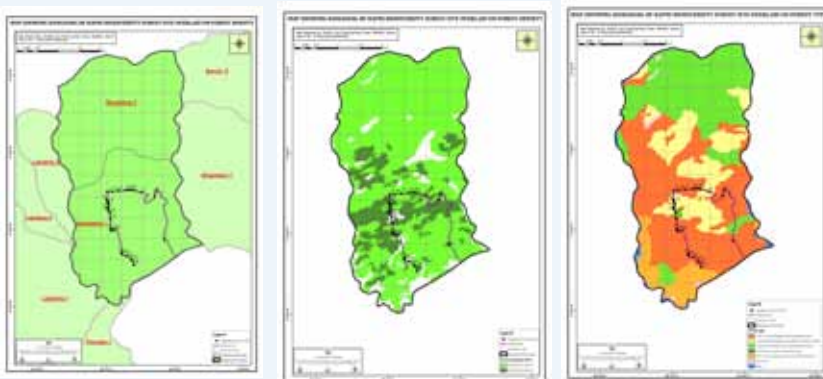
Team: Sabita Dahal & Meena Tamang



STUDY AREA

A field trip for conducting Rapid Biodiversity Survey to Rangdang Reserve Forest covering a sampling path along Rungdung Khola – Dhajay Dara – Relly Rhola in South Sikkim, were carried out during the month of November 2017. The trip was aimed for inventory and monitoring of the biodiversity of the area.

The present survey area along Rungdung Khola – Dhajay Dara – Relly Rhola sampling path, the forest type of which is represented by sub-tropical to wet temperate forest. The elevation range covered during the survey was from 1400m (Relly Khola) to 2500m (Dhajay Dara) which is represented by Figure 1. The slope angle of the area ranged between mild (5 degree) to steep (70 degree) slope and is facing towards NW and SE aspect.



Survey plots along Thulo Dharay - Toribari – Gai Kharka sampling path.

Site characteristics of the survey area along Rungdung Khola – Dhajay Dara – Rally Khola sampling path in Rangdang RE, South Sikkim.

Site Code	Forest type	Elevation (M)	GPS co-ordinates		Slope Angle (°)	Slope Aspect	Canopy cover/ Forest density	Dominate taxa	Disturbances	Location name
			Lat	Long						
P1	Wet Temperate Forest	1858	27.4013	88.307	50	NW	40%, Moderately dense	Trees	Nil	Rungdung Khola
p2	Wet Temperate Forest	1784	27.4117	88.305	40	NW	20%, Open	Trees	Nil	Near Rungdung Khola
P3	Wet Temperate Forest	1824	27.4106	88.3047	35	NW	30%, Moderately dense	Trees	Nil	Above Rungdung village
P4	Wet Temperate Forest	2056	27.4115	88.3015	30	NW	95%, very dense	Trees	Nil	Above Rungdung village
P5	Wet Temperate Forest	2197	27.412	88.2995	40	NW	30%, Moderately dense	Trees	Nil	-
P6	Wet Temperate Forest	2246	27.4121	88.299	70	SE	90%, very dense	Trees	Nil	-
P7	Wet Temperate Forest	2275	27.412	88.2983	55	SE	75%, very dense	Trees	Nil	-
P8	Wet Temperate Forest	2308	27.4121	88.2977	45	SE	70%, very dense	Trees	Nil	-
P9	Wet Temperate Forest	2349	27.412	88.296	75	SE	90%, very dense	Trees	Nil	-
P10	Wet Temperate Forest	2405	27.4117	88.2944	60	SE	90%, very dense	Herbs	Nil	Dhajay Dara
P11	Wet Temperate Forest	2447	27.4118	88.2933	30	SE	10%, open	Herbs	Nil	Dhajay Dara
P12	Wet Temperate Forest	2360	27.41	88.293	5	SE	10%, Open	Herbs	Nil	
P13	Wet Temperate Forest	2327	27.4095	88.2934	45	SE	60%, Moderately dense	Trees	Nil	
P14	Wet Temperate Forest	2308	27.4093	88.2935	70	SE	60%, Moderately dense	Trees	Nil	
P15	Wet Temperate Forest	2298	27.4092	88.2934	60	SE	80%, very dense	Trees	Nil	
P16	Wet Temperate Forest	2233	27.4084	88.2934	45	SE	45%, moderately dense	Trees	Nil	
P17	Wet Temperate Forest	2232	27.4083	88.2934	50	SE	45%, moderately dense	Trees	Nil	
P18	Wet Temperate Forest	2233	27.4083	88.2933	60	SE	75%, very dense	Trees	Nil	Tanki Dara
P19	Wet Temperate Forest	2234	27.4083	88.2933	70	SE	70%, very dense	Tree	Nil	Tanki Dara
P20	Wet Temperate Forest	2232	27.4083	88.2933	5	SE	20%, open	Planted Tree	Nil	Tanki Dara

P21	Wet Temperate Forest	2203	27.4079	88.2934	10 SE	40%, Moderately Dense	Trees	Nil	-
P22	Wet Temperate Forest	2154	27.4071	88.2938	15 SE	40%, Moderately dense	Trees	Nil	-
P23	Wet Temperate Forest	2104	27.4058	88.2939	45 SE	70%, very dense	Trees	Nil	-
P24	Wet Temperate Forest	2007	27.4038	88.2939	40 SE	60%, moderately dense	Trees	Nil	Below Rungdung village
P25	Wet Temperate Forest	1954	27.4035	88.2942	65 SE	80%, very dense	Trees	Nil	Below Rungdung village
P26	Wet Temperate Forest	1907	27.4034	88.2949	70 SE	70%, very dense	Trees	Nil	-
P27	Wet Temperate Forest	1713	27.3986	88.2966	70 SE	70% very dense	Trees	Nil	-
P28	Wet Temperate Forest	1692	27.3983	88.2965	70 SE	75%, very dense	Trees	Nil	-
P29	Wet Temperate Forest	1623	27.3978	88.2977	80 SE	80%, very dense	Trees	Nil	Above Relly Khola
P30	Sub tropical forest	1539	27.3971	88.2987	80 SE	70%,very dense	Trees	Nil	Above Relly Khola
P31	Sub tropical forest	1477	27.3968	88.2992	80 SE	70%, very dense	Trees	Nil	Near Relly Khola
P32	Sub tropical forest	1407	27.3958	88.2995	80 SE	70%, very dense	Trees	Nil	Relly Khola

FINDINGS

FLORA

During the survey, a total of 32 plots were laid covering 0.32 ha area (Table & Figure). A general checklist of the floral species (Table 2) of the area (including the areas outside of the plots) were prepared of which, trees and small trees represented the highest number of species (66 species) followed by herbs (62 species). 18 species of shrubs, 32 species of epiphytes and climbers, 25 species of ferns and ferns allies and 9 species of bamboos and cane were inventorised from the area. Location name, dominate taxa, elevation, GPS-co-ordinates, forest type, slope angle, Slope aspect, disturbances and forest density of the area in terms of canopy cover in and around the sample plots are provided in the Table.

Checklist of floral species in Rangdang Reserve Forest, South Sikkim

Sl. No.	Botanical Name	Family	Common name
	TREE		
1.	<i>Acer caudatum</i> Wallich.	Sapindaceae	Kapasey
2.	<i>Acer pectinatum</i> Wall.	Sapindaceae	Lek Kapasay
3.	<i>Actinidia callosa</i> Lindl.	Actinidiaceae	Theki fal
4.	<i>Actinodaphne sikkimensis</i> Meissn.	Lauraceae	Phurkey Sissi
5.	<i>Alangium begoniaefolium</i> (Roxb.) Baill	Alangiaceae	Akhanay
6.	<i>Albizia lebbeck</i> (L.) Benth.	Fabaceae	Hario siris
7.	<i>Albizia odoratissima</i> (L.f.) Benth.	Fabaceae	Kalo Siris
8.	<i>Albizia procera</i> (Roxb.) Benth.	Fabaceae	Seto Siris
9.	<i>Alnus nepalensis</i> D. Don.	Betulaceae	Utis
10.	<i>Antidesma acuminatum</i> Wight	Euphorbiaceae	Lekh bilaune
11.	<i>Beilschmiedia sikkimensis</i> King ex Hook.f.	Lauraceae	Tarsing
12.	<i>Betula alnoides</i> Wall. ex Diels	Betulaceae	Saur
13.	<i>Brassaiopsis mitis</i> C.B. Clarke	Araliaceae	Phutta
14.	<i>Castanopsis hystrix</i> Hook. & Thomson ex. A. DC.	Fagaceae	Patley katush

15.	<i>Castanopsis indica</i> (Roxb.ex Lindl.) A.DC.	Fagaceae	Dhalne kattus
16.	<i>Castanopsis tribuloides</i> (Smith) A. DC.	Fagaceae	Musrey katus
17.	<i>Cedrela febrifuga</i> Blume.	Meliaceae	Tuni
18.	<i>Cinnamomum impressinervium</i> Meisn.	Lauraceae	Sinkoli
19.	<i>Cryptomeria japonica</i> (Thunberg ex. Linn. F.) D. Don	Taxodiaceae	Dhuppi
20.	<i>Daphniphyllum himalayense</i> (Benth.) Mull. Arg.	Euphorbiaceae	Lal Chandan
21.	<i>Elaeocarpus lanceaefolius</i> Roxburgh.	Elaeocarpaceae	Bhadrasey
22.	<i>Engelhardtia spicata</i> Blume	Juglandaceae	Mauwa
23.	<i>Erythrina arborescens</i> Roxb	Leguminosae	Phaledo
24.	<i>Eurya acuminata</i> DC.	Theaceae	Jhingni
25.	<i>Eurya acuminata</i> DC.	Theaceae	Jhinganey
26.	<i>Exbucklandia populnea</i> R. Br. Ex Griff	Hamamelidaceae	Piplee
27.	<i>Ficus hookeri</i> Miq.	Moraceae	Nebharo
28.	<i>Ficus nemoralis</i> Wall.	Moraceae	Dudilo
29.	<i>Garuga pinnata</i> Roxb.	Burseraceae	Dabdabay
30.	<i>Glochidion acuminatum</i> Muell.	Euphorbiaceae	Latikaath
31.	<i>Gynocardia odorata</i> Roxburgh	Flacourtiaceae	Bandre/Gante
32.	<i>Hovenia dulcis</i> Thunb.	Thymelaeaceae	Bangi
33.	<i>Juglans regia</i> Linn.	Juglandaceae	Okhar
34.	<i>Leucosceptrum cannum</i> Smith	Lamiaceae	Ghurpis
35.	<i>Lithocarpus fenestrata</i> Roxb.	Fagaceae	Arkaulo
36.	<i>Litsea kingii</i> Hook.	Lauraceae	Siltimmur
37.	<i>Macaranga pustulata</i> King.	Euphorbiaceae	Malato
38.	<i>Machilus edulis</i> King.	Lauraceae	Pumsee / Funchey
39.	<i>Machilus gamblei</i> King ex J. D. Hooker	Lauraceae	Ghew Kaulo / Lapche Kaulo / Chi- play Kaulo
40.	<i>Machilus odoratissimus</i> Nees		Ghew funchey
41.	<i>Maesa chisia</i> Buch.-Ham. ex D. Don	Myrsinaceae	Bilaune

42.	<i>Magnolia cathcartii</i> (Hook.f. & Thomson) Noot.	Magnoliaceae	Tite champ
43.	<i>Magnolia doltsopa</i> (Buch.-Ham. ex DC.) Figlar	Magnoliaceae	Rani champ
44.	<i>Myrica esculenta</i> Buch. Ham.	Myricaceae	Kafal
45.	<i>Myrsine semiserrata</i> Wall.	Myrsinaceae	Phalame
46.	<i>Nyssa sessiliflora</i> Hook. f. & Thomson ex Benth	Cornaceae	Lek chilauney
47.	<i>Ostedes paniculatus</i> Blume.	Euphorbiaceae	Bepari
48.	<i>Pieris ovalifolia</i> D. Don	Ericaceae	Angari
49.	<i>Prunus cerasoides</i> Don.	Rosaceae	Paiyun
50.	<i>Prunus nepalensis</i> (Ser) Stendel	Rosaceae	Arupatey
51.	<i>Pyralaria edulis</i> (Wallich) A.	Santalaceae	Amphi
52.	<i>Quercus lamellosa</i> Smith.	Fagaceae	Buk/ Bajranth
53.	<i>Quercus pachyphylla</i> Kurz.	Fagaceae	Sungure Katus/ Ban- tay/ Oitay.
54.	<i>Rhododendron arboreum</i> ssp. <i>arboreum</i> (CB Clarke) Ridley.	Ericaceae	Lali gurans
55.	<i>Rhododendron falconeri</i> Hook.f.	Ericaceae	Korlinga
56.	<i>Rhododendron grande</i> Wright.	Ericaceae	Patle korlinga
57.	<i>Rhus succedanea</i> Linn.	Anacardiaceae	Bhalayo
58.	<i>Rhus succedanea</i> Linn.var. <i>acuminata</i>	Anacardiaceae	Rani bhalayo
59.	<i>Santalum</i> sp.	Santalaceae	Seto chandan
60.	<i>Saurauia napaulensis</i> DC.	Actinidiaceae	Gogun
61.	<i>Schima wallichii</i> (DC) Korth.	Theaceae	Chilaune
62.	<i>Spondias axillaris</i> Roxb.	Anacardiaceae	Lapsi
63.	<i>Symingtonia populnea</i> (R. Br. Ex Griff.)	Hamamelidaceae	Piple
64.	<i>Symplocos glomerata</i> King, ex. C.B. Clarke	Symplocaceae	Kholme
65.	<i>Symplocos theifolia</i> Don.	Symplocaceae	Kharanay
66.	<i>Tetradium fraxinifolium</i> (Hook.) Hartley	Rutaceae	Khanakpa
SHRUB & SHRUB-LETS			
1.	<i>Ardisia macrocarpa</i> Wall.	Myrsinaceae	Damai phal
2.	<i>Daphne cannabina</i> Wall.	Thymeleaceae	Kalo Argeli/Kagate
3.	<i>Dobinea vulgaris</i> Buch.-Ham. ex D.Don	Anacardiaceae.	
4.	<i>Dichroa febrifuga</i> Lour	Hydrangeaceae	Basak
5.	<i>Edgeworthia gardenerii</i> Meissn.	Thymeliaceae	Argali
6.	<i>Eupatorium adenophorum</i> Sprengel	Asteraceae	Kalijhar
7.	<i>Hypericum oblongifolium</i> Choisy	Hypericaceae	Urilo
8.	<i>Maesa chisia</i> Don	Myrsinaceae	Bilauney

9.	<i>Mahonia napaulensis</i> DC	Berberidaceae	Chutro
10.	<i>Neillia rubiflora</i> D.Don	Rosaceae	Khareto jhar
11.	<i>Osbeckia nepalensis</i> Hook.f.	Melastomataceae	
12.	<i>Osbeckia stellata</i> Buch.-Ham. ex Ker Gawl.	Melastomataceae	
13.	<i>Oxyspora paniculata</i> (D.Don) DC	Melastomataceae	Chulesi
14.	<i>Polygala arillata</i> Buch.- Ham ex D.Don.	Polygalaceae	Marcha jhar
15.	<i>Rubus ellipticus</i> Smith.	Rosaceae	Aiselu
16.	<i>Rubus niveus</i> Thunb	Rosaceae	Aiselu / Biralu kanra
17.	<i>Rubus paniculatus</i> (Smith) Rees.	Rosaceae	Kalo Aiselu
18.	<i>Viburnum erubescens</i> Wallich ex DC	Sambucaceae	Asaray
	HERB		
1.	<i>Aconogonum campanulatum</i> (Hook.f.) Hara	Polygonaceae	Kukur thotnay
2.	<i>Aconogonum molle</i> D. Don	Polygonaceae	Thotnay
3.	<i>Acorus calamus</i> Linn.	Acoraceae	Bojo
4.	<i>Aeschynanthus hookeri</i> C.B.Clarke	Gesneriaceae	Baklay patay
5.	<i>Aeschynanthus parviflorus</i> (D.Don) Spreng.	Gesneriaceae	Baklay patay
6.	<i>Ampelocissus latifolia</i> (Roxb.) Planch	Vitaceae	Pani lahara
7.	<i>Anaphalis triplinervis</i> C.B. Clarke	Asteraceae	Bukey Phool
8.	<i>Arisaema flavum</i> (Forsskal) Schott	Araceae	Sap ko makai
9.	<i>Arisaema intermedium</i> Blume	Araceae	Larua/Banko
10.	<i>Arisaema speciosum</i> (Wall.) Mart.	Araceae	Sap ko Makai
11.	<i>Artemisia vulgaris</i> Linn.	Asteraceae	Titaypati
12.	<i>Astilbe rivularis</i> Buch. – Ham. ex D. Don	Saxifragaceae	Buri-okhati
13.	<i>Begoniapicta</i> Sm.	Asteraceae	Magar kanje
14.	<i>Boehmeria platyphylla</i> D.Don	Urticaceae	Kamley
15.	<i>Carex</i> sp.	Cyperaceae	Harkatto
16.	<i>Cautleya spicata</i> – (J. M. Sm.) Bak	Zingiberaceae	Sara
17.	<i>Centellaasiatica</i> (L.) Urban	Umbelliferae	Golpatta
18.	<i>Commelina benghalensis</i> L.	Commelinaceae	Kanay
19.	<i>Cyanotis vaga</i> (Loour.) Roem & Schult.	Commelinaceae	Kanay
20.	<i>Cynodon dactylon</i> Linn	Poaceae	Dubo
21.	<i>Digitaria ciliaris</i> (Retzius) Koeler	Poaceae	Chitray Banso
22.	<i>Digitaria sanguinalis</i> (Linn.) Scopoli.	Poaceae	Banso
23.	<i>Drymaria cordata</i> Wild. ex. Roem & Schult.	Caryophyllaceae	Abhijalo
24.	<i>Elatostema platyphyllum</i> Weddell.	Urticaceae	Gagleto
25.	<i>Elatostema sessile</i> J.R.Forst. & G.Forst.	Urticaceae	Gagleto

26.	<i>Eragrostis cilianensis</i> (All.) Lut. ex	Poaceae	Banso
27.	<i>Eupatorium adenophorum</i> Spreng.	Asteraceae	Kali jhar
28.	<i>Fragaria nubicola</i> Lindley ex. Lacaíta	Rosaceae	Bhui-aiselu
29.	<i>Gerardiana diversifolia</i> (Link) Friis	Urticaceae	Bhangre sisnu
30.	<i>Hedychium</i> sp.	Zingiberaceae	Qiura
31.	<i>Hedychium spicatum</i>	Zingiberaceae	Gai sara
32.	<i>Heracleum wallichii</i> DC.	Umbelliferae	Chimphing
33.	<i>Houttuynia cordata</i> Thunb	Saururaceae	Raktha-jhar
34.	<i>Impatiens stenantha</i> Hook. f.	Balsaminaceae	Mujuro
35.	<i>Impatiens stenantha</i> Hook.f	Balsaminaceae	Mujuro
36.	<i>Impatiens urticifolia</i> Wallich	Balsaminaceae	Mujuro
37.	<i>Lecanthus peduncularis</i> (Wall. ex Royle) Wedd.	Urticaceae	Gagleto
38.	<i>Oxalis corniculata</i> Linn.		Chariamilo
39.	<i>Persicaria capitata</i> (Buch.- Ham. ex D.Don) H. Gross	Polygonaceae	Ratnaulo
40.	<i>Pilea stricta</i> (Buchanan-Hamilton ex D. Don) Weddell	Urticaceae	Chiple
41.	<i>Pilea umbrosa</i> Blume.	Urticaceae	Chiple
42.	<i>Pouzolzia sanguine</i> (Blume) Merrill	Urticaceae	Chiple
43.	<i>Rumex nepalensis</i> Spreng.	Polygonaceae	Halhalley
44.	<i>Rumex nepalensis</i> Sprengel	Polygonaceae	Halhaley
45.	<i>Selaginella biformis</i> A. Br. ex Kuhn	Selaginellaceae	Jhew
46.	<i>Selaginella chrysocaulos</i> (Hook. & Grev.) Spring.	Selaginellaceae	Jhew
47.	<i>Selaginella monospora</i> Spring.	Selaginellaceae	Jhew
48.	<i>Smilax</i> sp.	Smilacaceae	Madaney kara / Kirney ghans
49.	<i>Strobilanthes</i> sp.	Acanthaceae	Kibu ghans
50.	<i>Swertia bimaculata</i> (Roxb. ex Flem.) Karsten	Gentianaceae	Bhaley chiraito
51.	<i>Swertia chirayita</i> H. Karsten	Gentianaceae	Chiraito
52.	<i>Urtica dioica</i> Linn.	Urticaceae	Patley sisnu
53.	<i>Urtica parviflora</i> Roxburgh	Urticaceae	Gharia sisnu
54.	<i>Villebrunea frutescens</i> (Thunb.) Blume	Urticaceae	Thulo Chiple
55.	<i>Viola sikkimensis</i> W. Becker	Violaceae	Silamey jhar
EPIPHYTES / CLIMBERS			
1.	<i>Aconogonum molle</i> (D. Don) H. Hara	Polygonaceae	Thotne
2.	<i>Arisaema intermedium</i> Blume	Araceae	Larua/Banko

3.	<i>Boehmeria</i> sp.	Urticaceae	Kamley
4.	<i>Cardamine hirsuta</i> L.	Brassicaceae	Titey
5.	<i>Carex</i> sp.	Cyperaceae	Harkatto
6.	<i>Clematis acuminata</i> DC	Rununculaceae	Pinasay lahara
7.	<i>Clematis buchananiana</i> DC	Rununculaceae	Pinasey lahara
8.	<i>Clematis buchananiana</i> DC.	Ranunculaceae	Pinasey lahara
9.	<i>Codonopsis viridis</i> Wallich.	Campanulaceae	Padey lahara
10.	<i>Coelogyne flaccida</i> (Lindl.) Kuntz.	Orchidaceae	Sunakhari
11.	<i>Davallodes membranulosa</i> (Hook.) Copel.	Davalliaceae	Uniu
12.	<i>Digitaria sanguinalis</i> (Linn.) Scopoli.	Poaceae	Banso
13.	<i>Diplazium dilatatum</i> Blume Lek	Woodsiaceae	ChipleY Ningro
14.	<i>Diplazium stoliczkae</i> Beddome	Woodsiaceae	Lek kalo ningro
15.	<i>Elatostema platyphyllum</i> Weddell.	Urticaceae	Gagleto
16.	<i>Eragrostis cilianensis</i> (All.) Lut. ex Janchen	Poaceae	Banso
17.	<i>Galium</i> sp.	Rubiaceae	
18.	<i>Machilus gamblei</i> King ex J. D. Hooker		Seti kaulo / Ghew kaulo
19.	<i>Mucuna macrocarpa</i> Wall.	Leguminosae	Baldengra
20.	<i>Piper boehmeriaefolia</i> (Miq.) DC.	Piperaceae	Chabo / Jungali pan
21.	<i>Rhapidiphora decursiva</i> (Roxb.) Schott.	Araceae	Kanchirno
22.	<i>Rubia cordifolia</i> Linn	Rubiaceae	Majito
23.	<i>Rubia manjith</i> Roxb. ex Fleming	Rubiaceae	Majito
24.	<i>Smilax zeylanica</i> Linn.	Liliaceae	Kukur dainey
25.	<i>Smilax aspara</i> L.	Liliaceae	Kukurdaina
26.	<i>Tetrastigma serrulatum</i> (Roxb.) Planchon	Vitaceae	Charcharey lahara
27.	<i>Trichosanthes lepiniana</i> (Naud.) Cogn.	Cucurbitaceae	Indreni
28.	<i>Viscum articulatum</i> Burm. f.	Lorantaceae	Harchur
29.	<i>Wrightia gigantea</i>		Bauni Kath
30.	Unidentified		Chaulane lahara
31.	<i>Rubus</i> sp.		Boksi lahara
32.	<i>Thysanolaena latifolia</i> (Roxb. ex Hornem.) Honda		Amliso
FERNS AND FERN-ALLIES			
1.	<i>Asplenium laciniatum</i> D. Don.	Aspleniaceae	Uniu
2.	<i>Blechnum orientale</i> L.	Blechnaceae	Deer Fern
3.	<i>Coniogramme intermedia</i> Heiron.	Pteridaceae	Uniu
4.	<i>Coniogramme fraxinea</i> (D. Don) Fee ex Diels	Pteridaceae	Bamboo leaf fern

5.	<i>Cyathea spinulosa</i> Wall.ex Hook	Cyatheaceae	Rukh uniu
6.	<i>Dennstaedtia appendiculata</i> (Wall.ex Hook.) J.Sm	Dennstaedtiaceae	Piray uniu
7.	<i>Diplazium dilatatum</i> Blume	Woodsiaceae	Lek Chipley Ningro
8.	<i>Diplazium esculentum</i> (Retz.) Sw	Woodsiaceae	Chiplay ningro
9.	<i>Diplazium stoliczkae</i> Beddome	Woodsiaceae	Lek Kalo Ningro
10.	<i>Drynaria</i> sp.	Polypodiaceae	Basket fern
11.	<i>Equisetum diffusum</i> D.Don.	Equiaetaceae	Salli bisalli
12.	<i>Gleichenia gigantean</i> Wall. ex Hook	Dryopteridaceae	Kalamey Uniu
13.	<i>Gleichenia longissima</i> Blume	Dryopteridaceae	Sottarey uniu
14.	<i>Lepisorus</i> sp.	Polypodiaceae	Polypods
15.	<i>Leucostegia truncata</i> (D.Don) Fras.-Jenk.	Davalliaceae	Deer fern
16.	<i>Lycopodium japonicum</i> Thunb	Lycopodiaceae	Nagbelli
17.	<i>Monachosoram henryi</i> Christ.	Monachosoraceae	Uniu
18.	<i>Microsorium membranaceum</i> (D.Don) Cing	Polypodiaceae	Uniu
19.	<i>Nephrolepis cordifolia</i> (Linn.) C. Presl.	Davalliaceae	Pani amala
20.	<i>Odontosoria chinensis</i> (L.) J.Smith	Lindsaeaceae	Uneu
21.	<i>Plagiogyria pycnophylla</i> (Kunze.) Mett.	Plagiogyriaceae	Uniu
22.	<i>Pseudodrynaria coronans</i> (Wall.ex Mett.) T.Moore	Polypodiaceae	Kamray lahara
23.	<i>Pteridium revolutum</i> (Blume) Nakai		Uniu
24.	<i>Pteris wallichiana</i> J. Agardh	Pteridaceae	Uneu
25.	<i>Vittaria elongata</i> Sw	Vittariaceae	Uniu
BAMBOO / CANE			
1.	<i>Bambusa nutans</i> Wall. ex Munro	Poaceae	Mal Bans
2.	<i>Costus speciosus</i> Koenig Sm.	Costaceae	Bethlauri
3.	<i>Himalayacalamus hookerianus</i> (Munro) Stapleton	Poaceae	Pareng
4.	<i>Phyllostachys aurea</i> Riviere & C.Rivire	Poaceae	Katha Bans
5.	<i>Plectocomia himalayana</i> Giff.	Arecaceae	Fyakray bet
6.	<i>Schizostachyum capitatum</i> (Munro) R.B.Majumdar	Poaceae	Gope Bans
7.	<i>Sinarundinaria intermedia</i> (Munro) C.S.Chao & Renvoize	Poaceae	Nigalo/Tite Nigalo
8.	<i>Themnocalamus falconeri</i> Hook.f. ex. Munro.	Poaceae	Singanay Bans
9.	<i>Yushania maling</i> (Gamble) R.B.Majumdar & Karthik.	Poaceae	Malingo



Dobinea vulgaris

FAUNA

During the biodiversity survey in Rangdang Reserve forest, the existence of a total of 18 mammalian species, 51 birds species and 60 butterflies species were recorded through direct sightings and indirect evidences, which are listed in table.

Checklist of Faunal species, including Mammals, Avi-fauna and butterflies of Rangdang RF and surrounding area in South Sikkim.

Sl.No	Common name	Scientific name	Family
Mammals			
1.	Jackel	Cannis aurens	Canidae
2.	Himalayan Serow	Capricornis thar	Bovidae
3.	Parti-colored flying squirrel	Hylopetes alboniger	Sciuridae
5.	Yellow-Throated marten	Martes flavigula	Mustelids
6.	Barking Deer	Muntiacus muntjak	Cervidae
7.	Goral	Naemorhedus goral	Bovidae
8.	Himalayan palm civet	Paguma larvata	Viverridae
9.	Wild Boar	Sus scrofa	Suidae
11.	Himalayan black Bear	Ursus thibetanus	Ursidae
12.	Himalayan Crestless Porcupine	Hystrix brachyura	Hystriidae

13.	Hoary Bellied Himalayan Squirrel	<i>Callosciurus pygarythrus</i>	Sciuridae
14.	Himalayan Tahr	<i>Hemitragus jemlahicus</i>	Bovidae
15.	Wild Dog	<i>Cuon alpinus</i>	Canidae
16.	Musk deer	<i>Moschus sp.</i>	Moschidae
17.	Leopard cat	<i>Prionailurus sp.</i>	Felidae
18.	Jungle cat	<i>Felis chaus</i>	Felidae
19.	Macaque / Monkey	<i>Macaca sp.</i>	Cercopithecidae
Avi - Fauna			
1.	Ashy Drongo	<i>Dicurus leucophaeus</i>	Dicuridae
2.	Barred Cuckoo Dove	<i>Macropygia unchall</i>	Columbidae
3.	Blue Whistling Thrush	<i>Myophonus caeruleus</i>	Turdidae
4.	Blue-fronted Redstart	<i>Phoenicurus frontalis</i>	Muscicapidae
5.	Blue-winged Siva	<i>Siva cyanouoptera</i>	Timaliidae
6.	Black bulbul	<i>Hypsipetes leucocephalus</i>	Pycnonotidae
7.	Common Green Magpie	<i>Cissa chinensis</i>	Corvidae
8.	Common Hoopoe	<i>Upupa epops</i>	Upupidae
9.	Common Myna	<i>Acridotheres tristis</i>	Sturnidae
10.	Common pigeon	<i>Columba libia</i>	Columbidae
11.	Common Tailored Bird	<i>Orthotomus sutorius</i>	Cisticolidae
12.	Golden-breasted Fulvetta	<i>Lioparus chrysotis</i>	Sylviidae
13.	Great Barbet	<i>Megalaima virens</i>	Ramphastidae
14.	Greater Yellownape	<i>Picus flavinucha</i>	Picidae
15.	Green-backed Tit	<i>Parus monticolus</i>	Paridae
16.	Green-tailed Sunbird	<i>Aethopyga nipalensis</i>	Nectariniidae
17.	Grey-backed Shrike	<i>Lanius tephronotus</i>	Laniidae
18.	Grey-headed Canary Flycatcher	<i>Culicicapa ceylonensis</i>	Stenostiridae
19.	Grey-headed Parakeet	<i>Psittacula finschii</i>	Psittacidae
20.	Himalayan Bluetail	<i>Tarsiger rufilatus</i>	Muscicapidae
21.	Himalayan Bulbul	<i>Pycnonotus leucogenys</i>	Pycnonotidae
22.	Hodgson's Redstart	<i>Phoenicurus hodgsoni</i>	Muscicapidae
23.	House Crow	<i>Corvus splendens</i>	Corvidae
24.	House Sparrow	<i>Passer domesticus</i>	Passeridae
25.	Kalij Pheasant	<i>Lophura leucomelanos</i>	Phasianidae
26.	Large-billed Crow	<i>Corvus macrorhynchos</i>	Corvidae
27.	Lesser Yellownape	<i>Picus chlorolophus</i>	Picidae

28.	Little Spiderhunter	Aracanothra longirostra	Nectariniidae
29.	Nepal Fulvetta	Alcippe nipalensis	Sylviidae
30.	Oriental Magpie Robin	Copsychus saularis	Muscicapidae
31.	Oriental Turtle Dove	Streptopelia orientalis	Columbidae
32.	Oriental White-eye	Zosterops palpebrosus	Zosteropidae
33.	Red-billed Leiothrix	Leiothrix lutea	Timaliidae
34.	Red-tailed Minla	Minla ignotincta	Leiothrichidae
35.	Red-vented Bulbul	Pycnonotus cafer	Pycnonotidae
36.	Rufous sibia	Malacias capistratus	Timaliidae
37.	Rufous-bellied Niltava	Niltava sundara	Muscicapidae
38.	Rufous-gorgeted Flycatcher	Ficedula strophiat	Muscicapidae
39.	Scaly Laughingthrush	Garrulax austeni	Turdidae
40.	Scarlet Minivet	Pericrocotus cinnamomeus	Campephagidae
41.	Silver-eared Mesia	Mesia argentauris	Leiothrichidae
42.	Slender-billed Scimitar Babbler	Xiphirhynchus superciliaris	Timaliidae
43.	Spangled Drongo	Dicrurus hottentottus	Dicruridae
44.	Stripe-throated Yuhina	Yuhina gularis	Zosteropidae
45.	Velvet-fronted Nuthatch	Sitta frontalis	Sittidae
46.	Verditer flycatcher	Eumyias thalassinus	Muscicapidae
47.	Whiskered Yuhina	Yuhina flavicollis	Zosteropidae
48.	White-browed Fulvetta	Fulvetta vinipectus	Sylviidae
49.	White-browed Piculat	Sasia ochracea	Picidae
50.	White-capped Redstart	Chaimarrornis leucocephalus	Muscicapidae
51.	White-crested Laughingthrush	Garrulax leucolophus	Turdidae
Butterflies			
1.	Autumn leaf	Doleschallia bisaltidae	Nymphalidae
2.	Banded Treebrown	Lethe confuse	Nymphalidae
3.	Blue Peacock	Papilio acturus	Papilionidae
4.	Chocolate Pansy	Junonia iphita	Nymphalidae
5.	Common Bushbrown	Mycalesis perseus	Nymphalidae
6.	Common cerculean	Jamides celeno	Lycanidae
7.	Common Crow	Euploea core	Nymphalidae
8.	Common Earl	Tanaecia julii	Nymphalidae
9.	Common Evening Brown	Melanitis leda	Nymphalidae
10.	Common Five Ring	Ypthima baldus	Nymphalidae

11.	Common Grass Yellow	<i>Eurema hecabe</i>	Pieridae
12.	Common Jester	<i>Symbrenthia hippoclus</i>	Nymphalidae
13.	Common Line Blue	<i>Posotas nora</i>	Lycaenidae
14.	Common Map	<i>Cyrestis thyodamas</i>	Nymphalidae
15.	Common Maplet	<i>Chersonesia risa</i>	Nymphalidae
16.	Common Mormon	<i>Papilio polytes</i>	Papilionidae
17.	Common Nawab	<i>Polyuria athamas</i>	Nymphalidae
18.	Common Palmfly	<i>Elymnias hypermnestra</i>	Nymphalidae
19.	Common Peacock	<i>Papilio polyctor</i>	Papilionidae
20.	Common Pierrot	<i>Castalius rosimon</i>	Lycaenidae
21.	Common Red Eye	<i>Matapa aria</i>	Hesperiidae
22.	Common Red Forester	<i>Lethe mekara</i>	Nymphalidae
23.	Common Sergeant	<i>Athyma perius</i>	Nymphalidae
24.	Common Silverline	<i>Spindasis vulcans</i>	Lycaenidae
25.	Common Small Flat	<i>Sarangesa dasahara</i>	Hasperiidae
26.	Common Windmill	<i>Atrophaneura polyeuctes</i>	Papilionidae
27.	Dark Judy	<i>Abisara fylla</i>	Riodinidae
28.	Fluffy tit	<i>Zeltus amasa</i>	Lycaenidae
29.	Fulvous pied Flat	<i>Pseudocoladenia dan</i>	Hesperiidae
30.	Glassy Bluebottle	<i>Graphium sarpedon</i>	Papilionidae
31.	Golden Sapphire	<i>Heliophorus brahma</i>	Lycaenidae
32.	Grass Demon	<i>Udaspes folus</i>	Hesperiidae
33.	Green Commodore	<i>Sumalia daraxa</i>	Nymphalidae
34.	Indian Cabbage White	<i>Pieris canidia</i>	Pieridae
35.	Indian Fritillary	<i>Argynnis hyperbius</i>	Nymphalidae
36.	Indian Red Admiral	<i>Venessa indica</i>	Nymphalidae
37.	Indian Skipper	<i>Spialian galba</i>	Hesperiidae
38.	Indian Tortoiseshell	<i>Aglais cashmiriensis</i>	Nymphalidae
39.	Large Yeoman	<i>Cirrochroa aoris</i>	Nymphalidae
40.	Lemon Pansy	<i>Junonia lemonias</i>	Nymphalidae
41.	Mixed Punch	<i>Dodona ouida</i>	Riodinidae
42.	Nigger	<i>Orsotrioena medus</i>	Nymphalidae
43.	Orange Oakleaf	<i>Kallima inachus</i>	Nymphalidae
44.	Orange Punch	<i>Dodona egeon</i>	Riodinidae
45.	Painted Lady	<i>Venessa carduii</i>	Nymphalidae
46.	Plain Tiger	<i>Danaus chrysippus</i>	Nymphalidae

47.	Punchinello	<i>Zemeros flegyas</i>	Riodinidae
48.	Purple Sapphire	<i>Heliophorus epicles</i>	Lycaenidae
49.	Red Helen	<i>Papilio helenus</i>	Papilionidae
50.	Red Lacewing	<i>Cethosia biblustisamena</i>	Nymphalidae
51.	Redbreast	<i>Papilio alcmenor</i>	Papilionidae
52.	Rice Swift	<i>Borbo cinnara</i>	Hesperiidae
53.	Spotted sawtooth	<i>Prioneris thestylis</i>	Pieridae
54.	Spotted Snow Flat	<i>Tagiades menaka</i>	Hesperiidae
55.	Striped Tiger	<i>Danaus genutia</i>	Nymphalidae
56.	Tailed Jay	<i>Graphium agamemnon</i>	Papilionidae
57.	Tiger Hooper	<i>Ochus subvittatus</i>	Hasperiidae
58.	Water Snow Flat	<i>Tagiades litigiosa</i>	Hesperiidae
59.	Yamfly	<i>Loxura atymnus</i>	Lycaenidae
60.	Yellow Helen	<i>Papilio nephelus</i>	Papilionidae

DISCUSSION

Rangdang Reserved Forest was found to be rich in terms of the diversity of the species. Forest being sub tropical, temperate, upto subalpine type, trees are the most predominant taxa in the area. The area constitutes a diverse habitat for both flora and fauna. The area is highly dominated with the trees and small trees species namely *Symplocos theifolia*, *Lithocarpus fenestrata*, *Castanopsis tribuloides*, *Castanopsis hystrix*, *Brassaiopsis mitis*, *Quercus pachyphylla*, *Quercus lamellos*, *Pyricularia edulis*, *Pieris ovalifolia*, *Michelia cathcartii*, *Maesa chisia*, *Machilus gammieana*, *Antidesma acuminatum*, *Acer caudatum*, *Rhododendron arboreum* etc. and the high altitudes covers mainly the species of *Rhododendron falconeri*, *Acer pectinatum*, *Betula utilis*, *Tsuga dumosa* etc. Common shrub species recorded from the area are *Rubus ellipticus*, *Rubus niveus*, *Rubus paniculatus*, *Viburnum erubescens*, *Dichroa febrifuga*, *Maesa chisia*, *Oxyspora paniculata*, *Polygala arillata*, *Berberis* sp. *Ribes* sp. etc. In addition, the area also provide diverse habitat for the faunal and avi-faunal species.

Rangdang Reserve Forest is divided into two compartments. Compartment 1 is located shares its boundary with Rungdung khola bordering Dhuppidara village in the east, junction of Rangdang chu and Ralley chu in the South, Rally Khola boardering Lhabdang in the southwest and compartment 2 of the Rangdang RF in the Northern part. The placea above Rally khola and above Rungdung village, Tanki dara, Dhajay Dara etc. are located in the compartment 1 of the Rangdang RF (Fig.1, Table 1). Compartment 2 shares its western boundary with Rally khola boardering compartment 2 and 3 of Lhabdang RF, Northern boundary with Neythang, which is under Khangchenzunga National Park, eastern boundary with Rangdang khola boardering upper part of Dhuppidara village and southern boundary with the compartment 1 of Rangdang RF.

Sub tropical to lower temperate region (1400-1800m) of the Rangdang Reserved Forest below

Rungdung village and the lower sides of Rungdung khola and Relly khola and adjacent areas are highly covered with *Bambusa nutans*, *Machilus edulis*, *Engelhardtia spicata*, *Alnus napaulensis*, *Rubus ellipticus*, *Edgeworthia gardenerii*, *Maesa chisia*, *Ostedes paniculatus*, *Quercus lamellose*, *Saurauia napaulensis*, *Schima wallichii*, *Albizia lebbeck*, *Albizia odoratissima*, *Albizia procera*, *Alnus nepalensis* and so on. The area above Rungdung village upto the area in and around Tanki Dara (1800-2300m) are covered highly with *Eurya acuminata*, *Pieris ovalifolia*, *Symplocos theifolia*, *Symplocos glomerata*, *Dichroa febrifuga*, *Rubus niveus*, *Viburnum erubescens*, *Rubus paniculatus*, *Antidesma acuminatum*, *Castanopsis hystrix*, *Castanopsis indica*, *Castanopsis tribuloides*, *Acer caudatum*, *Actinodaphne sikkimensis*, *Brassaiopsis mitis*, *Cedrela febrifuga*, *Elaeocarpus lanceaefolius*, *Garuga pinnata*, *Glochidion acuminatum* etc. The area above Tanki Dara upto Dhajay dara and surrounding area, in an upper temperate region (2300-2600m) are efficiently covered with *Machilus odoratissimus*, *Michelia cathcartii*, *Michelia excelsa*, *Myrica esculenta*, *Nyssa sessiliflora*, *Rhus succedanea*, *Rhus succedanea* var. *acuminata*, *Daphne cannabina*, *Themnocalamus falconeri*, *Dichroa febrifuga*, *Rhododendron arboreum*, *acer pectinatum* etc.

CONCLUSION AND RECOMMENDATIONS

The area is not much impacted by the natural as well as anthropogenic disturbance. The unsustainable extraction of plants especially for firewood and livestock feed by the local inhabitants are the general disturbances resulted in the building up considerable pressure on the survival of the species. Other major threats are obviously, the effect of drastic changes in climate, hence studies on the impact of climate change on the biodiversity of the area is recommended, which will be helpful in framing conservation and management strategies.



Hedychium spicatum

Rayong Reserve Forest, South Sikkim

Anjana Pradhan, Nimesh Chamling, Suraj Subba and Dorjee Chewang Bhutia



View of Rayong village bounded by dominating *Cryptomeria japonica*

INTRODUCTION

Rayong Reserve Forest is located in the district of South Sikkim that lies between 27°14'28.69"N – 27°19'33.9"N latitude and 88°19'56.18"E – 88°22'32.10"E longitude. It covers a total area of 13.58 sq.km and the altitude of the forest ranges from 1700m to 2390m asl. The reserve forest lies in 7 compartments Rayong 1, Rayong 2, Rayong 3, Rayong 4, Rayong 5, Rayong 6 and Rayong 7 that falls under the jurisdiction of Rabong Block in Rabong Range. A part of the forest encloses Rayong bustling standing at an elevation of 2147m asl lying within compartment 2 and Rabong lying within compartment 6.

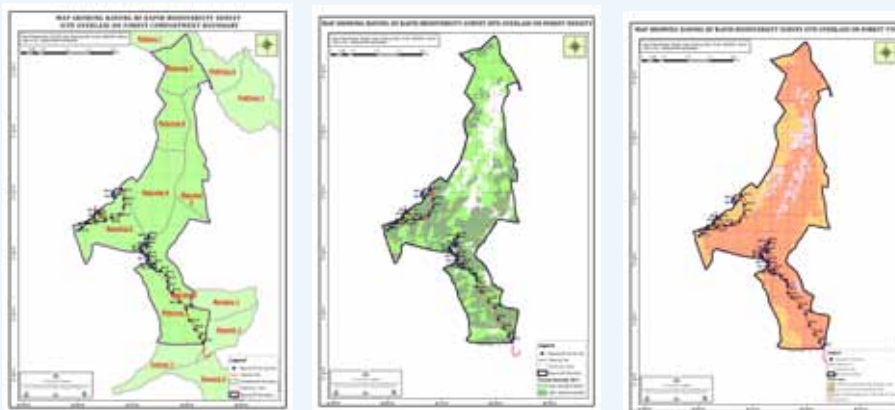
The forest broadly houses subtropical and wet-temperate oak forests where the subtropical zone is largely dominated by *Cryptomeria japonica* covering large areas and forming dense forests. The wet-temperate zone is flourished with various species of evergreen oak trees such as *Lithocarpus*, *Castanopsis*, *Quercus* and other tree species of *Symplocos*, *Magnolia*, *Juglans regia*, *Engelhardtia spicata*, *Leucosceptrum canum*, *Acer campbellii*, etc. A large number of *Rubus*, *Mahonia* and *Viburnum* species are the dominating shrubs distributed in the forest. The forest floor is, however, flooded with under shrubs and herbs such as *Eragrostis* sp., *Urtica* sp., *Persicaria* sp., *Polygonum* sp., *Lycopodium japonicum* and *Hedychium spicatum*. The trees of the forest are commonly seen with epiphytic orchids and climbers growing on them such as *Pleione praecox*, *Dendrobium longicornu*, *Coelogyne fuscescens* and *Otochilus*

fuscus. Epiphytic climbers such as *Agapetes serpens*, *Tetrastigma* species and *Raphidophora decursiva* are also regularly seen on trees. Other generally found climbers are *Rubia manjith*, *Smilax elegans*, *Herpetospermum pedunculatum*, *Piper boehmerifolium* and *Cissus elongata*. The forest also harbours bamboo species like *Yushania maling* (Malingo), *Himalayacalamus hookerianus* (Pareng) and *Himalayacalamus falconeri* (Singanay baas). Numerous medicinal plants such as *Swertia chirayita*, *S. bimaculata*, *Astilbe rivularis*, *Centella asiatica*, *Rohdea nepalensis* and *Ageratina adenophora* inhabit the forest as well.

Amongst the mammal species, Goral, Wild Boar, Himalayan Black Bear, monkey, chitwa, Barking Deer, fox, Yellow-throated Marten are reported in the forest. The forest also inhabits bird species like Fire-tailed myzornis, Red-vented bulbul, Rubus-bellied Niltava, Common Myna, Hoart-throated Barwing, Green-tailed Sunbird, Common Green Magpie, Black-faced Laughingthrush, Oriental Turtle Dove that were sighted during the survey. Some commonly seen butterflies in the area are *Euploea core* Cramer, Green commodore, Golden Sapphire, Common Silver Stripe, *Vanessa cardui* and *Aglais caschmirensis*.

SURVEY AREA

The objective of this study was to do Rapid Biodiversity Survey of the vegetation of Rayong Reserve Forest based on the density of the forest (moderate and dense) and the types of forest (wet temperate and sub-tropical) covering the compartments by laying plots as per the vegetation variation. Accordingly, the survey was conducted along the altitudinal range from 1758m to 2374m asl lying between 27°14'34.58"N – 27°17'0.3»N latitude and 88°19'56.38»E – 88°22'12.62»E longitude covering an area of 0.44ha. The field survey was conducted during December 2017. A total of 44 plots were laid covering mainly 3 compartments, i.e., Rayong 1, 2 & 3 which is represented in the maps below. Compartment 1 of Rayong shares its border with Deorali RF in the south, Compartment 2 shares its border with Rankey RF in the east and compartment 7 shares its boundary with Pathing RF in the north-east and Ralang RF in the north.



Maps showing survey plots of Rayong RF covering the compartments, forest density and forest types

Site characteristics of the sampling plots along Rayong Reserve Forest in South Sikkim							
Site code	Forest Type	Altitude (m)	GPS coordinates		Slope Aspect	Slope Angle (°)	Canopy Cover (%)
			Latitude (N)	Longitude (E)			
RRF 01	Moderate Wet temperate	1758	27°15'46.94"	88°21'19.22"	S	15	35
RRF 02	Moderate Wet temperate	2220	27°15'51.05"	88°21'13.68"	S	20	15
RRF 03	Moderate Wet temperate	2202	27°15'55.37"	88°21'13.14"	SE	15	20
RRF 04	Moderate Wet temperate	2276	27°16'5.16"	88°21'11.84"	NW	15	40
RRF 05	Moderate Wet temperate	2299	27°16'6.67"	88°21'12.35"	SE	45	30
RRF 06	Dense Wet temperate	2303	27°16'14.16"	88°21'13.61"	SE	45	50
RRF 07	Moderate Wet temperate	2308	27°16'14.79"	88°21'13.39"	NW	Mild	40
RRF 08	Moderate Wet temperate	2328	27°16'11.42"	88°21'10.50"	NE	Mild	15
RRF 09	Moderate Wet temperate	2319	27°16'06.81"	88°21'08.56"	W	15	20
RRF 10	Moderate Wet temperate	2361	27°16'04.48"	88°21'05.62"	N	10	40
RRF 11	Moderate Wet temperate	2374	27°16'01.63"	88°21'03.94"	N	20	30
RRF 12	Moderate Wet temperate	2350	27°16'00.40"	88°21'06.13"	N	35	40
RRF 13	Moderate Wet temperate	2272	27°15'55.57"	88°21'10.00"	NW	35	45
RRF 14	Moderate Wet temperate	2225	27°15'50.15"	88°21'11.68"	NE	15	35
RRF 15	Moderate Wet temperate	2213	27°15'46.33"	88°21'14.07"	W	Mild	30
RRF 16	Dense Wet temperate	2213	27°15'43.53"	88°21'16.38"	SW	Mild	60
RRF 17	Dense Wet temperate	2192	27°15'42.27"	88°21'19.88"	NE	15	65
RRF 18	Moderate Wet temperate	2170	27°15'40.17"	88°21'26.59"	W	55	40
RRF 19	Dense Wet temperate	2173	27°15'35.77"	88°21'32.23"	NE	35	60
RRF 20	Moderate Wet temperate	2167	27°15'30.27"	88°21'34.25"	NW	30	15
RRF 21	Moderate Wet temperate	2191	27°15'23.65"	88°21'34.50"	NW	Mild	10
RRF 22	Moderate Wet temperate	2222	27°15'18.81"	88°21'39.08"	N	15	40
RRF 23	Dense Wet temperate	2231	27°15'09.31"	88°21'47.05"	E	30	60
RRF 24	Dense Wet temperate	2262	27°15'02.58"	88°21'54.14"	W	Mild	55
RRF 25	Dense Wet temperate	2279	27°14'51.19"	88°21'57.45"	NW	Mild	75
RRF 26	Moderate Wet temperate	2333	27°14'42.11"	88°22'03.82"	NW	35	40

RRF 27	Dense Wet temperate	2311	27°14'34.58"	88°22'08.98"	N	60	55
RRF 28	Moderate Wet temperate	2311	27°14'28.77"	88°22'12.62"	N	Mild	20
RRF 29	Moderate Wet temperate	1827	27°16'53.00"	88°20'36.35"	W	Mild	45
RRF 30	Moderate Wet temperate	1826	27°16'53.19"	88°20'36.77"	W	10	20
RRF 31	Moderate Wet temperate	1816	27°16'56.30"	88°20'34.30"	W	15	20
RRF 32	Moderate Wet temperate	1938	27°16'43.10"	88°20'46.64"	NE	15	40
RRF 33	Dense Wet temperate	1947	27°16'35.90"	88°20'41.75"	NE	35	60
RRF 34	Moderate Wet temperate	1961	27°16'32.73"	88°20'33.11"	W	Mild	40
RRF 35	Dense Wet temperate	1961	27°16'32.78"	88°20'32.97"	E	25	60
RRF 36	Moderate Wet temperate	1939	27°16'30.75"	88°20'25.73"	E	30	20
RRF 37	Dense Wet temperate	1910	27°16'37.47"	88°20'19.44"	E	45	70
RRF 38	Dense Wet temperate	1994	27°16'29.24"	88°20'16.93"	NE	35	60
RRF 39	Moderate Wet temperate	1946	27°16'28.34"	88°20'06.57"	N	25	40
RRF 40	Dense Wet temperate	1947	27°16'27.68"	88°20'04.90"	E	45	60
RRF 41	Dense Wet temperate	1986	27°16'23.96"	88°19'59.93"	E	65	85
RRF 42	Moderate Wet temperate	2005	27°16'21.22"	88°19'56.38"	NE	50	40
RRF 43	Dense Wet temperate	1944	27°16'32.63"	88°20'14.07"	E	45	50
RRF 44	Moderate Wet temperate	1880	27°16'37.62"	88°20'15.39"	NE	45	10

Note: S: South; SE: South-East; NW: North-West; NE: North-East; N: North; W: West; SW: South-West; E: East



CBH measurement of the heritage tree *Quercus lamellosa*



Laying of plots



Observation and recording of species

FLORAL DIVERSITY OF THE FOREST

The vegetation of the surveyed path is a mild variation of subtropical and wet-temperate type. However, as per our survey, we came across the temperate forest type where the density of the forest is dense in all the compartments with moderately dense canopy. Since the altitude of the forest ranges from 1758m to 2374m asl, the forest is largely wet temperate covering all the compartments with only a part of it being subtropical.

The starting point of the survey was from Rayong busty (2147m) where the surrounding forest is largely dominated by *Cryptomeria japonica* covering large areas and forming dense forests. The ground vegetation underneath these forests is scanty due to lack of sunlight and unstable substratum. Only a few ferns grow on the fringes of such forests. However, *Rohdea nepalensis*, a medicinal value for diabetes and an appetizer, is found to be growing under *Cryptomeria japonica* vegetation near Rayong village.

The forest being wet temperate, it covers a large number of oak trees dominating the forest constituting the greater part of the trees of top canopy. Some commonly occurring oak species in this forest are *Castanopsis hystrix* mostly found between 1816m and 1970m, *Castanopsis tribuloides* (1950m – 2299m), *Lithocarpus elegans* (1800m – 2300m), *L. pachyphyllus* (1800m – 2303m) and *Quercus lamellosa* (1700m – 2280m). According to the Forest Survey of India, trees of CBH 20 – 26feet are demarcated as heritage trees and such trees of oak were recorded in the forest during the survey. One of them being *Castanopsis hystrix* with CBH 20ft (609.6cm) and *Quercus lamellosa* with CBH 26ft (792.48cm) are recorded at elevations of 1947m asl and 2231m asl. *Acer campbellii*, *Magnolia doltsopa*, *Engelhardtia spicata*, *Exbucklandia populnea*, *Symplocos glomerata*, *S. lucida* and *Eurya acuminata* are quite common in the forest upto 2300m. Saplings and seedlings of *Lithocarpus* and *Symplocos* are widely dispersed indicating good regeneration of the species in the forest. However, their vast vegetation indicates the presence of Himalayan Black Bear as they feed on the fruits of these trees. Other common trees available in this zone are *Quercus lamellosa*, *Beilschmiedia sikkimensis*, *Betula alnoides*, *Elaeocarpus lanceifolius*, *Garuga pinnata*, *Juglans regia*, *Lyonia ovalifolia*, *Pyralaria edulis* and *Zanthoxylum acanthopodium*.

The commonly found shrubs in the forest are *Rubus ellipticus*, *R. parviflorus*, *R. paniculatus*, *Osbeckia stellata*, *Daphne papyracea*, *Viburnum erubescens* and *Mahonia napaulensis*. The oaks have branched crowns and are abundantly covered with mosses and other epiphytes such as *Agapetes serpens*, *Tetrastigma* species and *Raphidophora decursiva*. Epiphytic orchids such as *Pleione praecox*, *Dendrobium longicornu*, *Coelogyne fuscescens* and *Otochilus fuscus* are the common orchids found covering the trees especially the oaks and *Cryptomeria japonica*. Trees are also seen covered with climbers such as *Cissus elongata*, *Piper boehmeriifolium*, *Clematis buchananiana*, *Herpetospermum pedunculatum*, *Trichosanthes lepiniana*, *Rubia manjith* and *Dactylicapnos scandens*. The ground vegetation is mostly a habitat for herbs like *Anaphalis triplinervis*, *A. margaritacea*, *Carex* species, *Elatostema platyphyllum*, *Hedychium spicatum*, *Impatiens racemosa*, *Persicaria runcinata*, *P. capitata*, *Polygonum molle*, *Rubus calycinus*, *Urtica parviflora* and *U. dioica*. Other commonly occurring ground vegetation is ferns such as *Selaginella* species, *Lycopodium japonicum*, *Diplazium dilatatum* and *Gleichenia longissima*. A large patch of ground is covered with *Cotoneaster* and *Gaultheria* species.



Pleione praecox



Dendrobium longicornu

Further into the forest, bamboo species of *Yushania maling* (Malingo), *Himalayacalamus hookerianus* (Pareng) and *Himalayacalamus falconeri* (Singanay baas) are found in dense and mild population. Their presence forms an important aspect as a soil binding property. While *Yushania maling* (Malingo) bamboo is densely populated along 2202m – 2374m asl, *Himalayacalamus hookerianus* (Pareng) and *Himalayacalamus falconeri* (Singanay baas) are seen occurring in the forest occasionally. Numerous medicinal plants as herbal remedies for treatment of various ailments such as *Swertia chirayita*, *S. bimaculata*, *Astilbe rivularis*, *Centella asiatica*, *Rohdea nepalensis*, *Ageratina adenophora*, *Oxalis corniculata*, *Dichroa febrifuga* and *Solanum aculeatissimum* are also found to be growing in the forest making the area an important prospect for conservation.

FAUNAL DIVERSITY OF THE FOREST

During the trail sampling, a number of faunal and avi-faunal species were sighted and some were recorded based on their calls and presence of scats, pellets, feathers or digging signs. Birds such as Fire-tailed Myzornis, Common Myna, Green-tailed Sunbird, Common Hill Partridge, Common Green Magpie, Black Bulbul, Black Eagle, Oriental Turtle Dove, Scaly Thrush, Rufous-bellied Niltava, Red-vented Bulbul, White-capped Water Redstart and Cheure were sighted during the survey. Some species were confirmed based on their calling such as that of Jungle Crow, Himalayan Tree Pie, Blue Whistling Thrush and Black-faced Laughingthrush. Other reported birds in the area are Hoart-throated Barwing, Verditer Flycatcher, White-crested Laughingthrush, Kalij Pheasant, Green-backed Tit, Scarlet Minivet, Rufous-vented Tit and Whiskered Yuhina.

Digging signs of Wild Boar was seen along the forest trail that confirmed its presence. Pellets of Goral and its sleeping area were especially observed at the view point of the forest at 2374m although its digging signs were common in the trail. Fox scat and Civet droppings were also observed along the trail that confirmed their presence in the forest. The scattered oak seeds on the forest floor indicated the presence of Himalayan Black Bear as well. Other reported mammal species in the forest are Barking Deer and Yellow-throated Marten are reported in the forest.



Fire-tailed Myzornis



Rufous-bellied Niltava



Civet droppings



Goral pellets

Many beautiful avians observed along the trail were *Euploea core* Cramer, Green commodore, Golden Sapphire, Common Silver Stripe, *Vanessa cardui* and *Aglais caschmirensis*.

FINDINGS

Flora

A total of 145 floral species belonging to 70 families were recorded during the survey. Herbs represented the highest number of species (44 species) belonging to 35 genera in 24 families. Trees characterized 38 species including 1 unidentified species belonging to 32 genera in 25 families. Recorded shrubs were 16 in number belonging to 12 genera in 9 families. Likewise, ferns were represented by 16 species belonging to 14 genera in 8 families. While 10 species of epiphytes were recorded, climbers represented 17 species belonging to 10 genera 8 families. The highest species was documented from Fagaceae family representing oak species of *Castanopsis hystrix*, *C. tribuloides*, *Lithocarpus elegans*, *L. pachyphyllus* and *Quercus lamellosa* along with other species belonging to Urticaceae, Rosaceae and Orchidaceae.

Checklist of floral species recorded in Rayong Reserve Forest in South Sikkim			
S. No	Botanical Name	Local Name	Family
TREES			
1	<i>Acer campbellii</i> Hook.f. & Thomson ex Hiern	Kapasey	Sapindaceae
2	<i>Actinodaphne sikkimensis</i> Meisn.	Sissi	Lauraceae
3	<i>Alnus nepalensis</i> D.Don	Utis	Betulaceae
4	<i>Beilschmiedia sikkimensis</i> King ex Hook.f.	Tarsing	Lauraceae
5	<i>Betula alnoides</i> Buch.-Ham.exD.Don	Saur	Betulaceae
6	<i>Brassaiopsishispida</i> Seem.	Chuletro/ Phutta	Araliaceae
7	<i>Castanopsis hystrix</i> Hook.f. & Thomson ex A. DC.	Patley katus	Fagaceae
8	<i>Castanopsis tribuloides</i> (Sm.) A.DC.	Musrey katus	Fagaceae
9	<i>Cryptomeria japonica</i> (Thunb. ex L.f.) D.Don	Dhuppi	Cupressaceae
10	<i>Dahlia</i> sp.		Compositae
11	<i>Echinocarpus dasycarpus</i> Benth.	Gobre	Elaeocarpaceae
12	<i>Elaeocarpus lanceifolius</i> Roxb.	Bhadrase	Elaeocarpaceae
13	<i>Engelhardtia spicata</i> Lechen ex Blume	Mauwa	Juglandaceae
14	<i>Eurya acuminata</i> DC.	Jhinganey	Pentaphylacaceae
15	<i>Exbucklandia populnea</i> (R.Br. ex Griff.) R.W.Br.	Piplee	Hamamelidaceae
16	<i>Ficus neriifolia</i> Sm.	Dudhilo	Moraceae
17	<i>Garuga pinnata</i> Roxb.	Dabdabe	Burseraceae
18	<i>Ilex sikkimensis</i> Kurz	Lise	Aquifoliaceae
19	<i>Juglans regia</i> L.	Okhar	Juglandaceae
20	<i>Leucosceptrum canum</i> Sm.	Ghurpis	Lamiaceae
21	<i>Lithocarpus elegans</i> (Blume) Hatus. exSoepadmo	Arkaulo katus	Fagaceae
22	<i>Lithocarpus pachyphyllus</i> (Kurz) Rehder	Sungure katus/Bante	Fagaceae

23	<i>Lyonia ovalifolia</i> (Wall.)Drude	Angeri	Ericaceae
24	<i>Machilus</i> sp.	Kawlo	Lauraceae
25	<i>Magnolia doltsopa</i> (Buch.-Ham. ex DC.) Figlar	Rani champ	Magnoliaceae
26	<i>Myrsine semiserrata</i> Wall.	Phalame	Primulaceae
27	<i>Prunus bracteopad us</i> Koehne	Arupatey	Rosaceae
28	<i>Pyralia edulis</i> (Wall.) A. DC.	Amphi	Santalaceae
29	<i>Quercus</i> sp.	Phalant	Fagaceae
30	<i>Quercus lamellosa</i> Sm.	Buk/Bajranth	Fagaceae
31	<i>Rapanea capitellata</i> (Wall.) Mez	Setikath	Primulaceae
32	<i>Symplocos glomerata</i> King ex C.B. Clarke	Kholmey	Symplocaceae
33	<i>Symplocos lucida</i> (Thunb.)Siebold&Zucc.	Kharanay	Symplocaceae
34	<i>Toona sureni</i> (Blume) Merr.	Tooni	Meliaceae
35	<i>Toxicodendron hookeri</i> (K.C. Sahni&Bahadur) C.Y. Wu & T.L. Ming	Bhalayo	Anacardiaceae
36	<i>Tsuga dumosa</i> (D.Don) Eichler	Thinge salla	Pinaceae
37	Unidentified	Halunday	
38	<i>Zanthoxylum acanthopodium</i> DC.	Boke timmur	Rutaceae
HERBS			
1	<i>Ageratina adenophora</i> (Spreng.) R.M.King & H.Rob.	Banmara/Kalijhar	Compositae
2	<i>Anaphalis margaritacea</i> (L.) Benth. & Hook.f.	Bukiphool	Compositae
3	<i>Anaphalis triplinervis</i> (Sims) Sims ex C.B.Clarke		Compositae
4	<i>Aster</i> sp.		Asteraceae
5	<i>Astilbe rivularis</i> Buch.-Ham. ex D.Don	Buro okhati	Saxifragaceae
6	<i>Begonia tessaricarpa</i> C.B. Clarke	Magar kajey	Begoniaceae
7	<i>Bidens pilosa</i> L.	Tikhe kuro	Compositae
8	<i>Boenninghausenia albiflora</i> (Hook.) Rchb. ex Meisn.	Dampate, Ankuree	Rutaceae
9	<i>Calceolaria</i> sp.	Lady's purse	Calceolariaceae
10	<i>Carex</i> sp.	Salimo	Cyperaceae

11	<i>Centella asiatica</i> (L.) Urb.	Golpatta	Apiaceae
12	<i>Cyanodon</i> sp.	Dubo	Poaceae
13	<i>Disporum</i> sp.	Mahjari	Colchicaceae
14	<i>Elatostema platyphyllum</i> Wedd.	Sano gagleto	Urticaceae
15	<i>Eragrostis</i> sp.	Banso	Poaceae
16	<i>Fragaria nubicola</i> (Lindl. ex Hook.f.) Lacaita	Bhui ainselu	Rosaceae
17	<i>Gaultheria</i> sp.		Ericaceae
18	<i>Gentiana capitata</i> Buch.-Ham. ex D.Don		Gentianaceae
19	<i>Girardinia diversifolia</i> (Link) Friis	Bhangray sisnu	Urticaceae
20	<i>Hedychium gardnerianum</i> Sheppard ex Ker Gawl	Saro	Zingibera- ceae
21	<i>Hedychium spicatum</i> Sm.	Saro	Zingibera- ceae
22	<i>Hemiphragma heterophyllum</i> Wall.	Lalgeri/Nash Jhaar, Lahare Phool, Raato Gedi	Plantagina- ceae
23	<i>Impatiens racemosa</i> DC.	Tantari, An- chirna	<u>Balsamina- ceae</u>
24	<i>Lecanthus peduncularis</i> (Wall. ex Royle) Wedd.		Urticaceae
25	<i>Neillia rubiflora</i> D.Don	Kirkirey jhar	Rosaceae
26	<i>Nephrolepis cordifolia</i> (L.) C. Presl.	Pani jhar	Oleandraceae
27	<i>Oxalis corniculata</i> Linn.	Amilo jhar	Oxalidaceae
28	<i>Persicaria runcinata</i> (Buch. – Ham. ex D.Don.) Masam.	Ratnaulo	Polygona- ceae
29	<i>Persicaria capitata</i> (Buch.-Ham. ex D.Don) H.Gross	Ratnaulo	Polygona- ceae
30	<i>Persicaria chinensis</i> (L.) H. Gross	Shrub like thotney	Polygona- ceae
31	<i>Persicaria wallichii</i> Greuter & Burdet	Rani thotney (like shrub)	Polygona- ceae
32	<i>Pilea scripta</i> (Buch.-Ham. ex D. Don) Wedd.	Chiplej jhar	Urticaceae
33	<i>Polygonum molle</i> D. Don	Thotney	Polygona- ceae

34	<i>Rohdea nepalensis</i> (Raf.) N.Tanaka	Nakima	Asparagaceae
35	<i>Rubus calycinus</i> Wall. ex D.Don	Bhui ainselu	Rosaceae
36	<i>Solanum aculeatissimum</i> Jacq.	Boksi kara	Solanaceae
37	<i>Strobilanthes</i> sp.	Kibu ghans	Acanthaceae
38	<i>Swertia chirayita</i> (Roxb. ex Fleming) H. Karst.	Chirowto	Gentianaceae
39	<i>Swertia bimaculata</i> (Siebold & Zucc.) Hook. f. & Thomson ex C.B. Clarke	Bhaley Chirowto	Gentianaceae
40	<i>Urtica parviflora</i> Roxb.	Patley sisnu	Urticaceae
41	<i>Urtica dioica</i> L.	Gharia sisnu	Urticaceae
42	<i>Viola</i> sp.		Violaceae
43		Khorsane jhar	
44		Siru	
SHRUBS			
1	<i>Actinodaphne sikkimensis</i> Meisn.	Phirphirey	Lauraceae
2	<i>Ardisia macrocarpa</i> Wall.	Damai daana	Primulaceae
3	<i>Cotoneaster</i> sp.		Rosaceae
4	<i>Daphne papyracea</i> Wall. ex G. Don	Kalo argeli	Thymelaeaceae
5	<i>Dichroa febrifuga</i> Lour.	Bhaasak, Bansuli, Ganhaaune Paat, Aseru, Banasuk	Hydrangeaceae
6	<i>Gaultheria</i> sp.		Ericaceae
7	<i>Ilex</i> sp.		Aquifoliaceae
8	<i>Lysionotus</i> sp.		<u>Gesneriaceae</u>
9	<i>Mahonia napaulensis</i> DC.	Kesari	Berberidaceae
10	<i>Osbeckia stellata</i> Buch.-Ham. ex Ker Gawl.	Lote jhar	Melastomataceae
11	<i>Rubus paniculatus</i> Sm.	Bhalu aiselu	Rosaceae
12	<i>Rubus parviflorus</i>	Aiselu	Rosaceae
13	<i>Rubus</i> sp.	Aiselu	Rosaceae
14	<i>Rubus ellipticus</i> Sm.	Aiselu	Rosaceae
15	<i>Unidentified</i>	Harey	

16	<i>Viburnum erubescens</i> Wall.	Asare	Adoxaceae
FERNS AND FERN-ALLIES			
1	<i>Cyathea</i> sp.	Bhoot ningro	Cyatheaceae
2	<i>Allantodia maxima</i> (D. Don) Ching	Sawney ningro / bhadore ningro	Athyriaceae
3	<i>Belvisia henryi</i> (Hieron. ex C. Chr.) Raymond	Needle fern or Tailed fern	Polypodiaceae
4	<i>Cyathea chinensis</i>	Rukh uniu	Cyatheaceae
5	<i>Diplazium dilatatum</i>	Lek Chipley Ningro	Athyriaceae
6	<i>Diplazium</i> sp.	Singaray ningro	Athyriaceae
7	<i>Dryopteris</i> sp.		Dryopteridaceae
8	<i>Gleichenia longissima</i> Blume	Kalamey uniu	Gleicheniaceae
9	<i>Goniophlebium argutum</i> (Wall. ex Hook.) J. Sm. ex Hook.		Polypodiaceae
10	<i>Lepisorus longifolius</i> (Blume) Holttum		Polypodiaceae
11	<i>Lycopodium japonicum</i> Thunb.	Nagbeli	Lycopodiaceae
12	<i>Pteris biaurita</i>	Thado unew	
13	<i>Pteris wallichiana</i> J. Agardh	Chatey uniu	Pteridaceae
14	<i>Selaginella</i> sp.	Sindure	Selaginellaceae
15		Dhodre fern	
16		Alepathay uniu	
CLIMBERS			
1	<i>Cissus elongata</i> Roxb.	Charcharey lahara	Vitaceae
2	<i>Clematis buchananiana</i> DC.	Pinasey lahara	Ranunculaceae
3	<i>Dactylicapnos scandens</i> (D. Don) Hutch.	Lahara	Papaveraceae

4	<i>Herpetospermum pedunculatum</i> (Ser.) C.B. Clarke	Ban karela	Cucurbitaceae
5	<i>Piper boehmeriifolium</i> (Miq.) Wall. ex C. DC.	Chambo / Panpatta	Piperaceae
6	<i>Rubia manjith</i> Roxb. ex Fleming	Majito	Rubiaceae
7	<i>Smilax zeylanica</i> L.	Kukur dainey/ Datuin lahara	Smilacaceae
8	<i>Stephania elegans</i> Hook. f. & Thomson	Tamarke lahara	Menispermaceae
9	<i>Tetrastigma serrulatum</i> (Roxb.) Planch.	Charcharey lahara	Vitaceae
10	<i>Trichosanthes lepiniana</i> (Naudin) Cogn.	Indreni	Cucurbitaceae
11		Bikhma lahara	
12		Cherpatey lahara	
13		Boksi lahara	
14		Gothale lahara	
15		Chamre lahara	
16		Pani lahara	
17		Othanay lahara	
18		Gulfa lahara	
EPIPHYTES/ORCHIDS			
1	<i>Agapetes serpens</i> (Wight) Sleumer		Ericaceae
2	<i>Coelogyne</i> sp.	Sunakhari	Orchidaceae
3	<i>Coelogyne fuscescens</i> Lindl.		Orchidaceae
4	<i>Dendrobium longicornu</i> Lindl.		Orchidaceae
5	<i>Eria coronaria</i> (Lindl.) Rchb.f.		Orchidaceae
6	<i>Hoya linearis</i> Wall. ex D. Don		Apocynaceae
7	<i>Otochilus fuscus</i> Lindl.		Orchidaceae
8	<i>Pleione praecox</i> (Sm.) D. Don		Orchidaceae
9	<i>Rhaphidophora decursiva</i> (Roxb.) Schott	Kanchirno	Araceae
10	<i>Tetrastigma</i> sp.		Vitaceae

Fauna

In the faunal diversity, a total of 29 bird species were recorded belonging to 23 genera and 13 families out of which 17 were confirmed based direct sightings and indirect signs. Ten mammal species were recorded out of which Goral being stated as Near Threatened as per the IUCN, was confirmed. Amongst the butterflies, 9 species were recorded out of which Indian Tortoise Shell, Green Commodore, Golden Sapphire, Painted Lady and Indian Common Crow were observed and confirmed.

Checklist of faunal and avi-faunal species recorded in the Rayong Reserve Forest in South Sikkim						
S. No	Scientific Name	Common Name	Local Name	Family	Evidences	IUCN Status
AVI-FAUNA						
1	<i>Acridotheres tristis</i>	Common Myna	Ruppi	Sturnidae	Sighted	LC
2	<i>Actinodura nipalensis</i>	Hoart-throated Barwing		Timaliidae	Reported	LC
3	<i>Aethopyga nipalensis</i>	Green-tailed Sunbird	Kalo Balchi	Nectariniidae	Sighted	LC
4	<i>Arborophila torqueola</i>	Common Hill Partridge	Peura	Phasinidae	Sighted	LC
5	<i>Cissa chinensis</i>	Common Green Magpie	Doday Koilee	Corvidae	Sighted	LC
6	<i>Corvus macrorhyncus</i>	Jungle Crow	Kag	Corvidae	Sighted	NA
7	<i>Dendrocitta formosae</i>	Himalayan Tree pie	Kokoley	Corvidae	Call	LC
8	<i>Eumyias thalassinus</i>	Verditer Flycatcher	Harini	Muscicapidae	Reported	LC
9	<i>Garrulax affinis</i>	Black-faced Laughingthrush	Bhakura	Turdidae	Call	LC
10	<i>Garrulax leucolophus</i>	White-crested Laughingthrush	Kolkoley	Turdidae	Reported	LC
11	<i>Hypsipetes leucocephalus</i>	Black Bulbul	Jureli	Pycnonotidae	Sighted	LC
12	<i>Ictinaetus malayensis</i>	Black Eagle	Cheel	Accipitridae	Sighted	LC
13	<i>Lophura leucomelana</i>	Kalij Pheasant	Kalij	Phasinidae	Reported	NA
14	<i>Myophoneus caeruleus</i>	Blue Whistling Thrush	Kalchura	Turdidae	Call	NA
15	<i>Myzoris pyrrhoura</i>	Fire-tailed Myzornis		Timaliidae	Sighted	NA

16	<i>Otus</i> sp.	Owl	Owl		Reported	NA
17	<i>Parus monticolus</i>	Green-backed Tit	Chi Chink Kotey	Paridae	Reported	LC
18	<i>Passer domesticus</i>	House sparrow	Sparrow	Passeridae	Sighted	LC
19	<i>Pericrocotus flammeus</i>	Scarlet Minivet	Rani chari	Campephagidae	Reported	LC
20	<i>Periparus rubidiventris</i>	Rufous-vented Tit	Fista	Muscicapidae	Reported	LC
21	<i>Pycnonotus cafer</i>	Red-vented Bulbull	Jureli	Pycnonotidae	Sighted	LC
22	<i>Streptopelia orientalis</i>	Oriental Turtle Dove	Dhukur	Columbidae	Sighted	LC
23	<i>Yuhina flavicollis</i>	Whiskered Yuhina	Megma	Timaliidae	Reported	LC
24	<i>Zoothera dauma</i>	Scaly Thrush		Turdidae	Sighted	LC
25			Cheure		Sighted	LC
26			Pokole		Reported	
27			Chire		Reported	
28			Sunkutey		Reported	
29			Paparay (migratory bird)		Reported	

FAUNA

1	<i>Naemorhedus goral</i>	Goral	Goral	Bovidae	Pellets, Digging sign	NT
2	<i>Muntiacus muntjak</i>	Barking Deer	Mirga	Cervidae	Reported	LC
3			Chitwa		Reported	LC
4		Monkey	Badar	Cebidae	Scat	LC
5	<i>Vulpes</i> sp.	Fox	Syaal	Canidae	Scat	LC
6	<i>Hylopetes</i> sp.	Flying Squirrel	Squirrel	Sciuridae	Sighted	LC
7	<i>Sus scrofa</i>	Wild Boar	Badel	Suidae	Digging sign	LC
8	<i>Ursus thibetanus</i>	Himalayan Black Bear	bhalu	Ursidae	Digging sign	VU
9	<i>Martes flavigula</i>	Yellow-throated Marten		Mustelidae	Reported	LC
10	<i>Paguma</i> sp.	Civet Cat		Viverridae	Droppings	LC

BUTTERFLIES					
1	<i>Aglais caschmirensis</i>	Indian Tortoiseshell	Nymphalidae	Sighted	NA
2	<i>Sumalia daraxa</i>	Green Commodore	Nymphalidae	Sighted	NA
3	<i>Pieris rapae</i>	Cabbage White	Pieridae	Reported	LC
4	<i>Heliophorus brahma</i>	Golden Sapphire	<u>Lycaenidae</u>	Sighted	NA
5	<i>Vanessa cardui</i>	Painted Lady	Nymphalidae	Sighted	NA
6	<i>Vanessa indica</i>	Indian Red Admiral	Nymphalidae	Reported	NA
7	<i>Colias croceus</i>	Clouded Yellow	Pieridae	Reported	NA
8	<i>Eurema hecabe hecabe</i>	Grass Yellow	Pieridae	Reported	NA
9	<i>Euploea core Cramer</i>	Indian Common Crow	Nymphalidae	Sighted	LC
NOTE: NA, Not Assessed; LA, Least Concern; VU, Vulnerable					

DISCUSSION

As per the survey conducted in Rayong Reserve Forest, all the three compartments of the forest are basically wet-temperate forest type ranging from 1758m to 2374m asl. The density of the forest is partly moderate in all the compartments with dense temperate forest. Since compartments 5, 6 & 7 are settlement areas, survey was not done there. However, these areas have lots of planted *Cryptomeria japonica* and *Acer palmatum*.

As per the survey, the forest does hold significance in terms of the forest being a home to heritage oak species of evergreen *Castanopsis hystrix* and *Quercus lamellosa* forming dense forest with *Lithocarpus* and *Castanopsis* species. Saplings and seedlings of *Lithocarpus* and *Symplocos* are widely dispersed indicating good regeneration of the species in the forest. However, their vast vegetation indicates the presence of the vulnerable Himalayan Black Bear as they feed on the fruits of these trees. Its availability in the forest marks an important aspect for wildlife and livelihood as well. According to the Forest Survey of India, trees of CBH 20 – 26feet are demarcated as heritage trees and such trees of oak were recorded in the forest during the survey. One of them being *Castanopsis hystrix* with CBH 20ft (609.6cm) and *Quercus lamellosa* with CBH 26ft (792.48cm) are recorded at elevations of 1947m asl and 2231m asl.

Just a few number of *Juglans regia* was encountered and recorded within the plot that needs immediate attention in conserving the tree for further regeneration providing future prospects both in terms of forest conservation and medicinal purpose.

Though *Cryptomeria japonica* beautifies the area, it suppresses the ground vegetation with only few ferns in the fringes of the forest. Nevertheless, *Rohdea nepalensis*, a medicinal value for diabetes and an appetizer, is found to be growing under cryptomeria vegetation near Rayong busy. Hence, some measures must be taken to control the growth of such species. Most part of the forest is widely distributed with *Persicaria chinensis* that suppresses the growth of other undershrubs and herbs.

The view point area at 2374m is a fire prone area that was completely destroyed in the past. However, this area has been regenerated with various floral species such as *Carex* species (salimo), *Cyanodon* species and trees such as *Symplocos* species and *Lyonia ovalifolia* whose barks were terribly destroyed at the time. Pure stands of *Lyonia ovalifolia* can be found regenerated here. This tree species is commonly associated with oak and rhododendron forest. It is commonly used to prepare various agricultural instruments, fuel, timber and as an important source of timber for construction of traditional houses. Amazingly, this particular area is a butterfly zone where a number of varied butterflies can be seen which can be helpful for lepidopterist. Also, it is a habitat for Goral which is considered as Near Threatened as per the IUCN. This is one area in the entire forest with a view point or a resting place from where a beautiful Mount Kanchendzonga can be witnessed.



View of the forest-fire prone area regenerated with *Carex* and *Lyonia ovalifolia*

Maenam wildlife sanctuary and the adjacent area are supposedly to be one of the hotspots of Fire-tailed Myzornis. During winter season, ornithologists and tourists visit the locality only to witness the presence of this bird. And this is the only area where this bird has been sighted in our survey so far. So this area naturally becomes a hotspot for the species posing significance of the forest.

Rimbi (Lunggang) Reserve Forest, West Sikkim

Anjana Pradhan, Nimesh Chamling and Dorjee Chewang Bhutia



INTRODUCTION

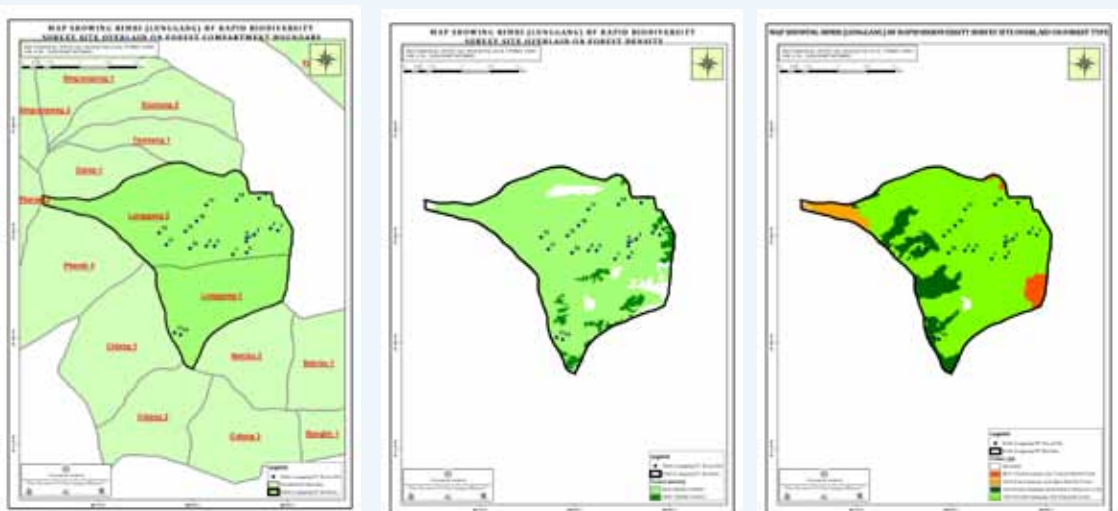
Rimbi (Lunggang) Reserve Forest falls in the compartments “Lunggang 1 and Lunggang 2” of the Pelling Beat 2. Located in the district of West Sikkim under the jurisdiction of Pelling Block in Gyalsing Range, the RF lies between 27°19'19.944"N – 27°19'20.504"N latitude and 88°6'26.529"E – 88°8'51.391"E longitude. The altitude of the forest ranges from 2038m to 2444m above sea level covering an area of 7.23km² (722.55ha). The forest type of this RF is classified as 8B/C1 East Himalayan Subtropical Wet Hill Forest, 14/C2 East Himalayan Sub Alpine Birch/Fir Forest, 12/C3a East Himalayan Moist Mixed Coniferous Forest and 11B/C1b East Himalayan Wet Temperate Forest. The RF is a hilly terrain with a vast vegetation of oak species indicating a habitat for Bears. The floral diversity of the forest is a composition of numerous large evergreen and deciduous trees providing a habitat for various faunal species. The ground vegetation favours a rich repository for herbaceous medicinal plants of importance providing accessibility for local herbal remedies.



Wet-temperate forest of Rimbi (Lunggang) Reserve Forest

STUDY AREA

The objective of this study was to conduct Rapid Biodiversity Survey of the vegetation of Rimbi (Lunggang) Reserve Forest based on the density of the forest and the types of forest covering the compartments by laying plots as per the vegetation variation as shown in the Maps. The current field survey was carried out along the sampling path of Rimbi (Lunggang) Reserve Forest during the month of October 2017. The survey was conducted covering the altitudes from 2038m to 2444m asl lying between 27°11'34.4"N – 27°17'0.3"N latitude and 88°18'03.6"E – 88°18'25.2"E longitude. A total of 19 plots were laid covering an area of 0.19ha. The slope angle of the area ranged from mild to 55 degrees facing East, West, South, South-West, North-West and North-East aspect.





Laying sampling plots and CBH measurement

Site characteristics of the sampling plots along Rimbi (Lunggang) Reserve Forest, West Sikkim							
Site Code	Forest Type	Altitude (m)	GPS Coordinates		Slope Aspect	Slope Angle (°)	Canopy Cover (%)
			Latitude (N)	Longitude (E)			
R-LF 01	Moderate wet temperate	2149	27°18'59.1"	88°08'55.4"	E	30	45
R-LF 02	Dense wet temperate	2181	27°19'00.3"	88°08'50.7"	SW	45	75
R-LF 03	Dense wet temperate	2267	27°18'56.8"	88°08'40.3"	S	Mild	78
R-LF 04	Dense wet temperate	2309	27°18'55.3"	88°08'35.6"	NW	45	65
R-LF 05	Dense wet temperate	2333	27°18'53.0"	88°08'35.3"	W	35	60
R-LF 06	Dense wet temperate	2382	27°18'46.7"	88°08'35.5"	W	50	60
R-LF 07	Moderate wet temperate	2427	27°18'45.9"	88°08'26.7"	SE	45	45
R-LF 08	Moderate wet temperate	2444	27°18'50.8"	88°08'15.2"	SW	15	20
R-LF 09	Moderate wet temperate	2440	27°18'50.7"	88°08'10.0"	NE	35	40
R-LF 10	Moderate wet temperate	2443	27°18'49.6"	88°07'59.6"	NE	55	25
R-LF 11	Moderate wet temperate	2437	27°18'51.7"	88°07'44.6"	NE	25	30
R-LF 12	Moderate wet temperate	2442	27°18'58.5"	88°07'40.1"	W	45	45
R-LF 13	Dense wet temperate	2404	27°18'01.9"	88°07'49.3"	W	Mild	60

R-LF 14	Moderate wet temperate	2370	27°18'00.8"	88°07'53.2"	NE	55	55
R-LF 15	Moderate wet temperate	2261	27°18'59.1"	88°07'56.7"	E	35	35
R-LF 16	Moderate wet temperate	2242	27°19'04.9"	88°08'04.1"	SE	45	30
R-LF 17	Dense wet temperate	2176	27°19'13.9"	88°08'10.3"	SE	45	60
R-LF 18	Dense wet temperate	2119	27°19'16.7"	88°08'29.3"	NE	40	65
R-LF 19	Dense wet temperate	2038	27°19'17.4"	88°08'43.8"	NE	50	65
NOTE: E, East; SW, South-West; S, South; NW, North-West; W, West; W, West; SE, South-East; NE, North-East							

FINDINGS AND DISCUSSION

During the survey, a total of 19 plots were laid covering the wet temperate area of the forest starting from Lunggang village border. A total of 105 floral species was recorded and a general checklist was prepared of it including the species outside the plots. Herbs represented the highest number of species (45 species) belonging to 34 genera in 24 family members. Trees represented 23 species belonging to 18 genera in 13 family members. Fern and fern-allies were represented by 13 species belonging to 10 genera in 8 family members. Eleven species of epiphytes and climbers belonging to 9 family members were recorded. Eleven shrub species were also recorded belonging to 7 genera in 6 family members.

The highest tree species was documented from family Fagaceae representing oak species of *Castanopsis hystrix*, *Lithocarpus pachyphyllus*, *Quercus glauca* and *Q. lamellosa* followed by family Magnoliaceae representing *Magnolia campbellii*, *M. pterocarpa* and *M. doltsopa*. The dominant herb species belonged to family Poaceae, Polygonaceae and Urticaceae representing *Eragrostis* sp., *Persicaria capitata* and *P. runcinata*, and *Urtica parviflora*, *U. dioica*, respectively.

The floral diversity of the RF as per the survey is a moderate wet-temperate type. Forest composition of the surveyed path is dominated by evergreen and deciduous tree species. Large evergreen oak trees of *Castanopsis hystrix*, *Lithocarpus pachyphyllus*, *Quercus lamellosa* and *Q. glauca* dominate the upper storey of the forest. Other trees occupying the middle storey of the forest are *Acer campbellii*, *Eurya acuminata*, *Ficus neriifolia*, *Macaranga denticulata*, *Machilus odoratissima*, *Magnolia campbellii*, *M. pterocarpa*, *M. doltsopa* and *Toxicodendron hookeri*. The lower storey is mixed with shrubby species of *Daphne*, *Viburnum* and *Rubus* along with a vast regeneration of saplings and seedlings of *Magnolia doltsopa*, *M. campbellii*, *Machilus* sp. and *Acer campbellii*. The seedlings of *Acer campbellii* is observed throughout the forest especially from 2038m to 2444m asl indicating a natural regeneration of the species. Trees and saplings of *Rhododendron arboreum* can be seen from 2242m to 2443m asl.

Growth of mosses covering the tree trunks and branches support the habitat of various epiphytic orchids along with other epiphytes and climbers. Some commonly observed epiphytes and climbers are *Agapetes serpens*, *Cissus elongata*, *Crawfordia speciosa*, *Hoya linearis*, *Pleione praecox*, *Trichosanthes lepiana* and *Smilax zelanica*.

Being a dominant wet-temperate forest, the ground vegetation is a dominion of various herbaceous plants and ferns widely scattered with *Dryopteris redactopinnata*. This fern densely covers the ground even blocking the way through the forest. *Gleichenia longissima* is another fern that is regularly seen covering the walls of the forest with. The commonly distributed herbs of the area are *Begonia tessaricarpa*, *Carex baccans*, *Impatiens stanantha*, *I. racemosa*, *I. decipiens*, *Neillia rubiflora*, *Persicaria capitata*, *P. runcinata*, *Rubus calycinus*, *Hedychium spicatum*, *H. gardnerianum*, etc.



Daphne papyracea



Impatiens stanantha

The RF also forms a rich habitat for a large number of medicinal plants of importance. *Ageratina adenophora*, *Artemisia vulgaris*, *Astilbe rivularis*, *Drymaria cordata*, *Heracleum wallichii*, *Houttuynia cordata*, *Oxalis corniculata*, *Urtica parviflora*, *U. dioica* and *Swertia bimaculata* are some of the commonly found species in the region. *Swertia bimaculata* is being studied for the presence of an important bioactive compound for combating cancer and for other important research avenues. As observed, this species is widely found distributed throughout the forest and hence can be considered an important species. *Urtica parviflora* is found in large quantity throughout the forest. The root is chewed as aid during discomfort in the throat. The leaves are cooked just as vegetables, and are taken to stabilize high blood pressure. A candy cane bamboo called singanay baas, *Himalayacalamus falconeri*, is available in dense clusters from 2267m to 2424m asl.



Swertia bimaculata



Urtica parviflora

Checklist of floral species recorded along Rimbi (Lunggang) Reserve Forest, West Sikkim			
S. No	Scientific Name	Local Name	Family
TREES			
1	<i>Acer campbellii</i> Hook.f.& Thomson ex Hiern	Kapasey	Sapindaceae
2	<i>Alangium chinense</i> (Lour.) Harms	Akhaney	Cornaceae
3	<i>Castanopsis hystrix</i> Hook.f. & Thomson ex A. DC.	Patley katus	Fagaceae
4	<i>Engelhardtia spicata</i> Lechen ex Blume	Mauwa	Juglandaceae
5	<i>Eurya acuminata</i> DC.	Jhinganey	Pentaphylacaceae
6	<i>Ficus neriifolia</i> Sm.	Dudhilo	Moraceae
7	<i>Lithocarpus pachyphyllus</i> (Kurz) Rehder	Sungure katus/Bante	Fagaceae
8	<i>Lyonia ovalifolia</i> (Wall.)Drude	Angeri	Ericaceae
9	<i>Macaranga denticulata</i> (Blume) Müll.Arg.	Malato	Euphorbiaceae
10	<i>Machilus odoratissima</i> Nees.	Lali kawla	Lauraceae
11	<i>Machilus</i> sp.	Kawla	Lauraceae
12	<i>Magnolia campbellii</i> Hook.f. & Thom.	Ghoge chanp	Magnoliaceae
13	<i>Magnolia pterocarpa</i> Roxb.	Patpate chanp	Magnoliaceae
14	<i>Magnolia doltsopa</i> (Buch.-Ham. ex DC.)Figlar	Rani chanp	Magnoliaceae
15	<i>Nyssa javanica</i> (Blume) Wangerin	Lek chillauney	Cornaceae
16	<i>Quercus glauca</i>	Phalant	Fagaceae
17	<i>Quercus lamellosa</i> Sm.	Buk/Bajranth	Fagaceae
18	<i>Rhododendron arboreum</i> Sm.	Lali gurans	Ericaceae
19	<i>Symplocos lucida</i> (Thunb.)Siebold&Zucc.	Kharanay	Symplocaceae
20	<i>Tetradium fraxinifolium</i> (Hook. f.) T.G. Hartley	Khanakpa	Rutaceae
21	<i>Toxicodendron hookeri</i> (K.C. Sahni&Bahadur) C.Y. Wu & T.L. Ming	Bhalayo	Anacardiaceae
22	<i>Zanthoxylum acanthopodium</i> DC.	Boke timmur	Rutaceae
23	Unidentified	Dhusrey	
HERBS			
1	<i>Ageratina adenophora</i> (Spreng.) R.M.King & H.Rob.	Banmara/Kalijhar	Compositae
2	<i>Anaphalis</i> sp.	Bukiful	Asteraceae
3	<i>Arisaema consanguineum</i> Schott	Larua/Banko	Araceae
4	<i>Arisaema speciosum</i> (Wall.) Mart.	Larua/Banko	Araceae

5	<i>Artemisia vulgaris</i> L.	Titepati	Compositae
6	<i>Astilbe rivularis</i> Buch.-Ham. ex D.Don	Buro okhati	Saxifragaceae
7	<i>Begonia tessaricarpa</i> C.B. Clarke	Magar Kajay	Begoniaceae
8	<i>Bidens pilosa</i> L.	Tikhe kuro	Compositae
9	<i>Calceolaria</i> sp.	Lady's purse	Calceolariaceae
10	<i>Carex baccans</i> Nees	Harkatto	<u>Cyperaceae</u>
11	<i>Centella asiatica</i> (L.) Urb.	Golpatta	Apiaceae
12	<i>Commelina benghalensis</i> Linn.	Kaney jhar	Commelinaceae
13	<i>Cyanodon dactylon</i>	Dubo	Poaceae
14	<i>Drymaria cordata</i> (L) Wild. ex Roem. & Schult.	Abijalo	Caryophyllaceae
15	<i>Elatostema platyphyllum</i> Wedd.	Sano gagleto	Urticaceae
16	<i>Eragrostis</i> sp.	Banso	Poaceae
17	<i>Eragrostis</i> sp.	Kirkirey banso	Poaceae
18	<i>Eragrostis</i> sp.	Chitrey banso	Poaceae
19	<i>Fragaria nubicola</i> (Lindl. ex Hook.f.) Lacaíta	Bhui ainselu	Rosaceae
20	<i>Gaultheria nummularioides</i> D.Don	Kaali Gedee, Bhui Ghangaaru , Bibee Phal, Bhui Kaafal, Dhasingre	Ericaceae
21	<i>Geranium</i> sp.		Geraniaceae
22	<i>Hedychium gardnerianum</i> Sheppard ex Ker Gawl	Saro	Zingiberaceae
23	<i>Hedychium spicatum</i> Sm.	Saro	Zingiberaceae
24	<i>Heracleum wallichii</i> DC	Chimping	Apiaceae
25	<i>Houttuynia cordata</i> Thunb.	Padey / Gandey Jhar	Saururaceae
26	<i>Impatiens decipiens</i> Hook.f.		<u>Balsaminaceae</u>
27	<i>Impatiens stenantha</i> Hook.f.		<u>Balsaminaceae</u>
28	<i>Impatiens racemosa</i> DC.	Tantari, Anchirna	<u>Balsaminaceae</u>
29	<i>Molineria</i> sp.		Hypoxidaceae
30	<i>Neillia rubiflora</i> D.Don	Kirkirey jhar	Rosaceae
31	<i>Oxalis corniculata</i> Linn.	Amilo jhar	Oxalidaceae
32	<i>Persicaria runcinata</i> (Buch. – Ham. ex D.Don.) Masam.	Ratnaulo	Polygonaceae
33	<i>Persicaria capitata</i> (Buch.-Ham. ex D.Don) H.Gross	Ratnaulo	Polygonaceae
34	<i>Pilea scripta</i> (Buch.-Ham. ex D. Don) Wedd.	Chiplej jhar	Urticaceae
35	<i>Polygonum molle</i> D. Don	Thotney	Polygonaceae
36	<i>Rubus calycinus</i> Wall. ex D.Don	Bhui ainselu	Rosaceae

37	<i>Rumex nepalensis</i> Spreng.	Halhalley	Polygonaceae
38	<i>Solanum nigrum</i> Linn.	Junglee bihee	Solanaceae
39	<i>Solanum aculeatissimum</i> Jacq.	Boksi kara	Solanaceae
40	<i>Strobilanthes rankanensis</i> Hayata	Kibu ghans	Acanthaceae
41	<i>Strobilanthes</i> sp.	Kibu ghans	Acanthaceae
42	<i>Swertia bimaculata</i> (Siebold & Zucc.) Hook. f. & Thomson ex C.B. Clarke	Bhaley chirowto	Gentianaceae
43	<i>Urtica parviflora</i> Roxb.	Patley sisnu	Urticaceae
44	<i>Urtica dioica</i> L.	Gharia sisnu	Urticaceae
45	<i>Viola</i> sp.		Violaceae
SHRUBS			
1	<i>Actinodaphne sikkimensis</i> Meisn.	Sissi	Lauraceae
2	<i>Cotoneaster</i> sp.		Rosaceae
3	<i>Daphne papyracea</i> Wall. ex G. Don	Kalo argeli	Thymelaeaceae
4	<i>Dichroa febrifuga</i> Lour.	Bhaasak, Bansuli, Ganhaaune Paat, Aseru, Banasuk	Hydrangeaceae
5	<i>Osbeckia stellata</i>	Chulesi phool	Melastomataceae
6	<i>Rubus ellipticus</i>	Aiselo	Rosaceae
7	<i>Rubus lineatus</i> Reinw. ex Blume	Aiselu	Rosaceae
8	<i>Rubus niveus</i> Thunb.	Aiselu	Rosaceae
9	<i>Rubus parviflorus</i>	Thulo aiselo	Rosaceae
10	<i>Rubus</i> sp.	Ghampey aiselu	Rosaceae
11	<i>Viburnum erubescens</i> Wall.	Asare	Adoxaceae
FERN AND FERN-ALLIES			
1	<i>Aleuritopteris formosana</i> (Hayata) Tagawa	Rani uniu	Pteridaceae
2	<i>Cheilanthes albomarginata</i> C.B. Clarke	Rani uniu	Pteridaceae
3	<i>Diplazium</i> sp.	Ningro	Woodsiaceae
4	<i>Diplazium stoliczkae</i>	Kalo Unew	Woodsiaceae
5	<i>Dryopteris redactopinnata</i> S.K. Basu & Panigrahi	Thumsey uniu	Dryopteridaceae
6	<i>Gleichenia longissima</i> Blume	Kalamey uniu	Gleicheniaceae
7	<i>Microsorium membranaceum</i> (D. Don) Ching		Polypodiaceae
8	<i>Nephrolepis cordifolia</i> (L.) C. Presl	Pani amla	Nephrolepidaceae
9	<i>Odontosoria chinensis</i> (L.) J. Sm.	Lace fern	Lindsaeaceae
10	<i>Pteris biaurita</i> L.	Thado unew	Pteridaceae

11	<i>Pteris wallichiana</i> J. Agardh	Chatey uniu	Pteridaceae
12	<i>Selaginella</i> sp.	Sindure	Selaginellaceae
13		Kalo ningro	
EPIPHYTES/ORCHIDS/CLIMBERS			
1	<i>Agapetes serpens</i> (Wight) Sleumer	Glass flower/Chewre	Ericaceae
2	<i>Cissus elongata</i> Roxb.	Charcharey lahara	Vitaceae
3	<i>Clematis buchananiana</i> DC.	Pinasey lahara	Ranunculaceae
4	<i>Crawfurdia speciosa</i> C.B.Clarke		Gentianaceae
5	<i>Herpetospermum pedunculatum</i> (Ser.) C.B. Clarke	Ban karela	Cucurbitaceae
6	<i>Hoya linearis</i> Wall. ex D.Don	Dudey lahara	Apocynaceae
7	<i>Pleione praecox</i> (Lindl.) Rollisson		Orchidaceae
8	<i>Rubia manjith</i> Roxb. ex Fleming	Majito	Rubiaceae
9	<i>Smilax zeylanica</i> Linn.	Kukur dainey	Liliaceae
10	<i>Tetrastigma serrulatum</i> (Roxb.) Planch.	Charcharey lahara	Vitaceae
11	<i>Trichosanthes lepiniana</i> (Naudin) Cogn.	Indreni	Cucurbitaceae
12		Pani lahara	
BAMBOO			
1	<i>Himalayacalamus falconeri</i>	Singane baas	Poaceae

In the faunal diversity, a total of 15 bird species were recorded belonging to 15 genera and 8 families which were confirmed based on direct sightings and indirect signs. Only 4 mammal species were recorded. Amongst the butterflies, 7 species were recorded out of which Blue-tailed Jester, Fulvous Pied Flat, Great Swift, Queen of Spain Fritillary, Lacewing and Restricted Demon were observed and confirmed. The forest is home to many animals, birds and butterflies that are recorded through direct and indirect evidences. Barking deer, fox, Black Bear, Wild Boar and porcupine are some of the reported animals in the forest. Many beautiful butterfly species are available in this region where Bluetail Jester, Fulvous Pied Flat, Great Swift, Queen of Spain Fritillary, Lacewing butterfly, Restricted Demon and Three Spot Grass Yellow were sighted and reported. Amongst the bird species, Common Hill Partridge, Common Myna, Oriental Turtle Dove, Wedge-tailed Green Pigeon, Common Pigeon and Common Tailor bird are some of the reported birds of the region.



Blue-tailed Jester



Queen of Spain Fritillary



Restricted Demon



Leopard Lacewing (Female)

Checklist of faunal and avi-faunal species recorded in Rimbi (Lunggang) Reserve Forest

S. No	Bird Species	Common Name	Local Name	Family	Evidences	IUCN Status
1	Barred Cuckoo Dove	<i>Macropygia rufiventris</i>	Columbidae	Dhukur	Reported	NA
2	Blue Whistling Thrush	<i>Myophonus caeruleus</i>	Muscicapidae	Kalchura	Sighted	LC
3	Blue-throated Barbet	<i>Megalaima asiatica</i>	Megalaimidae	Neol	Reported	NA
4	Common Hill Partridge	<i>Arborophila torqueola</i>	Phasinidae	Peura	Sighted	LC
5	Common Myna	<i>Acridotheres tristis</i>	Sturnidae	Ruppi	Sighted	LC
6	Common Pigeon	<i>Columba livia</i>	Columbidae	Parewa	Sighted	LC
7	Greater Yellow-nape (Woodpecker)	<i>Chrysophlegma flavinucha</i>	Picidae	Lachey	Reproted	LC
8	Kalij Pheasant	<i>Lophura leucomelanos</i>	Phasianidae	Kaleej	Reproted	LC
9	Large-billed crow	<i>Corvus macrorhynchos</i>	Corvidae	Kag	Sighted	LC
10	Oriental Turtle Dove	<i>Streptopelia orientalis</i>	Columbidae	Dhukur	Reported	LC
11	Oriental Magpie Robin	<i>Copsychus saularis</i>	Muscicapidae	Dhobi chara	Call	NA
12	Spangled Drongo	<i>Dicrurus bracteatus</i>	Dicruridae	Chebey	Reported	LC
13	Verditer Flycatcher	<i>Eumyias thalassinus</i>	Muscicapidae	Harini	Reported	LC

14	Wedge-tailed Green Pigeon	<i>Treron sphenurus</i>	Columbidae	Haaleysho	Call	LC
15	Yellow-billed Blue Magpie	<i>Urocissa flavirostris</i>	Corvidae	Lamppucheri	Call	LC

MAMMALS

1	Barking Deer	<i>Muntiacus muntjak</i>	Mirga	Cervidae	Pellet	LC
2	Himalayan Black Bear	<i>Ursus thibetanus</i>	Bhalu	Ursidae	Digging sign	VU
3	Monkey	<i>Macaca</i> sp.	Badar	Cebidae	Scat	LC
4	Wild Boar	<i>Sus scrofa</i>	Badel	Suidae	Digging sign	LC

BUTTERFLIES

1	Bluetail Jester	<i>Symbrenthia niphanda</i>	Nymphalidae		Sighted	
2	Fulvous Pied Flat	<i>Pseudocoladenia dan</i>	Hesperiidae		Sighted	
3	Great Swift	<i>Pelopidas assamensis</i>	Hesperiidae		Sighted	
4	Queen of Spain Fritillary	<i>Issoria lathonia</i>	Nymphalidae		Sighted	
5	Red Lacewing	<i>Cethosia cyane</i>	Nymphalidae		Sighted	
6	Restricted Demon	<i>Notocrypta curvifascia</i>	Hesperiidae		Sighted	
7	Three Spot Grass Yellow	<i>Eurema blanda</i>	Pieridae		Reported	

NOTE: LC, Least Concern; NA, Not Assessed

Rinchenpong Reserve Forest, West Sikkim

Sanjyoti Subba, Sumitra Nepal & Sanchi Subba



Overview of RF

INTRODUCTION

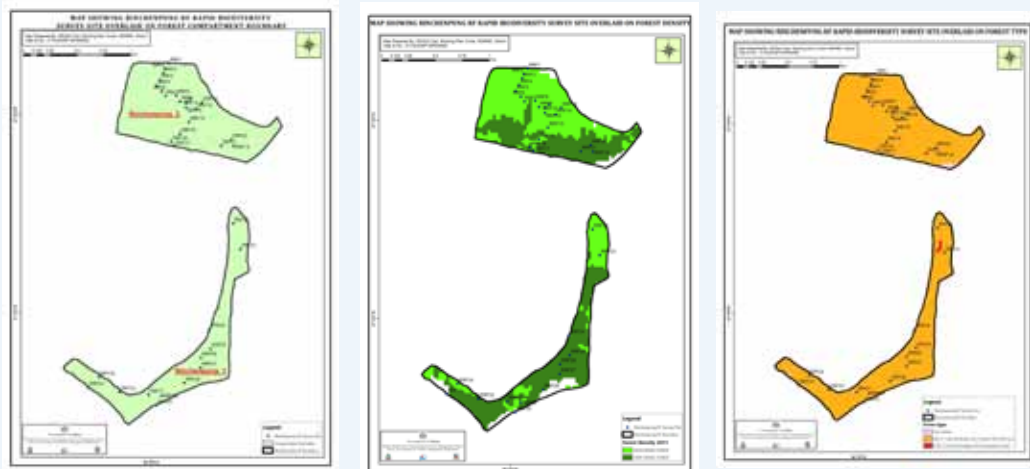
The survey area is a representative vegetation of the wet temperate and subtropical forest in the Rinchenpong Reserve Forest, West Sikkim. The broad vegetation of this reserve forest includes tree species viz., *Magnolia doltsopa*, *Magnolia velutina*, *Magnolia cathcartii*, *Ostodes paniculata*, *Alnus nepalensis*, *Schima wallichii*, *Castanopsis indica*, *Macaranga pustulata*, *Hovenia dulcis*, *Albizia procera*, *Terminalia myriocarpa*, *Duabanga sonneratioides*, *Cryptomeria japonica*, *Exbucklandia populnea*, *Erythrina arborescens*, *Juglans regia*, *Hovenia dulcis*, *Macaranga pustulata*, *Machilus* sp., *Schima wallichii*, *Terminalia myriocarpa*, *Tetradium fraxinifolia* were amongst the important tree species. The other *Rhododendron arboreum*, which was in small patch at altitude of ca 1517 m asl. The common small tree species of the area includes *Pandanus furcatus*, *Symplocos lucida*, *Symplocos glomerata*, *Leucosceptrum canum*, *Ficus neriifolia*, & *Zanthoxylum acanthopodium*, etc.

The most common shrub viz., *Vibrunum erubescens*, *Rubus ellipticus*, *Boehmeria sp.*, *Polygonum molle*, *Osbeckia stellata*, *Osbeckia nepalensis*, *Daphne cannabina*, *Edgeworthia gardenierii*, *Oxyspora paniculata*, *Polygala arillata*, *Dichroa febrifuga*, *Maesa chisia*, etc., and the forest floor below the dense canopy is covered by herbaceous plant species such as *Biden pilosa*, *Pilea umbrosa*, *Heacleum wallichii*, *Drymaria cordata*, *Oxalis corniculata*, *Hedychium spicatum*, *Persicaria capitata*, *Fragaria nubicola*, *Swertia bimaculata*, *Centella asiatica*, *Viola sp.*, *Hydrocotyle javanica* etc., and many other epiphytes, ferns and fern-allies, mosses, and lichens.

The reserve forest is home to many faunal species, viz., Himalayan Black bear, Wild Boar, Barking Deer, Flying squirrel, Wild dog, and Red fox etc. Due to dense forest provides shelter as well as abundant fruits/feed and as such are good indicator of faunal presence and richness.

STUDY AREA

The study area is lying between Lat 27°13'37.6" N to 27°15'17.5" and Long 88°15'39.9"E to 88°16'29.0"E and the elevation ranges between 1220-1879 m asl, as per the toposheet, sharing its border with Rinchenpong (north), Barfok (south), Yangsum (west) and Kartok (east) with the Rangsang khola in the western Sikkim. It shows aspects of E, N and NE with the slope angle falling between 5 to 70 degree inclinations. The climate is characterized by a moist in monsoon season. Based on topography, reserve forest can be broadly categorized into two types of forest wet temperate and sub-tropical forest. The field survey was conducted during October 2017.



Showing the forest compartment boundary, forest density & forest types along the sampling plots of Rinchenpong Reserve Forest, West Sikkim



Forest landslide area



Measuring circumference at breast height & laying sampling plots at Rinchenpong Reserve Forest, West Sikkim

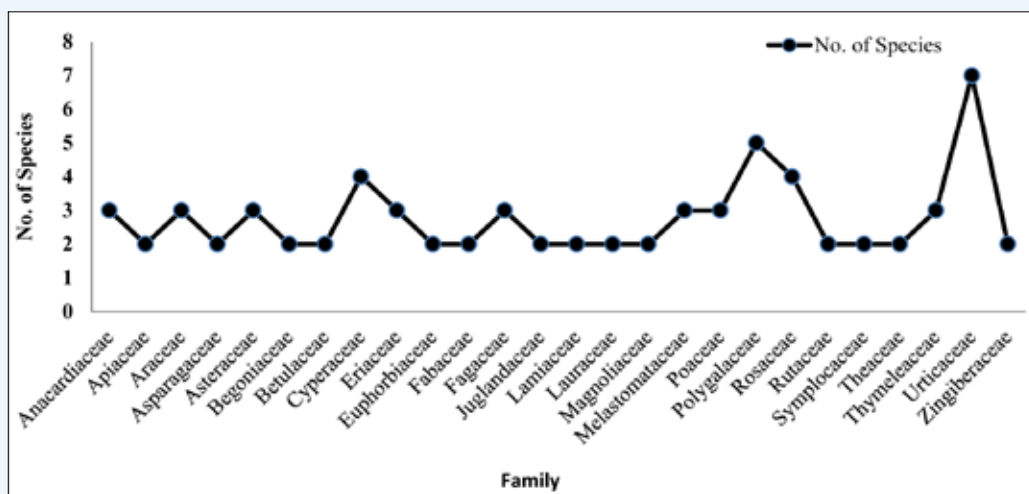
The area has a history of immense landslide stress in the past, which can be visualized during the survey. The forest area at the landslide affected area is fully covered by *Alnus nepalensis*, *Macaranga pustulata*, *Engelhardtia spicata*, etc., and ground floor is covered by herb species viz., *Biden pilosa*, *Pilea umbrosa*, *Drymaria cordata*, *Oxalis corniculata*, *Persicaria capitata* and many other lianas and forbs species etc., were also recorded. Some part of the reserve forest witnessed the plantation of the tree species viz., *Exbucklandia populnea* & *Magnolia doltsopa* in the forest.



Persicaria capitata

FINDINGS & DISCUSSION

A total of 108 plant species were recorded in 34 sampling plots, covering an area 0.34 ha, along the Rinchenpong Reserve Forest in West Sikkim. Of which 40 tree species belonging to 36 genera and 25 families and 1 unidentified were recorded. Similarly, 14 species of shrubs (10 genera and 8 families and 1 unidentified) and 39 species of herbs (34 genera and 21 families), 8 species of climber and epiphytes (7 genera and 7 families) and 7 species of fern and fern-allies (5 genera and 5 families and 2 unidentified) were inventoried, which are listed in the Table. Diversity of vegetation was found most in case of the ground flora in comparison to trees and shrubs. Additionally, numerous orchid species like *Calanthe* sp., *Coelogyne* sp., *Dendrobium* sp., etc., and bamboo species like *Arundinaria* sp., were also recorded along the sampling plots.



Family-wise species composition

A total of 59 families containing 108 number of plant species represented the floral face of the study site. For the phanerogamic flora maximum species recorded for Urticaceae (7 species) followed by Polygonaceae (5 species), Rosaceae and Cyperaceae (4 species each) in figure. The families of Anacardiaceae, Araceae, Asteraceae, Ericaceae, Fagaceae, Melastomataceae, Poaceae and Thymelaceae were represented by 3 species each followed by 2 species which was that of families viz., Apiaceae, Asparagaceae, Begoniaceae, Betulaceae, Euphorbiaceae, Fabaceae, Juglandaceae, Lamiaceae, Lauraceae, Magnoliaceae, Rutaceae, Symlocaceae, Theaceae, Zingiberaceae etc. The other remaining families were represented by single species.

Regarding forest compartment boundary, randomly laid 23-34 sampling plots for compartment 1 and other remaining 1-22 sampling plots for compartment 2. In the forest density (dense) forest, randomly laid (17-21,24-28 & 31-33) sampling plots and other remaining sampling plots (1-16, 22, 23, 29-30, 34) were randomly laid for moderate dense forest. However, in the forest types, the sampling plots (23) were randomly laid in the wet temperate forest and other remaining was laid in the sub-tropical forest.

Site Characteristics of the sampling plots of Rinchenpong Reserve Forest, West Sikkim

Site Code	Forest types	Altitude (m) asl	Coordinates		Slope Angle (°)	Slope Aspect	Humus depth (cm)	Disturbance	
			Lat(N)	Long(E)				Anthropogenic	Natural
RRF1	sub-tropical	1278	27°15'17.5"	88°16'07.9"	30	NE	0.5		Natural
RRF2	sub-tropical	1221	27°15'15.8"	88°16'06.6"	45	NE	1		Natural
RRF3	sub-tropical	1220	27°15'12.2"	88°16'05.3"	40	E	0.5		Natural
RRF4	sub-tropical	1222	27°15'10.2"	88°16'04.2"	50	W	0.5		Natural
RRF5	sub-tropical	1238	27°15'08.4"	88°16'03.0"	25	NE	0.5		Natural
RRF6	sub-tropical	1265	27°15'06.7"	88°16'04.8"	10	N	0.5		Natural
RRF7	sub-tropical	1272	27°15'05.2"	88°16'06.0"	20	E	1		Natural
RRF8	sub-tropical	1345	27°15'05.4"	88°16'09.6"	40	E	1		Natural
RRF9	sub-tropical	1324	27°15'03.5"	88°16'10.9"	45	N	0.5		Natural
RRF10	sub-tropical	1406	27°15'01.7"	88°16'12.9"	30	N	0.5		Natural
RRF11	sub-tropical	1442	27°15'03.3"	88°16'13.0"	30	NW	0.5		Natural
RRF12	sub-tropical	1458	27°15'04.2"	88°16'14.3"	20	N	0.5		Natural
RRF13	sub-tropical	1478	27°15'03.2"	88°16'18.3"	40	N	1.5		Natural
RRF14	sub-tropical	1517	27°15'01.2"	88°16'16.5"	30	NE	0.5		Natural
RRF15	sub-tropical	1527	27°14'57.3"	88°16'13.8"	15	E	0.5		Natural
RRF16	sub-tropical	1533	27°14'53.7"	88°16'10.7"	30	SW	0.5		Natural
RRF17	sub-tropical	1550	27°14'50.2"	88°16'08.9"	20	W	1		Natural
RRF18	sub-tropical	1480	27°14'51.3"	88°16'07.8"	60	NE	0.5		Natural
RRF19	sub-tropical	1641	27°14'49.8"	88°16'29.0"	50	N	0.5		Natural

RRF20	sub-tropical	1651	27°14'51.8"	88°16'28.2"	40	NE	0.5		Natural
RRF21	sub-tropical	1641	27°14'50.0"	88°16'24.8"	40	N	0.5		Natural
RRF22	sub-tropical	1674	27°14'29.7"	88°16'19.1"	40	NE	0.5		Natural
RRF23	sub-tropical	1667	27°14'21.9"	88°16'21.4"	30	SE	1		Natural
RRF24	Wet temperate	1803	27°13'71.7"	88°16'10.6"	30	SW	0.5		Natural
RRF25	sub-tropical	1834	27°13'51.8"	88°16'10.9"	40	S	0.5		Natural
RRF26	sub-tropical	1830	27°13'49.1"	88°16'07.6"	70	E	1		Natural
RRF27	sub-tropical	1879	27°13'46.1"	88°16'07.5"	50	N	0.5		Natural
RRF28	sub-tropical	1852	27°14'43.0"	88°16'00.9"	35	SW	0.5		Natural
RRF29	sub-tropical	1852	27°13'37.6"	88°15'54.2"	40	NE	1		Natural
RRF30	sub-tropical	1830	27°13'34.7"	88°15'52.3"	60	E	1.5		Natural
RRF31	sub-tropical	1830	27°13'38.0"	88°15'49.7"	30	S	0.5		Natural
RRF32	sub-tropical	1755	27°13'38.9"	88°15'39.9"	40	S	1		Natural
RRF33	sub-tropical	1682	27°14'16.7"	88°16'00.8"	45	E	1		Natural
RRF34	sub-tropical	1654	27°14'19.8"	88°16'04.6"	25	NE	1		Natural

Checklist of floral species in Rinchenpong Reserve Forest, West Sikkim

Sl. No	Botanical Name	Local Name	Family	Altitudinal ranges (m)asl	IUCN Status
	TREE				
1	<i>Albizzia procera</i> Benth.	Seto sirisS	Fabaceae		
2	<i>Alnus nepalensis</i> Don.	Utis	Betulaceae	200-2800	LC
3	<i>Betula cylindrostachya</i> Lindl. ex Wall.	Saur	Betulaceae	1400-2800	LC
4	<i>Brassaiopsis mitis</i> Clarke	Chuletro	Araliaceae		NA
5	<i>Castanopsis hystrix</i> Hook. & Thomson ex. A. DC.	Patley katush	Fagaceae	1600-1600	NA
6	<i>Castanopsis indica</i> (Roxb. ex Lindl.) A.DC.	Dalney katus	Fagaceae	1500-1500	NA
7	<i>Choerospondias axillaris</i> (Roxb.) B.L.Burt & A.W.Hill	Lapsi	Anacardiaceae	900-2500	NA
8	<i>Cryptomeria japonica</i> (Thunberg ex. Linn. F.) D. Don	Dhupi	Taxodiaceae	1100-2500	NT
9	<i>Duabanga grandiflora</i> (DC.) Walp.	Lampate	Lythraceae		
10	<i>Engelhardtia spicata</i> Lechen ex Blume.	Mauwa	Juglandaceae	500-2100	LC

11	<i>Erythrina arborescens</i> Roxb.	Phalado	Fabaceae	400-2100	NA
12	<i>Eurya acuminata</i> DC.	Jhingni	Theaceae	700-3000	NA
13	<i>Exbucklandia populnea</i> (R. Br. Ex Griff) R. W. Br	Piplee	Hamamelidaceae	1200-2000	NA
14	<i>Ficus nemarolis</i> Wall.	Dudhilo	Moraceae		NA
15	<i>Hovenia dulcis</i> Thunb.	Bangi	Thymelaeaceae		NA
16	<i>Jambosa formosa</i> (Wall.) G. Don.	Ambakey	Myrtaceae		NA
17	<i>Juglans regia</i> L.	Okhar	Juglandaceae	500-1800	LC
18	<i>Leucosceptrum canum</i> Sm.	Gurpis	Lamiaceae	1000-2600	NA
19	<i>Lithocarpus fenestratus</i> (Roxb.) Rehde	Arkowlo	Fagaceae		NA
20	<i>Lyonia ovalifolia</i> var. <i>ovalifolia</i>	Angeri	Ericaceae	200-3400	NA
21	<i>Macaranga denticulata</i> (Blume) Müll. Arg.	Malata	Euphorbiaceae	100-1300	NA
22	<i>Machilus</i> sp.	Kawlo	Lauraceae	100-1300	NA
23	<i>Maesa</i> sp.	Bilauney	Myrtaceae		
24	<i>Magnolia velutina</i> DC.	Phusrey champ	Magnoliaceae		
25	<i>Magnolia doltsopa</i> (Buch.-Ham. ex DC.) Figlar	Ranichamp	Magnoliaceae	1500-2400	
26	<i>Nyssa javanica</i> (Blume) Wangerin	Lek chilauney	Cornaceae		
27	<i>Ostodes paniculata</i> Blume	Bepari	Euphorbiaceae	100-2500	NA
28	<i>Pandanus furcatus</i> Roxb	Tarika	Pandanaceae		
29	<i>Persea odoratissima</i> (Nees) Kosterm.	Kawlo	Lauraceae		
30	<i>Prunus bracteopadus</i> Koehne	Arupatey	Rosaceae		
31	<i>Rhododendron arboreum</i> ssp. <i>arboreum</i> (CB Clarke) Ridley	Guras	Ericaceae		
32	<i>Rhus chinensis</i> Mill.	Bhakimlo	Anacardiaceae		
33	<i>Rhus succedanea</i> Linn.	Rani bhalayo	Anacardiaceae		
34	<i>Schima wallichii</i> Choisy	Chilaune	Theaceae	800-1800	NA
35	<i>Symplocos glomerata</i> King ex C.B. Clarke	Kholme	Symplocaceae	1200-2700	NA
36	<i>Symplocos lucida</i> (Thunb.) Siebold & Zucc	Kharane	Symplocaceae	1500-3000	NA
37	<i>Terminalia myriocarpa</i> Heurck & Muell. Arg.	Pani saj	Combretaceae		
38	<i>Tetradium fraxinifolium</i> (Hook. f.) T.G. Hartley	Khanakpa	Rutaceae	1200-2500	NA
39	<i>Zanthoxylum acanthopodium</i> DC	Boke timmur	Rutaceae		
40	<i>Gynocardia odorata</i> R.Br.	Gante	Achariaceae		
41	Unidentified				
SHRUB					
1	<i>Ardisia macrocarpa</i> Wall.	Damai phal	Myrsinaceae	1500-2400	NA

2	<i>Boehmeria platyphylla</i> D. Don.	Kamley	Urticaceae	700-1500	NA
3	<i>Boehmeria</i> sp.	Kamley	Urticaceae		
4	<i>Daphne cannabina</i> Wall	Kalo algeri	Thymeleaceae	1900-2700	NA
5	<i>Dichroa febrifuga</i> Lour.	Basak	Hydrangaceae	200-2000	NA
6	<i>Edgeworthia gardenerii</i> Meissn	Algeri	Thymeleaceae	1000-2500	NA
7	<i>Osbeckia stellata</i> Buch.-Ham.ex D. Don	Lote Jhar	Melastomataceae	200-2300	NA
8	<i>Osbeckia nepalensis</i> Hook. f	Lote Jhar	Melastomataceae		
9	<i>Oxyspora paniculata</i> (D.Don) DC	Chulesee	Melastomataceae	500-2000	NA
10	<i>Polygala arillata</i> Buch.-Ham. ex D. Don	Marcha Jhar	Polygalaceae	1000-2800	NA
11	<i>Rubus ellipticus</i> Sm.	Aiselu	Rosaceae	1000-2600	NA
12	<i>Rubus paniculatus</i> Sm.	Aiselu	Rosaceae		
13	<i>Unidentified</i>	Chipley			
14	<i>Viburnum erubescence</i> Wall. ex D	Asarey	Adoxaceae	1400-3950	NA
	HERB				
1	<i>Ageratum conyzoides</i> Linn.	Elame jhar	Asteraceae		
2	<i>Aeginetia indica</i> L.	Ghost phul	Orobanchaceae		
3	<i>Arisaema intermedium</i> Blume	Larua/Banko	Araceae	2600-3400	NA
4	<i>Artemisia vulgaris</i> L.	Titey pate	Compositae	1500-3800	NA
5	<i>Astilbe rivularis</i> Buch.-Ham. ex D. Don	Budi okhati	Saxifragaceae	900-3200	NA
6	<i>Begonia rubella</i> Buch.-Ham. ex D. Don	Magarkachi	Begoniaceae	1000-1900	NA
7	<i>Begonia</i> sp.	Magarkachi	Begoniaceae		
8	<i>Bidens pilosa</i> Linn.	Kuro	Asteraceae	200-1900	NA
9	<i>Carex</i> sp.	Harkatto	Cyperaceae	1500-2000	
10	<i>Carex baccans</i> Nees	Harkatto	Cyperaceae		
11	<i>Colocasia esculanta</i> (L.) Schott.	Mane	Caryophyllaceae		
12	<i>Commelina benghalensis</i> Linn.	Kaney jhar	Commelinaceae		
13	<i>Cyperus eragrostis</i> Lam	Harkatto	Cyperaceae		
14	<i>Cyperus scariosus</i> R.Br.	Harkatto	Cyperaceae		
15	<i>Digitaria</i> sp.	Banso	Poaceae		
16	<i>Elatostema platyphyllum</i> Weddell.	Gagleto	Urticaceae		
17	<i>Elatostema sessile</i> J.R.Forst. & G.Forst.	Galato	Urticaceae		
18	<i>Eragrostis</i> sp.		Poaceae	1500-2500	
19	<i>Eupatorium adenophorum</i> Spreng.	Kalijhar	Asteraceae		
20	<i>Fragaria nubicola</i> Lindley ex Lacaita	Vui Aiselu	Rosaceae	2500-3900	NA
21	<i>Gerardiana diversifolia</i> (Link) Friis	Bhangre sisnu	Urticaceae		
22	<i>Globba sessiliflora</i> Sims	Sara	Zingiberaceae		LC

23	<i>Hedychium spicatum</i> Smith	Sara	Zingiberaceae	1800-2800	NA
24	<i>Heracleum wallichii</i> DC	Chimphing	Apiaceae	1900-2700	NA
25	<i>Impatiens</i> sp.		Balsaminaceae		
26	<i>Laportea terminalis</i> Wight.	Patle sisnu	Urticeae		
27	<i>Monotropa uniflora</i> L.	Ghost plant	Eriaceae		
28	<i>Nepeta</i> sp.		Lamiaceae		
29	<i>Oxalis corniculata</i> Linn	Amilo jhar	Oxalidaceae		
30	<i>Persicaria capitata</i> (Buch.Ham.ex D.Don) Gross	Ratneulo	Polygonaceae		
31	<i>Persicaria nepalensis</i> (Meisn.) Miyabe	Ratneulo	Polygonaceae		
32	<i>Pilea umbrosa</i> Wall. ex Blume	Chipleay ghans	Urticaceae	1200-2500	NA
33	<i>Poa</i> sp.	Banso	Poaceae		
34	<i>Polygonatum</i> sp.		Asparagaceae		
35	<i>Polygonum molle</i> D. Don	Thotney	Polygonaceae	1200-3400	NA
36	<i>Rohdea nepalensis</i> (Raf.) N.Tanaka	Janglee Nakima	Asparagaceae		
37	<i>Rumex nepalensis</i> Sprengel	Halhalley	Polygonaceae		
38	<i>Selinum</i> sp.		Apiaceae		
39	<i>Swertia bimaculata</i> (Siebold & Zucc.) Hook. f. & Thomson ex C.B. Clarke	Chirito	Gentianaceae	200-3500	NA
CLIMBER & EPIPHYTE					
1	<i>Rubia cordifolia</i> L	Manjith	Rubiaceae	300-2800	NA
2	<i>Holboellia angustifolia</i> Wall.	Gulfa	Lardizabalaceae		
3	<i>Rhaphidophora decursive</i> (Roxb.) Scott	Kanchirna	Araceae	2000	NA
4	<i>Rhaphidophora</i> sp.	Kanchirna	Araceae		
5	<i>Piper boechmeriaefolium</i> (Miq.) DC.	Chambo	Piperaceae	1000-2700	NA
6	<i>Stephania</i> sp.	Tamarkey	Menispermaceae		
7	<i>Herpetospermum pedunculatum</i> (Seringe.) C.B. Clarke	Ban karela	Cucurbitaceae	2300-2500	NA
8	<i>Tetrastigma serrulatum</i> (Roxb.) Planch	Charcharay lahara	Vitaceae		
FERNS & FERN-ALLIES					
1	<i>Asplenium lacinatedum</i> D.Don		Aspleniaceae	1000-2500	NA
2	<i>Selaginella</i> sp.		Selaginellaceae	2500	NA
3	<i>Lycopodium</i> sp.		Lycopodiaceae	1900-2400	NA
4	<i>Diplazium</i> sp.	Sauney ningro	Athyriaceae	1700-2500	NA
5	<i>Plagiogyria pycnophylla</i> (Kunze) Mett		Plagiogyriaceae		
6	<i>Unidentified</i>				
7	<i>Unidentified</i>				

SIGNIFICANCE OF THE RINCHENPONG RESERVE FOREST

1. High value timber species were recorded
2. Over 20 species of commonly used medicinal plants were recorded
3. The two ghost plants viz., *Aeginetia indica* and *Monotropa uniflora* were recorded

High value timber species were recorded along the sampling plots such as *Castanopsis indica*, *Cryptomeria japonica*, *Castanopsis hystrix*, *Alnus nepalensis*, *Duabanga grnadiflora* etc., The two common shrub viz., *Edgeworthia gardeneri* and *Daphne cannabina* are distributed in reserve forest for making fibers and papers. *Polygala arillata* (Marcha Plant) which was found growing at 1852 m asl in moist shady places mixed with *Magnolia doltsopa*, *Magnolia velutina*, *Castanopsis indica* and *Castanopsis hystrix*. The roots of *Polygala arillata* is used to make yeast cake for fermented alcoholic product.

Over 20 species of commonly used medicinal plants were recorded from Rinchenpong Reserve forest such as *Artimesia vulgaris*, *Eupatorium adenophorum*, *Hydrocotyle asiatica*, *Astilbe rivularis*, *Gerardiana diversifolia*, *Rumex nepalensis*, *Laportea terminalis*, *Hedychium spicatum* are widely used for different medicinal purposes but are not marketed. These herbs plants are found in open, moist shaded and some in bushy areas of the reserve forests along the altitudinal gradients 1200 - 1800 m asl.

On the other hand, *Heracleum wallichii* was found in the patches of reserve forest in the forest compartment boundary number 1. The mature and immature fruits (umbel) are openly marketed in the local *bazar* which has high medicinal value. In Sikkim, *H. wallichii* is known as ‘Chimping’ (Locally). Its seeds are used for making ‘chatni’ and as traditional spice throughout the region. It is used to treat headache, vomiting sensation, stomachache and indigestion.

The two ghost plants viz., *Aeginetia indica* and *Monotropa uniflora* were recorded along the sampling plots under the canopy of *Oak* species.



Aeginetia indica



Monotropa uniflora

Aeginetia indica is medicinal parasitic plant found growing in the moist shady place under the canopy of *Castanopsis* sp., *Magnolia* sp., etc. The seed of *A. indica* is used for antitumor activity in China and Northeast India. Similarly, the ghost flower *Monotropa uniflora* was found growing at 1900 m in mixed forest. The juice from the stem has been used to treat nervous irritability and epilepsy in Nepal.

Similarly, the area have huge number of orchid species were recorded. *Herpysma longicaulis* is orchid species, found growing in 1238 m asl with common fern-allies species *Selaginella* sp., and under the canopy of *Ostodes paniculata*, *Nyssa javanica*, *Macaranga denticulata*, *Jambosa formasa*, etc., were recorded along the sampling plots at Rinchenpong Reserve Forest.



Heracleum wallichii (blooming)



Laportea terminalis (blooming)




Gynocardia odorata

Gynocardia odorata is a species of evergreen tree belonging to Achariaceae family. *G. odorata* species was found growing in moist forest in the study area at 1272 m asl with mixed tree species viz., *Ostodes paniculata*, *Macaranga pustulata* etc., and found growing fern & epiphytic species like *Asplenium* sp, *Aeschynanthus* sp., & climber species *Piper* sp., etc. and one orchid species *Dendrobium* sp., are epiphytic in nature and was found to favour the *G.odorata* tree. It is a key stone species in the forest for the conservation of other species too. The seed of this plant is used in Indian medicine to treat skin conditions and diseases but fruit itself is poisonous.

FAUNA

During the survey, 7 species of animal were recorded from Rinchenpong Reserve Forest. Further, a total of 21 bird species belonging to 14 families were recorded. The family-wise bird species composition were recorded for Turdidae & Corvidae (3 species each) followed by Dicaeidae, Paridae, Phasinidae (2 species each) from this particular transect. The other remaining family represented by single species.

Checklist of Fauna & avifauna species were encountered at Rinchenpong Reserve Forest, West Sikkim

Sl. No	Scientific Name	Family	Common Name	Local Name	Evidence (Direct & Indirect)
	FAUNA				
	<i>Muntiacus muntjak</i>	Cervidae	Barking deer	Mirga	Pellet
	<i>Ursus thibetanus</i>	Carnivora	Himalayan Black bear	Ban kukur	Scat
	<i>Cuon alpinus</i>	Carnivora	Wild dog	Bhalu	Scat
	<i>Sus scrofa</i>	Suidae	Wild Boar	Bodyal	Scat
	<i>Canis sp</i>	Carnivora	Common Jackal	Syall	Scat
	<i>Naemorhedus goral</i>	Bovidae	Goral	Goral	Scat
			 Common Monkey	Common monkey	Direct Sighting
	AVI-FAUNA				
	<i>Aegithalos louschistos</i>	Paridae	Rufous-fronted Tit	Fista	Direct Sighting
	<i>Cettia major</i>	Sylviidar	Chestnut Crowned Warbler	Fista	Direct Sighting
	<i>Fulvetta vinipectus</i>	Paridae	Coal Tit	Fista	Direct Sighting
	<i>Corvus macrorhyncus</i>	Corvidae	Jungle Crow	Khag	Direct Sighting
	<i>Cuculus canorus</i>	Cuculidae	Eurassian	Cuckoo	Direct Sighting
	<i>Dendrocopos darjellensis</i>	Picidae	Darjeeling Woodpecker	Laachey	Direct Sighting
	<i>Dicrurus leucophaeus</i>	Dicaeidae	Ashy Drongo	Chibey	Direct Sighting
	<i>Dicrurus macrocercus</i>	Dicaeidae	Black Drongo	Chibey	Direct Sighting
	<i>Garrulax leucolophus</i>	Turdidae	White-crested Laughingthrush	Kolkoley	Direct Sighting
	<i>Garrulax ocellatus</i>	Turdidae	Spotted Laughing Thrush	Kolkoley	Direct Sighting
	<i>Gypaetus barbatus</i>	Accipitridae	Lammergeier	Chill	Direct Sighting
	<i>Lophura leucomelana</i>	Phasinidae	Kalij pheasant	Kalij	Direct Sighting

	<i>Megalaima virens</i>	Megalaimidae	Great Barbet	Neual	Direct Sighting
	<i>Myophonus caeruleus</i>	Turdidae	Blue Whistling Thrush	Kalchura	Direct Sighting
	<i>Passer rutilans</i>	Passeridae	Russet Sparrow	Bhangera	Direct Sighting
	<i>Pycnonotus cafer</i>	Pycnonotidae	Red Vented Bulbull	Jureli	Direct Sighting
	<i>Stroptopelia orientails</i>	Columbidae	Oriental Turtle Dove	Dhukur	Direct Sighting
	<i>Urocissa ornata</i>	Corvidae	Yellow Billed Blue Magpie	Lampucharey	Direct Sighting
	<i>Corvus macrorhyncus</i>	Corvidae	Large billed Crow	Kag	Direct Sighting
	<i>Arborophila torqueola</i>	Phasinidae	Hill Partridge	Peura	Direct Sighting
	<i>Aethopyga ignicauda</i>	Nectariniidae	Fire-tailed sunbird	Balchi	Direct Sighting

CONSERVATION RECOMMENDATION AND CONCLUSIONS

It is concluded that, some parts of the reserve forest is frequent landslide occurs. So, it needs to plant a soil binding species because it causes a great loss of biodiversity in the forest.

Sadam Reserve Forest, South Sikkim

Sanjyoti Subba, Sanchi Subba & Sumitra Nepal



Overview of RF

INTRODUCTION

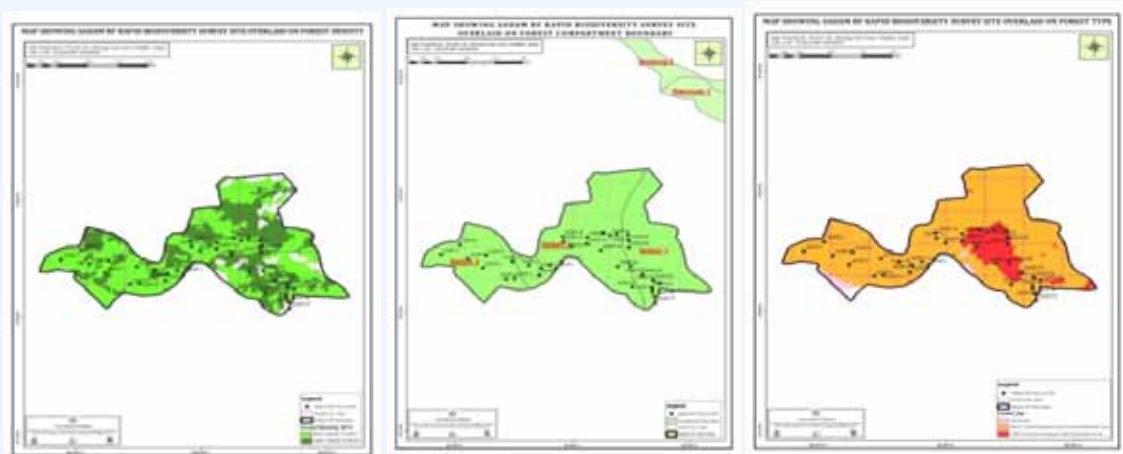
The present study is represented of sub-tropical & wet temperate forest at Sadam Reserve Forest, South Sikkim. The main vegetation of the reserve forest includes *Alnus nepalensis*, *Beilschmiedia sikkimensis*, *Castanopsis hystrix*, *Castanopsis tribuloides*, *Castanopsis indica*, *Choerospondias axillaris*, *Cryptomeria japonica*, *Echinocarpus dasycarpus*, *Engelhardtia spicata*, *Exbucklandia populnea*, *Macaranga denticulata*, *Magnolia cathcarti*, *Magnolia doltsopa*, *Persea odoratissima*, *Quercus lamellosa*, *Symplocos lucida* & *Symplocos glomerata* .etc. The most of the main tree species is dying & unhealthy in the forest. Only some part of the forest is covered by *Oak* species locally called “Kalo Jungle” which have the Oak habitat.

The most common shrub viz., *Daphne cannabina*, *Oxyspora paniculata*, *Dichroa febrifuga*, *Maesa chisia*, *Viburnum erubescens*, *Rubus ellipticus*, *Boehmeria sp.*, *Polygonum molle*, *Osbeckia stellata*, *Osbeckia nepalensis*, etc., and the forest floor below the dense canopy is covered by herbaceous plant species such as *Biden pilosa*, *Pilea umbrosa*, *Heacleum wallichii*, *Drymaria cordata*, *Oxalis corniculata*, *Hedychium spicatum*, *Persicaria capitata*, *Fragaria nubicola*, *Swertia bimaculata*, *Centella asiatica*, *Camphylandra aurantica*, *Viola sp.*, *Hydrocotyle javanica* etc., and many other epiphytes, fern and fern-allies, mosses, and lichens.

Many other faunal species viz., Himalayan Black bear, Wild Boar, Barking Deer, Flying squirrel, Wild dog, and Red fox etc has been habitat in the forest. Over 20 bird species has been distributed in the reserve forest and its surrounding areas. The important ones the Kalij pheasant has been home in the reserve forest.

STUDY AREA

Sadam Reserve forest is located in the south district between latitude 27°07'28.35"N to 27°08'34.3"N and longitude 88°22'42.5"E to 88°24'46.88"E and, sharing its border with Banjhang in the north, Mungram in the south, Singtam in the west and Pochere in the east direction. Its elevation ranges from 1654 - 2059 meters asl. This reserve forests are very rich in floral and faunal diversity. The reserve forest showing the aspects of E, N and NE with the slope angle falling between 10 to 90 degree inclinations. The field survey was conducted during January 2018.



Showing the forest compartment boundary, forest density & forest types along the sampling plots of Sadam Reserve Forest, South Sikkim

Site Characteristics of Sadam Reserve Forest, South Sikkim

Site Code	Forest types	Altitude (m) asl	GPS Coordinates		Slope Angle (°)	Slope Aspect	Humus depth (cm)	Disturbance	
			Lat(N)	Long(E)					
SRF1	Sub-tropical	1917	27°08'18.0"	88°23'41.1"	30	E	0.5	Anthropogenic	Natural
SRF2	Sub-tropical	1825	27°08'14.8"	88°23'32.5"	40	N	1		Natural
SRF3	Sub-tropical	1856	27°08'13.3"	88°23'19.8"	80	NE	1		Natural
SRF4	Sub-tropical	1879	27°08'13.0"	88°23'15.5"	50	N	0.5		Natural
SRF5	Sub-tropical	1786	27°08'18.7"	88°23'03.6"	25	N	0.5		Natural
SRF6	Sub-tropical	1768	27°08'23.4"	88°22'56.2"	35	E	0.5		Natural
SRF7	Sub-tropical	1659	27°08'25.7"	88°22'42.5"	30	N	0.5		Natural
SRF8	Sub-tropical	1664	27°08'30.7"	88°22'52.1"	40	SW	0.5		Natural
SRF9	Sub-tropical	1654	27°08'25.1"	88°23'05.5"	30	E	0.5		Natural
SRF10	Sub-tropical	1685	27°08'21.8"	88°23'18.7"	60	NE	0.5		Natural
SRF11	Sub-tropical	1693	27°08'19.8"	88°23'27.1"	80	N	0.5		Natural
SRF12	Sub-tropical	1740	27°08'18.1"	88°23'33.4"	70	E	0.5		Natural
SRF13	Sub-tropical	1819	27°08'19.8"	88°23'38.1"	80	NE	0.5		Natural
SRF14	Sub-tropical	1847	27°08'34.3"	88°23'44.8"	40	E	0.5		Natural
SRF15	Sub-tropical	1884	27°08'31.8"	88°23'45.1"	25	N	0.5		Natural
SRF16	Sub-tropical	1908	27°08'21.34"	88°23'43.86"	70	N	0.5		Natural
SRF17	Sub-tropical	1942	27°08'29.4"	88°23'49.30"	70	NE	0.5		Natural
SRF18	Wet Temperate	1987	27°08'30.35"	88°23'57.02"	60	SW	1		Natural
SRF19	Wet Temperate	2000	27°08'27.14"	88°24'04.14"	90	NE	1		Natural
SRF20	Wet Temperate	1981	27°08'18.64"	88°24'12.55"	80	NE	1		Natural

SRF21	Wet Temperate	1950	27°08'08.16"	88°24'19.85"	40	NE	2	Natural
SRF22	Wet Temperate	1939	27°07'58.66"	88°24'30.88"	45	W	2	Natural
SRF23	Wet Temperate	1962	27°08'02.56"	88°24'30.65"	10	NE	2	Natural
SRF24	Wet Temperate	1983	27°08'10.13"	88°24'33.89"	35	SE	2	Natural
SRF25	Wet Temperate	2021	27°08'11.14"	88°24'30.97"	60	W	1	Natural
SRF26	Wet Temperate	2028	27°08'11.63"	88°24'30.39"	30	N	2	Natural
SRF27	Wet Temperate	2049	27°08'14.41"	88°24'25.11"	50	S	2	Natural
SRF28	Wet Temperate	2057	27°08'18.98"	88°24'19.09"	25	SE	2	Natural
SRF29	Wet Temperate	2059	27°08'28.42"	88°24'18.37"	55	N	2	Natural
SRF30	Wet Temperate	2043	27°08'31.77"	88°24'18.44"	20	SW	2	Natural
SRF31	Wet Temperate	2046	27°08'34.73"	88°24'17.82"	30	E	1	Natural
SRF32	Wet Temperate	2047	27°08'34.99"	88°24'12.38"	45	NE	2	Natural
SRF33	Wet Temperate	2026	27°08'34.62"	88°24'09.06"	60	NE	2	Natural
SRF34	Sub-tropical	2001	27°08'35.75"	88°24'05.24"	45	N	2	Natural
SRF35	Sub-tropical	1965	27°08'33.70"	88°23'57.20"	20	SE	1	Natural
SRF36	Sub-tropical	1736	27°07'48.95"	88°24'46.88"	40	N	0.5	Natural
SRF37	Sub-tropical	1794	27°07'28.35"	88°24'34.48"	30	NE	0.5	Natural

FINDINGS AND DISCUSSION

The study revealed a total of 97 species were recorded in 37 sampling plots, covering an area 0.37 ha of Sadam Reserve Forest, South Sikkim. Of which 31 tree species belonging to 23 genera and 18 families were recorded. Similarly, 12 species of shrubs belonging to 12 genera and 11 families, 34 herb species (28 genera & 18 families), 10 climbers & epiphytes (9 genera & 8 families) and 9 fern and fern-allies (9 genera & 8 families) were inventoried in entire the sampling plots. Diversity of vegetation was found most in case of the ground flora in comparison to tree and shrubs, which are listed in the below Table .

In the forest density (dense) forest, randomly laid (1, 5, 16, 19) & (20-34) sampling plots and other remaining sampling plots were randomly laid for moderate dense forest. However, in the forest types, the sampling plots (18-21) & (24-33) were randomly laid in the wet temperate forest and other remaining was in the sub-tropical forest. The wet-temperate mixed forest consists of evergreen tree species such as *Oak* species which are a biologically diverse reserve forest that are completely covered by moss and especially the large number of epiphytes recorded along the sampling plot. The ground is densely covered by the herbs, ferns & fern-allies, climber, liana, etc. Where the humus content is very high and the ground always remains moist. Along the sub-tropical region, the tree species widely distributed are *Alnus nepalensis*, *Juglans regia*, *Macaranga denticulata*, *M. pustulata*, *Choerospondias axillaris*, etc.

Regarding, forest compartment boundary, randomly laid 20,23,26-32,36-37 random sampling plots for compartment 1 and other sampling plots such as 1-2, 11-19, 21 & 35 for compartment 2 and other remaining were laid in forest compartment boundary 3.

Checklist of floral species in Sadam Reserve Forest in South Sikkim

Sl. No	Botanical name	Local name	Family	Altitudinal ranges (m) asl	IUCN status
	TREE				
1.	<i>Acer campbellii</i> Hook. & Thom. Ex Hiern	Kapasey	Sapindaceae	1800-2700	LC
2.	<i>Actinodaphne Sikkimensis</i> Meissn	Sisi phal	Lauraceae	1700-1700	NA
3.	<i>Alnus nepalensis</i> Don.	Utis	Betulaceae	200-2800	LC
4.	<i>Beilschmiedia sikkimensis</i> King ex Hook. f.	Tarsing	Lauraceae	300-2400	NA
5.	<i>Brassaiopsis hispida</i> Seem	Putta	Araliaceae		
6.	<i>Brassaiopsis mitis</i> C.B.Clarke	Putta	Araliaceae		
7.	<i>Castanopsis hystrix</i> Hook. & Thomson ex. A. DC.	Patley katush	Fagaceae	1600-1600	NA
8.	<i>Castanopsis tribuloides</i> (Smith) A. DC	musre Katush	Fagaceae	450-2300	NA
9.	<i>Castanopsis indica</i> (Roxb. ex Lindl.) A.DC.	Dalney katus	Fagaceae	1500-1500	NA
10.	<i>Choerospondias axillaris</i> (Roxb.) B.L.Burt & A. W.Hill	Lapsi	Anacardiaceae	900-2500	NA
11.	<i>Cryptomeria japonica</i> (Thunberg ex. Linn. F.) D. Don	Dhupi	Taxodiaceae	1100-2500	NT

12.	<i>Echinocarpus dasycarpus</i> Benth.	Gobre	Elaeocaraceae		
13.	<i>Engelhardtia spicata</i> Lechen ex Blume.	Mauwa	Juglandaceae	500-2100	LC
14.	<i>Eurya acuminata</i> DC.	Jhingni	Theaceae	700-3000	NA
15.	<i>Exbucklandia populnea</i> (R. Br. Ex Griff) R. W. Br	Piplee	Hamamelidaceae	1200-2000	NA
16.	<i>Lyonia ovalifolia</i> var. <i>ovalifolia</i>	Angeri	Ericaceae	200-3400	NA
17.	<i>Macaranga pustulata</i> King.			100-1500	NA
18.	<i>Macaranga denticulata</i> (Blume) Müll.Arg.	Malata	Euphorbiaceae	100-1300	NA
19.	<i>Machilus</i> sp.	Kawlo	Lauraceae	100-1300	NA
20.	<i>Maesa</i> sp.	Bilauney	Myrtaceae		
21.	<i>Magnolia cathcartii</i> Hook.f.Thomson	Titey champ	Magnoliaceae	1400-2700	LC
22.	<i>Magnolia velutina</i> DC.	Phusrey champ	Magnoliaceae	1500-2400	NA
23.	<i>Magnolia doltsopa</i> (Buch.-Ham. ex DC.) Figlar	Ranichamp	Magnoliaceae	1500-2400	
24.	<i>Persea odoratissima</i> (Nees) Kosterm.	Kawlo	Lauraceae	1500-2100	NA
25.	<i>Pyrularia edulis</i> (Wall.) A. DC.	Amphi	Santalaceae	1700-1700	
26.	<i>Quercus lamellosa</i> Sm.	Buk	Fagaceae	1600-2800	NA
27.	<i>Rhus chinensis</i> Mill.	Bhakimlo	Anacardiaceae		
28.	<i>Rhus succedanea</i> Linn.	Rani bhalayo	Anacardiaceae		
29.	<i>Symplocos glomerata</i> King ex C.B. Clarke	Kholme	Symplocaceae	1200-2700	NA
30.	<i>Symplocos lucida</i> (Thunb.) Siebold & Zucc	Kharane	Symplocaceae	1500-3000	NA
31.	<i>Tetradium fraxinifolium</i> (Hook. f.) T.G. Hartley	Khanakpa	Rutaceae	1200-2500	NA
	SHRUB				
32.	<i>Ardisia macrocarpa</i> Wall.	Damai phal	Myrsinaceae	1500-2400	NA
33.	<i>Berberis aristata</i> DC.		Berberidaceae		
34.	<i>Boehmeria</i> sp		Urticaceae		
35.	<i>Daphne cannabina</i> Wall	Kalo argeli	Thymeleaceae	1900-2700	NA
36.	<i>Dichroa febrifuga</i> Lour.	Basak	Hydrangaceae	200-2000	NA
37.	<i>Ilex</i> sp.		Aquifoliaceae		
38.	<i>Osbeckia stellata</i> Buch.-Ham.ex D. Don	Lote Jhar	Melastomataceae	200-2300	NA
39.	<i>Oxyspora paniculata</i> (D.Don) DC	Chulesee	Melastomataceae	500-2000	NA
40.	<i>Polygala arillata</i> Buch.-Ham.ex D. Don	Marcha Jhar	Polygalaceae	1000-2800	NA
41.	<i>Rubus ellipticus</i> Sm.	Aiselu	Rosaceae	1000-2600	NA
42.	<i>Strobilanthes wallichii</i> Nees.	kebu	Acanthaceae		
43.	<i>Phyllanthus</i> sp.		Phyllanthaceae		
44.	<i>Viburnum erubescence</i> Wall. ex D	Asarey	Adoxaceae	1400-3950	NA
	HERB				

45.	<i>Anaphalis triplinervis</i> (Sims) Sims ex C. B. Clarke		Compositae		
46.	<i>Arisaema intermedium</i> Blume	Larua/Banko	Araceae	2600-3400	NA
47.	<i>Artemisia vulgaris</i> L.	Titey pate	Compositae	1500-3800	NA
48.	<i>Astilbe rivularis</i> Buch.-Ham. ex D. Don	Budi okhati	Saxifragaceae	900-3200	NA
49.	<i>Bidens pilosa</i> Linn.	Kuro	Asteraceae	200-1900	NA
50.	<i>Carex</i> sp.	Harkatto	Cyperaceae	1500-2000	
51.	<i>Carex baccans</i> Nees	Harkatto	Cyperaceae		
52.	<i>Commelina benghalensis</i> Linn.	Kaney jhar	Commelinaceae		
53.	<i>Craniotome furcata</i> (Link) Kuntze		Lamiaceae		
54.	<i>Cyathula capitata</i> Moq.		Amaranthaceae		
55.	<i>Cyperus eragrostis</i> Lam	Harkatto	Cyperaceae		
56.	<i>Cyperus scariosus</i> R.Br.	Harkatto	Cyperaceae		
57.	<i>Digitaria</i> sp.	Banso	Poaceae		
58.	<i>Elatostema platyphyllum</i> Weddell.	Gagleto	Urticaceae		
59.	<i>Elatostema sessile</i> J.R.Forst. & G.Forst.	Galato	Urticaceae		
60.	<i>Eragrostis</i> sp.		Poaceae	1500-2500	
61.	<i>Eupatorium adenophorum</i> Spreng.	Kalijhar	Asteraceae		
62.	<i>Fragaria nubicola</i> Lindley ex Lacaita	Vui Aiselu	Rosaceae	2500-3900	NA
63.	<i>Hedychium spicatum</i> Smith	Sara	Zingiberaceae	1800-2800	NA
64.	<i>Hemiphragma heterophyllum</i> Wall.		Plantaginaceae		
65.	<i>Heracleum wallichii</i> DC	Chimphing	Apiaceae		
66.	<i>Impatiens latiflora</i> Hook.f. & Thomson	Mujuro	Balsaminaceae		
67.	<i>Impatiens</i> sp.		Balsaminaceae		
68.	<i>Impatiens stenantha</i> Hook.f.	Mujuro	Balsaminaceae		
69.	<i>Laportea terminalis</i> Wight.	Patle sisnu	Urticaceae		
70.	<i>Oxalis corniculata</i> Linn	Amilo jhar	Oxalidaceae		
71.	<i>Persicaria capitata</i> (Buch.Ham.ex D.Don) Gross	Ratneulo	Polygonaceae	1500-2300	NA
72.	<i>Persicaria nepalensis</i> (Meisn.) Miyabe	Ratneulo	Polygonaceae		
73.	<i>Pilea umbrosa</i> Wall. ex Blume	Chipleyghans	Urticaceae	1200-2500	NA
74.	<i>Pogostemon benghalensis</i> (Burm.f) Kuntze		Lamiaceae		
75.	<i>Polygonum molle</i> D. Don	Thotney	Polygonaceae		
76.	<i>Rubus niveus</i> Thunb.		Rosaceae		
77.	<i>Rumex nepalensis</i> Sprengel	Halhalley	Polygonaceae		
78.	<i>Swertia bimaculata</i> (Siebold & Zucc.) Hook. f. & Thomson ex C.B. Clarke	Chirito	Gentianaceae	200-3500	NA
CLIMBER & EPIPHYTES					

79.	<i>Crawfordia speciosa</i> C.B. Clarke		Gentianaceae		
80.	<i>Herpetospermum pedunculatum</i> (Seringe.) C.B. Clarke	Ban karela	Cucurbitaceae	2300-2500	
81.	<i>Piper boechmeriaefolium</i> (Miq.) DC.	Chambo	Piperaceae	1000-2700	NA
82.	<i>Rhaphidophora decursive</i> (Roxb.) Scott	Kanchirna	Araceae	2000	NA
83.	<i>Rhaphidophora</i> sp.	Kanchirna	Araceae		
84.	<i>Rubia cordifolia</i> L	Manjith	Rubiaceae	300-2800	NA
85.	<i>Smilax</i> sp	Kukur diney	Smilacaceae		
86.	<i>Smilax zeylanica</i> Linn.	Kukur dainey	Liliaceae		
87.	<i>Stephania</i> sp.	Tamarkey	Menispermaceae	1500-2300	NA
88.	<i>Tetrastigma serrulatum</i> (Roxb.) Planch	Charchary Lahara	Vitaceae	1800-2500	NA
FERNS & FERN-ALLIES					
89.	<i>Asplenium lacinatedum</i> D. Don		Aspleniaceae	1000-2500	NA
90.	<i>Angiopteris indica</i> (G. Forster) Hoffmann		Marattiaceae		
91.	<i>Dicranopteris</i> sp.	Sottar	Gleicheniaceae		
92.	<i>Diplazium</i> sp.	Sauney ningro	Athyriaceae	1700-2500	NA
93.	<i>Gleichenia gigantean</i> Wall. ex Hook		Gleicheniaceae		
94.	<i>Huperzia</i> sp.		Lycopodiaceae		
95.	<i>Lycopodium japonicum</i> Thunb.	Nagbelli	Lycopodiaceae		
96.	<i>Plagiogyria pycnophylla</i> (Kunze) Mett		Plagiogyriaceae		
97.	<i>Selaginella</i> sp.		Selaginellaceae	2500	NA

FAUNA

During the trail sampling, a number of faunal and avi-faunal species were sighted and some were recorded based on their calls and presence of scats, pellets, and feathers or digging signs.

Checklist of Fauna & avi-faunal species

Sl. No.	Scientific Name	Family	Common Name	Local Name	Evidence (Direct & Indirect)
FAUNA					
1	<i>Muntiacus muntjak</i>	Cervidae	Barking deer	Mirga	Pellet
2	<i>Ursus thibetanus</i>	Carnivora	Himalayan Black bear	Ban kukur	Scat
3	<i>Cuon alpinus</i>	Carnivora	Wild dog	Bhalu	Scat
4	<i>Sus scrofa</i>	Suidae	Wild Boar	Bodyal	Scat
5	<i>Canis sp</i>	Carnivora	Common Jackal	Syall	Scat
6	<i>Naemorhedus goral</i>	Bovidae	Goral	Goral	Scat
AVI-FAUNA					
1	<i>Aegithalos louschistos</i>	Paridae	Rufous-fronted Tit	Fista	Direct Sighting
2	<i>Cettia major</i>	Sylviidar	Chestnut Crowned Warbler	Fista	Direct Sighting
3	<i>Fulvetta vinipectus</i>	Paridae	Coal Tit	Fista	Direct Sighting
4	<i>Corvus macrorhyncus</i>	Corvidae	Jungle Crow	Khag	Direct Sighting
5	<i>Cuculus canorus</i>	Cuculidae	Eurassian	Cuckoo	Direct Sighting
6	<i>Dendrocopos darjellensis</i>	Picidae	Darjeeling Woodpecker	Laachey	Direct Sighting

CONSERVATION RECOMMENDATION AND CONCLUSIONS

This reserve forest is completely dry and windy places. The areas of the forest is covered by *Cryptomeria japonica* and few other tree species which is also dying in the forest. As per the field survey, the tree species is not healthy and natural. Hence, it is recommended that the area need to plantation of the tree species like *Oak* species which have the ability to store the water holding capacity. Oak species plays a critical role in protecting soils from erosion and thus land sliding. The composition of the oak forest regulates water flow in watersheds, and maintaining water quality in streams and rivers. Oaks are highly mycorrhizal and the trees themselves inhabit soils and the roots growth through soil and break it into aggregates thus increasing its porosity and ability to take in water. This species needs to be conserved for healthy ecosystem and forest.



Pogostemon benghalensis



Phyllanthus clarkei Hook

Sokpay Reserved Forest, South Sikkim

Team: Sabita Dahal, Meena Tamang



STUDY AREA

A field trip for conducting Rapid Biodiversity Survey of Sokpay Reserved Forest in South Sikkim covering a sampling path along Taal Kharka - Gogunay Khola were carried during December (2017) – January (2018). The trip was aimed for inventory and monitoring of the biodiversity of the area.

The present survey area along Taal Kharka - Gogunay Khola sampling path, the forest type of which is represented by Wet Temperate Forest. The elevation range covered during the survey was not much varied, which is represented by Figure 1. The slope angle of the area ranged between 40 – 75 degree (stiff) and is facing towards SW aspect .



Survey plots along Taal Kharka – Gogunay Khola of forest compartment boundary, in Sokpay RF.

Showing the forest types and forest density of sakpey RF, South Sikkim



Daphne cannabina

Site characteristics of the survey area along Taal Kharka – Gogunay Khola sampling path in Sokpay RF, South Sikkim

Site Code	Forest type	Elevation (M)	GPS co-ordinates		Slope Angle (°)	Slope Aspect	Canopy cover / Forest Density	Dominate taxa	Disturbances	Location name
			Lat	Long						
Plot 1	Wet Temperate Forest	2051	27.3857	88.4225	55	SW	95%, Very dense	Tree	Nil	Taal Kharka
Plot 2	Wet Temperate Forest	2078	27.3867	88.4213	50	SW	70%, very dense	Tree	Nil	Taal Kharka
Plot 3	Wet Temperate Forest	2118	27.388	88.4208	40	SW	65%, Moderately dense	Tree	Nil	Matlo Bajratay
Plot 4	Wet Temperate Forest	2109	27.3896	88.4194	40	SW	60%, Moderately dense	Tree	Nil	Matlo Torkay
Plot 5	Wet Temperate Forest	2099	27.3903	88.4187	40	SW	80%, very dense	Tree	Nil	Matlo Khunrekay
Plot 6	Wet Temperate Forest	2079	27.3906	88.4191	55	SW	75%, very dense	Tree	Nil	Matlo Khunrekay
Plot 7	Wet Temperate Forest	2081	27.3914	88.4204	45	SW	60%, Moderately dense	Tree	Nil	Tallo Peepli Gawra
Plot 8	Wet Temperate Forest	2100	27.3931	88.4205	75	SW	80%, very dense	Tree	Nil	Peepli Gaura
Plot 9	Wet Temperate Forest	2106	27.3949	88.4213	60	SW	85%, very dense	Tree	Nil	Peepli Gaura
Plot 10	Wet Temperate Forest	2151	27.3971	88.4221	75	SW	80%, Very dense	Tree	Nil	Peepli Gaura
Plot 11	Wet Temperate Forest	2115	27.3983	88.4228	40	SW	50%, Moderately dense	Tree	Nil	Sokpay Kharka
Plot 12	Wet Temperate Forest	2023	27.4005	88.4233	50	SW	40%, Moderately dense	Tree	Nil	Sokpay Kharka
Plot 13	Wet Temperate Forest	2011	27.4011	88.4232	60	SW	70%, very dense	Tree	Nil	Gogunay Khola

FINDINGS

FLORA

During the survey, a total of 13 plots were laid covering 0.13 ha area (Table & Figure). A general checklist of the floral species (Table 2) of the area (including the areas outside of the plots) were prepared of which, herbs represented the highest number of species (54 species), followed by trees (52 species). 29 species of climbers and epiphytes, 17 species of shrubs and shrublets, 26 numbers of ferns and fern allies, 5 numbers of bamboos and cane were recorded from the area during the present study. Location name, dominate taxa, elevation, GPS-co-ordinates, forest type, slope angle, Slope aspect, disturbances and forest density of the area in terms of canopy cover in and around the sample plots are provided in the Table.

List of floral species in Sokpay Reserve Forest, South Sikkim

Sl. No.	Botanical Name	Family	Common name
	Tree and small tree species		
1.	<i>Acer caudatum</i> Wallich	Sapindaceae	Kapasey
2.	<i>Acer pectinatum</i> Wall.	Sapindaceae	Lek Kapasay
3.	<i>Actinodaphne sikkimensis</i> Meissn.	Lauraceae	Phurkey Sissi
4.	<i>Alangium begoniaefolium</i> (Roxb.) Baill	Alangiaceae	Akhanay
5.	<i>Alnus nepalensis</i> D. Don.	Betulaceae	Utis
6.	<i>Antidesma acuminatum</i> Wight	Euphorbiaceae	Lekh bilaune
7.	<i>Brassaiopsis mitis</i> C.B.Clarke	Araliaceae	Phutta
8.	<i>Castanopsis hystrix</i> Hook. & Thomson ex. A. DC.	Fagaceae	Patley katush
9.	<i>Castanopsis indica</i> (Roxb.ex Lindl.) A.DC.	Fagaceae	Dhalne kattus
10.	<i>Castanopsis tribuloides</i> (Smith) A. DC.	Fagaceae	Musrey katus
11.	<i>Cedrela febrifuga</i> Blume.	Meliaceae	Tuni
12.	<i>Cinnamomum impressinervium</i> Meisn.	Lauraceae	Sinkoli
13.	<i>Daphniphyllum himalayense</i> (Benth.) Mull. Arg.	Euphorbiaceae	Lal Chandan
14.	<i>Elaeocarpus lanceaefolius</i> Roxburgh.	Elaeocarpaceae	Bhadrasey
15.	<i>Engelhardtia spicata</i> Blume	Juglandaceae	Mauwa
16.	<i>Erythrina arborescens</i> Roxb	Leguminosae	Phaledo
17.	<i>Eurya acuminata</i> DC.	Theaceae	Jhingni
18.	<i>Exbucklandia populnea</i> R. Br. Ex Griff	Hamamelidaceae	Piplee
19.	<i>Ficus hookeri</i> Miq.	Moraceae	Nebharo
20.	<i>Ficus nemoralis</i> Wall.	Moraceae	Dudilo
21.	<i>Garuga pinnata</i> Roxb.	Burseraceae	Dabdabay
22.	<i>Glochidion acuminatum</i> Muell.	Euphorbiaceae	Latikaath
23.	<i>Gynocardia odorata</i> Roxburgh	Flacourtiaceae	Bandre/Gante
24.	<i>Juglans regia</i> Linn.	Juglandaceae	Okhar

25.	<i>Leucosceptrum cannum</i> Smith	Lamiaceae	Ghurpis
26.	<i>Litsea kingii</i> Hook.	Lauraceae	Siltimmur
27.	<i>Macaranga pustulata</i> King.	Euphorbiaceae	Malato
28.	<i>Machilus edulis</i> King.	Lauraceae	Pumsee / Funchey
29.	<i>Machilus gamblei</i> King ex J. D. Hooker	Lauraceae	Ghew Kaulo / Lapche Kaulo / Chiplay Kaulo
30.	<i>Machilus gammieana</i> King ex. Hook. f.	Lauraceae	Kawla
31.	<i>Machilus odoratissimus</i> Nees		Ghew funchey
32.	<i>Maesa chisia</i> Buch.-Ham. ex D. Don	Myrsinaceae	Bilaune
33.	<i>Magnolia cathcartii</i> (Hook.f. & Thomson) Noot.	Magnoliaceae	Tite champ
34.	<i>Magnolia doltsopa</i> (Buch.-Ham. ex DC.) Figlar	Magnoliaceae	Rani champ
35.	<i>Myrsine semiserrata</i> Wall.	Myrsinaceae	Phalame
36.	<i>Nyssa sessiliflora</i> Hook. f. & Thomson ex Benth	Cornaceae	Lek chilauney
37.	<i>Ostedes paniculatus</i> Blume.	Euphorbiaceae	Bepari
38.	<i>Pieris ovalifolia</i> D. Don	Ericaceae	Angari
39.	<i>Prunus cerasoides</i> Don.	Rosaceae	Paiyun
40.	<i>Prunus nepalensis</i> (Ser) Stendel	Rosaceae	Arupatey
41.	<i>Pyralaria edulis</i> (Wallich) A.	Santalaceae	Amphi
42.	<i>Quercus lamellosa</i> Smith.	Fagaceae	Buk/ Bajranth
43.	<i>Quercus pachyphylla</i> Kurz.	Fagaceae	Sungure Katus/ Bantay/ Oitay.
44.	<i>Rhododendron arboreum</i> ssp. <i>arboreum</i> (CB Clarke) Ridley.	Ericaceae	Lali gurans
45.	<i>Rhus succedanea</i> Linn.	Anacardiaceae	Bhalayo
46.	<i>Rhus succedanea</i> Linn.var. <i>acuminata</i>	Anacardiaceae	Rani bhalayo
47.	<i>Spondias axillaris</i> Roxb.	Anacardiaceae	Lapsi
48.	<i>Symingtonia populnea</i> (R. Br. Ex Griff.)	Hamamelidaceae	Piple
49.	<i>Symplocos glomerata</i> King, ex. C.B. Clarke	Symplocaceae	Kholme
50.	<i>Symplocos theifolia</i> Don.	Symplocaceae	Kharanay
51.	<i>Tetradium fraxinifolium</i> (Hook.) Hartley	Rutaceae	Khanakpa
52.	<i>Calicarpa arborea</i> Roxb.	Lamiaceae	Guenlo
SHRUBS AND SHRUBLETS			
1.	<i>Ardisia macrocarpa</i> Wall.	Myrsinaceae	Damai phal
2.	<i>Daphne cannabina</i> Wall.	Thymeleaceae	Kalo Argeli/Kagate
3.	<i>Dichroa febrifuga</i> Lour	Hydrangeaceae	Basak
4.	<i>Edgeworthia gardenieri</i> Meissn.	Thymeliaceae	Argali
5.	<i>Eupatorium adenophorum</i> Sprengel	Asteraceae	Kalijhar
6.	<i>Hypericum oblongifolium</i> Choisy	Hypericaceae	Urilo
7.	<i>Maesa chisia</i> Don	Myrsinaceae	Bilauney

8.	<i>Mahonia napaulensis</i> DC	Berberidaceae	Chutro
9.	<i>Neillia rubiflora</i> D.Don	Rosaceae	Khareto jhar
10.	<i>Oxyspora paniculata</i> (D.Don) DC	Melastomataceae	Chulesi
11.	<i>Polygala arillata</i> Buch.- Ham ex D.Don.	Polygalaceae	Marcha jhar
12.	<i>Rubus ellipticus</i> Smith.	Rosaceae	Aiselu
13.	<i>Rubus niveus</i> Thunb	Rosaceae	Aiselu / Biralu kanra
14.	<i>Rubus paniculatus</i> (Smith) Rees.	Rosaceae	Kalo Aiselu
15.	<i>Viburnum erubescens</i> Wallich ex DC	Sambucaceae	Asaray
16.	<i>Gaultheria fragrantissima</i> Wall.	Ericaceae	Dhasingarey
17.	<i>Gaultheria nummularioides</i> D.Don	Ericaceae	Kaligedi
	HERBS		
1.	<i>Aconogonum campanulatum</i> (Hook.f.) Hara	Polygonaceae	Kukur thotnay
2.	<i>Aconogonum molle</i> D. Don	Polygonaceae	Thotnay
3.	<i>Acorus calamus</i> Linn.	Acoraceae	Bojo
4.	<i>Aeschynanthus parviflorus</i> (D.Don) Spreng.	Gesneriaceae	Baklay patay
5.	<i>Aeschynanthus hookeri</i> C.B.Clarke	Gesneriaceae	Baklay patay
6.	<i>Amomum dealbatum</i> Roxb.	Zingiberaceae	Churumph
7.	<i>Ampelocissus latifolia</i> (Roxb.) Planch	Vitaceae	Pani lahara
8.	<i>Anaphalis triplinervis</i> C.B. Clarke	Asteraceae	Bukey Phool
9.	<i>Arisaema intermedium</i> Blume	Araceae	Larua/Banko
10.	<i>Arisaema flavum</i> (Forsskal) Schott	Araceae	Sap ko makai
11.	<i>Arisaema speciosum</i> (Wall.) Mart.	Araceae	Sap ko Makai
12.	<i>Artemisia vulgaris</i> Linn.	Asteraceae	Titaypati
13.	<i>Astilbe rivularis</i> Ham	Saxifragaceae	Burokhati
14.	<i>Begoniapicta</i> Sm.	Asteraceae	Magar kanje
15.	<i>Boehmeria platyphylla</i> D.Don	Urticaceae	Kamley
16.	<i>Campylandra aurantiaca</i> Baker	Asparagaceae	Jangali nakima
17.	<i>Carex</i> sp.	Cyperaceae	Harkatto
18.	<i>Cautleya spicata</i> – (J. M. Sm.) Bak	Zingiberaceae	Sara
19.	<i>Centella asiatica</i> (L.) Urban	Umbelliferae	Golpatta
20.	<i>Commelina benghalensis</i> L.	Commelinaceae	Kanay
21.	<i>Cyanotis vaga</i> (Loour.) Roem & Schult.	Commelinaceae	Kanay
22.	<i>Digitaria sanguinalis</i> (Linn.) Scopoli.	Poaceae	Banso
23.	<i>Elatostema platyphyllum</i> Weddell.	Urticaceae	Gagleto
24.	<i>Elatostema sessile</i> J.R.Forst. & G.Forst.	Urticaceae	Gagleto
25.	<i>Eupatorium adenophorum</i> Spreng.	Asteraceae	Kali jhar
26.	<i>Gerardiana diversifolia</i> (Link) Friis	Urticaceae	Bhangre sisnu
27.	<i>Globba clarkei</i> Baker	Zingiberaceae	

28.	<i>Hedychium spicatum</i> Sm.	Zingiberaceae	Gai sara
29.	<i>Hemiphragma heterophyllum</i> Wall.	Plantaginaceae	Nash jhar
30.	<i>Houttuynia cordata</i> Thunb	Saururaceae	Raktha-jhar
31.	<i>Impatiens stenantha</i> Hook. f.	Balsaminaceae	Mujuro
32.	<i>Impatiens urticifolia</i> Wallich.	Balsaminaceae	Mujuro
33.	<i>Lecanthus peduncularis</i> (Wall. ex Royle) Wedd.	Urticaceae	Gagleto
34.	<i>Osbeckia stellata</i> Hook.f	Melastomataceae	Arbal
35.	<i>Pilea stricta</i> (Buchanan-Hamilton ex D. Don) Weddell	Urticaceae	Chiple
36.	<i>Pilea umbrosa</i> Blume.	Urticaceae	Chiple
37.	<i>Pouzolzia sanguine</i> (Blume) Merrill	Urticaceae	Chiple
38.	<i>Rumex nepalensis</i> Spreng.	Polygonaceae	Halhalley
39.	<i>Selaginella biformis</i> A. Br. ex Kuhn	Selaginellaceae	Jhew
40.	<i>Selaginella chrysocaulos</i> (Hook. & Grev.) Spring.	Selaginellaceae	Jhew
41.	<i>Selaginella monospora</i> Spring.	Selaginellaceae	Jhew
42.	<i>Smilax</i> sp.	Smilacaceae	Madaney kara / Kirney ghan
43.	<i>Strobilanthes</i> sp.	Acanthaceae	Kibu ghan
44.	<i>Swertia bimaculata</i> (Roxb. ex Flem.) Karsten	Gentianaceae	Bhaley chiraito
45.	<i>Swertia chirayita</i> H. Karsten	Gentianaceae	Chiraito
46.	<i>Urtica dioica</i> Linn.	Urticaceae	Patley sisnu
47.	<i>Urtica parviflora</i> Roxburgh	Urticaceae	Gharia sisnu
48.	<i>Villebrunea frutescens</i> (Thunb.) Blume	Urticaceae	Chiple
49.	<i>Viola sikkimensis</i> W. Becker	Violaceae	Silamey jhar
50.	<i>Hedychium</i> sp.	Zingiberaceae	Qiura
51.	<i>Heracleum wallichii</i> DC.	Umbelliferae	Chimphing
52.	<i>Digitaria ciliaris</i> (Retzius) Koeler	Poaceae	Chitray Banso
53.	<i>Holboellia angustifolia</i> Diels.	Lardizabalaceae	Gulfa
54.	<i>Stephania glabra</i> (Roxb.) Miers	Menispermaceae	Tambarkay
EPIPHYTES / CLIMBERS			
1.	<i>Aconogonum molle</i> (D. Don) H. Hara	Polygonaceae	Thotne
2.	<i>Arisaema intermedium</i> Blume	Araceae	Larua/Banko
3.	<i>Boehmeria</i> sp.	Urticaceae	Kamley
4.	<i>Cardamine hirsuta</i> L.	Brassicaceae	Titey
5.	<i>Carex</i> sp.	Cyperaceae	Harkatto
6.	<i>Clematis acuminata</i> DC	Rununculaceae	Pinasay lahara
7.	<i>Clematis buchananiana</i> DC.	Ranunculaceae	Pinasey lahara
8.	<i>Codonopsis viridis</i> Wallich.	Campanulaceae	Padey lahara
9.	<i>Coelogyne flaccida</i> (Lindl.) Kuntz.	Orchidaceae	Sunakhari

10.	<i>Davallodes membranulosa</i> (Hook.) Copel.	Davalliaceae	Uniu
11.	<i>Digitaria sanguinalis</i> (Linn.) Scopoli.	Poaceae	Banso
12.	<i>Diplazium dilatatum</i> Blume Lek	Woodsiaceae	Chipley Ningro
13.	<i>Diplazium stoliczkae</i> Beddome	Woodsiaceae	Lek kalo ningro
14.	<i>Elatostema platyphyllum</i> Weddell.	Urticaceae	Gagleto
15.	<i>Eragrostis cilianensis</i> (All.) Lut. ex Janchen	Poaceae	Banso
16.	<i>Eria coronaria</i> (Lindl.) Rchb.f.	Orchidaceae	
17.	<i>Galium</i> sp.	Rubiaceae	-
18.	<i>Machilus gamblei</i> King ex J. D. Hooker		Seti kaulo / Ghew kaulo
19.	<i>Mucuna macrocarpa</i> Wall.	Leguminosae	Baldengra
20.	<i>Pleione praecox</i> (Lindl.)	Orchidaceae	-
21.	<i>Piper</i> sp.	Piperaceae	
22.	<i>Piper boehmeriaefolia</i> (Miq.) DC.	Piperaceae	Chabo / Jungali pan
23.	<i>Rhaphidophora decursiva</i> (Roxb.) Schott.	Araceae	Kanchirno
24.	<i>Rubia cordifolia</i> Linn.	Rubiaceae	Majito
25.	<i>Smilax zeylanica</i> Linn.	Liliaceae	Kukur dainey
26.	<i>Smilax aspara</i> L.	Liliaceae	Kukurdaina
27.	<i>Trichosanthes lepiniana</i> (Naud.) Cogn.	Cucurbitaceae	Indreni
28.	<i>Viscum articulatum</i> Burm. f.	Lorantahceae	Harchur
29.	<i>Wrightia gigantia</i>		Bauni Kath
	FERNS AND FERN- ALLIES		
1.	<i>Asplenium laciniatum</i> D. Don.	Aspleniaceae	Uniu
2.	<i>Blechnum orientale</i> L.	Blechnaceae	Deer Fern
3.	<i>Coniogramme intermedia</i> Heiron.	Pteridaceae	Uniu
4.	<i>Coniogramme fraxinea</i> (D.Don) Fee ex Diels	Pteridaceae	Bamboo leaf fern
5.	<i>Cyathea spinulosa</i> Wall.ex Hook	Cyatheaceae	Rukh uniu
6.	<i>Dennstaedtia appendiculata</i> (Wall.ex Hook.) J.Sm	Dennstaedtiaceae	Piray uniu
7.	<i>Diplazium dilatatum</i> Blume	Woodsiaceae	Lek Chipley Ningro
8.	<i>Diplazium esculentum</i> (Retz.) Sw	Woodsiaceae	Chiplay ningro
9.	<i>Diplazium stoliczkae</i> Beddome	Woodsiaceae	Lek Kalo Ningro
10.	<i>Drynaria</i> sp.	Polypodiaceae	Basket fern
11.	<i>Equisetum diffusum</i> D.Don.	Equiaetaceae	Salli bisalli
12.	<i>Gleichenia gigantean</i> Wall. ex Hook	Dryopteridaceae	Kalamey Uniu
13.	<i>Gleichenia longissima</i> Blume	Dryopteridaceae	Sottarey uniu
14.	<i>Lepisorus</i> sp.	Polypodiaceae	Polypods
15.	<i>Leucostegia truncata</i> (D.Don) Fras.-Jenk.	Davalliaceae	Deer fern
16.	<i>Lycopodium japonicum</i> Thunb	Lycopodiaceae	Nagbelli

17.	<i>Monachosoram henryi</i> Christ.	Monachosoraceae	Uniu
18.	<i>Microsorium membranaceum</i> (D.Don) Cing	Polypodiaceae	Uniu
19.	<i>Nephrolepis cordifolia</i> (Linn.) C. Presl.	Davalliaceae	Pani amala
20.	<i>Odontosoria chinensis</i> (L.) J.Smith	Lindsaeaceae	Uneu
21.	<i>Plagiogyria pycnophylla</i> (Kunze.) Mett.	Plagiogyriaceae	Uniu
22.	<i>Pseudodrynaria coronans</i> (Wall.ex Mett.) T.Moore	Polypodiaceae	Kamray lahara
23.	<i>Pteridium revolutum</i> (Blume) Nakai	Pteridaceae	Uniu
24.	<i>Pteris biaurita</i> L.	Pteridaceae	Uniu
25.	<i>Pteris wallichiana</i> J. Agardh	Pteridaceae	Uneu
26.	<i>Vittaria elongata</i> Sw	Vittariaceae	Uniu
BAMBOO / CANE			
1	<i>Costus speciosus</i> Koenig Sm.	Costaceae	Bethlauri
2	<i>Plectocomia himalayana</i> Giff.	Arecaceae	Fyakray bet
3	<i>Sinarundinaria intermedia</i> (Munro) C.S.Chao & Renvoize	Poaceae	Nigalo/Tite Nigalo
4	<i>Themnocalamus falconeri</i> Hook.f. ex. Munro.	Poaceae	Singanay Bans
5	<i>Yushania maling</i> (Gamble) R.B.Majumdar & Karthik.	Poaceae	Malingo

FAUNA

During the biodiversity survey in Sokpay Reserve forest, the existence of a total of 14 mammalian species, 52 birds species and 62 butterflies species were recorded through direct sightings and indirect evidences, which are listed in table 3.

Checklist of Faunal species, including Mammals, Avi-fauna and butterflies of Sokpay RF and surrounding area in South Sikkim

Sl.No	Common name	Scientific name	Family
Mammalian species			
1.	Jackel	<i>Cannis aurens</i>	Canidae
2.	Himalayan Serow	<i>Capricornis thar</i>	Bovidae
3.	Parti-colored flying squirrel	<i>Hylopetes alboniger</i>	Sciuridae
4.	Yellow-Throated marten	<i>Martes flavigula</i>	Mustelids
5.	Barking Deer (big and small)	<i>Muntiacus muntjak</i>	Cervidae
7.	Goral	<i>Naemorhedus goral</i>	Bovidae
8.	Himalayan palm civet	<i>Paguma larvata</i>	Viverridae
9.	Wild Boar	<i>Sus scrofa</i>	Suidae
11.	Himalayan black Bear (big and small) tree bear	<i>Ursus thibetanus</i>	Ursidae
12.	Himalayan Crestless Porcupine	<i>Hystrix brachyura</i>	Hystricidae
13.	Hoary Bellied Himalayan Squirrel	<i>Callosciurus pygarythrus</i>	Sciuridae

14.	Himalayan Thar	<i>Hemitragus jemlahicus</i>	Bovidae
15.	Red panda	<i>Ailurus fulgens</i>	Ailuridae
Avi - Fauna			
1.	Ashy Drongo	<i>Dicrurus leucophaeus</i>	Dicruridae
2.	Barred Cuckoo Dove	<i>Macropygia unchall</i>	Columbidae
3.	Blue Whistling Thrush	<i>Myophonus caeruleus</i>	Turdidae
4.	Blue-fronted Redstart	<i>Phoenicurus frontalis</i>	Muscicapidae
5.	Blue-winged Siva	<i>Siva cyanouroptera</i>	Timaliidae
6.	Black bulbul	<i>Hypsipetes leucocephalus</i>	Pycnonotidae
7.	Common Green Magpie	<i>Cissa chinensis</i>	Corvidae
8.	Common Hoopoe	<i>Upupa epops</i>	Upupidae
9.	Common Myna	<i>Acridotheres tristis</i>	Sturnidae
10.	Common pigeon	<i>Columba libia</i>	Columbidae
11.	Common Tailored Bird	<i>Orthotomus sutorius</i>	Cisticolidae
12.	Golden-breasted Fulvetta	<i>Lioparus chrysotis</i>	Sylviidae
13.	Great Barbet	<i>Megalaima virens</i>	Ramphastidae
14.	Greater Yellownappe	<i>Picus flavinucha</i>	Picidae
15.	Green-backed Tit	<i>Parus monticolus</i>	Paridae
16.	Green-tailed Sunbird	<i>Aethopyga nipalensis</i>	Nectariniidae
17.	Grey-backed Shrike	<i>Lanius tephronotus</i>	Laniidae
18.	Grey-headed Canary Flycatcher	<i>Culicicapa ceylonensis</i>	Stenostiridae
19.	Grey-headed Parakeet	<i>Psittacula finschii</i>	Psittacidae
20.	Himalayan Bluetail	<i>Tarsiger rufilatus</i>	Muscicapidae
21.	Himalayan Bulbul	<i>Pycnonotus leucogenys</i>	Pycnonotidae
22.	Hodgson's Redstart	<i>Phoenicurus hodgsoni</i>	Muscicapidae
23.	House Crow	<i>Corvus splendens</i>	Corvidae
24.	House Sparrow	<i>Passer domesticus</i>	Passeridae
25.	Kalij Pheasant	<i>Lophura leucomelanos</i>	Phasianidae
26.	Large-billed Crow	<i>Corvus macrorhynchos</i>	Corvidae
27.	Lesser Yellownappe	<i>Picus chlorolophus</i>	Picidae
28.	Little Spiderhunter	<i>Aracanothra longirostra</i>	Nectariniidae
29.	Nepal Fulvetta	<i>Alcippe nipalensis</i>	Sylviidae
30.	Oriental Magpie Robin	<i>Copsychus saularis</i>	Muscicapidae
31.	Oriental Turtle Dove	<i>Streptopelia orientalis</i>	Columbidae
32.	Oriental White-eye	<i>Zosterops palpebrosus</i>	Zosteropidae
33.	Red-billed Leiothrix	<i>Leiothrix lutea</i>	Timaliidae

34.	Red-tailed Minla	<i>Minla ignotincta</i>	Leiothrichidae
35.	Red-vented Bulbul	<i>Pycnonotus cafer</i>	Pycnonotidae
36.	Rufous sibia	<i>Malacias capistratus</i>	Timaliidae
37.	Rufous-bellied Niltava	<i>Niltava sundara</i>	Muscicapidae
38.	Rufous-gorgeted Flycatcher	<i>Ficedula strophiat</i>	Muscicapidae
39.	Scaly Laughingthrush	<i>Garrulax austeni</i>	Turdidae
40.	Scarlet Minivet	<i>Pericrocotus cinnamomeus</i>	Campephagidae
41.	Silver-eared Mesia	<i>Mesia argentauris</i>	Leiothrichidae
42.	Slender-billed Scimitar Babbler	<i>Xiphirhynchus superciliaris</i>	Timaliidae
43.	Spangled Drongo	<i>Dicrurus hottentottus</i>	Dicruridae
44.	Stripe-throated Yuhina	<i>Yuhina gularis</i>	Zosteropidae
45.	Velvet-fronted Nuthatch	<i>Sitta frontalis</i>	Sittidae
46.	Verditer flycatcher	<i>Eumyias thalassinus</i>	Muscicapidae
47.	Whiskered Yuhina	<i>Yuhina flavicollis</i>	Zosteropidae
48.	White-browed Fulvetta	<i>Fulvetta vinipectus</i>	Sylviidae
49.	White-browed Piculat	<i>Sasia ochracea</i>	Picidae
50.	White-capped Redstart	<i>Chaimarrornis leucocephalus</i>	Muscicapidae
51.	White-crested Laughingthrush	<i>Garrulax leucolophus</i>	Turdidae
52.	Satyr tragopan	<i>Tragopan satyra</i>	Phasianidae
Butterfly			
1.	Autumn leaf	<i>Doleschallia bisaltidae</i>	Nymphalidae
2.	Banded Treebrown	<i>Lethe confuse</i>	Nymphalidae
3.	Blue Peacock	<i>Papilio acturus</i>	Papilionidae
4.	Chocolate Pansy	<i>Junonia iphita</i>	Nymphalidae
5.	Common Bushbrown	<i>Mycalesis perseus</i>	Nymphalidae
6.	Common cerculean	<i>Jamides celeno</i>	Lycaenidae
7.	Common Crow	<i>Euploea core</i>	Nymphalidae
8.	Common Earl	<i>Tanaecia julii</i>	Nymphalidae
9.	Common Evening Brown	<i>Melanitis leda</i>	Nymphalidae
10.	Common Five Ring	<i>Ypthima baldus</i>	Nymphalidae
11.	Common Grass Yellow	<i>Eurema hecabe</i>	Pieridae
12.	Common Jester	<i>Symbrenthia hippoclus</i>	Nymphalidae
13.	Common Line Blue	<i>Posotas nora</i>	Lycaenidae
14.	Common Map	<i>Cyrestis thyodamas</i>	Nymphalidae

15.	Common Maplet	<i>Chersonesia risa</i>	Nymphalidae
16.	Common Mormon	<i>Papilio polytes</i>	Papilionidae
17.	Common Nawab	<i>Polyuria athamas</i>	Nymphalidae
18.	Common Palmfly	<i>Elymnias hypermnestra</i>	Nymphalidae
19.	Common Peacock	<i>Papilio polyctor</i>	Papilionidae
20.	Common Pierrot	<i>Castalius rosimon</i>	Lycaenidae
21.	Common Red Eye	<i>Matapa aria</i>	Hesperiidae
22.	Common Red Forester	<i>Lethe mekara</i>	Nymphalidae
23.	Common Sergeant	<i>Athyma perius</i>	Nymphalidae
24.	Common Silverline	<i>Spindasis vulcans</i>	Lycaenidae
25.	Common Small Flat	<i>Sarangesa dasahara</i>	Hasperiidae
26.	Common Windmill	<i>Atrophaneura polyeuctes</i>	Papilionidae
27.	Dark Judy	<i>Abisara fylla</i>	Riodinidae
28.	Fluffy tit	<i>Zeltus amasa</i>	Lycaenidae
29.	Fulvous pied Flat	<i>Pseudocoladenia dan</i>	Hesperiidae
30.	Glassy Bluebottle	<i>Graphium sarpedon</i>	Papilionidae
31.	Golden Sapphire	<i>Heliophorus brahma</i>	Lycaenidae
32.	Grass Demon	<i>Udaspes folus</i>	Hesperiidae
33.	Green Commodore	<i>Sumalia daraxa</i>	Nymphalidae
34.	Indian Cabbage White	<i>Pieris canidia</i>	Pieridae
35.	Indian Fritillary	<i>Argynnis hyperbius</i>	Nymphalidae
36.	Indian Red Admiral	<i>Venessa indica</i>	Nymphalidae
37.	Indian Skipper	<i>Spialian galba</i>	Hesperiidae
38.	Indian Tortoiseshell	<i>Aglais cashmiriensis</i>	Nymphalidae
39.	Large Yeoman	<i>Cirrochroa aoris</i>	Nymphalidae
40.	Lemon Pansy	<i>Junonia lemonias</i>	Nymphalidae
41.	Mixed Punch	<i>Dodona ouida</i>	Riodinidae
42.	Nigger	<i>Orsotrioena medus</i>	Nymphalidae
43.	Orange Oakleaf	<i>Kallima inachus</i>	Nymphalidae
44.	Orange Punch	<i>Dodona egeon</i>	Riodinidae
45.	Painted Lady	<i>Venessa carduii</i>	Nymphalidae
46.	Plain Tiger	<i>Danaus chrysippus</i>	Nymphalidae
47.	Punchinello	<i>Zemeros flegyas</i>	Riodinidae
48.	Purple Sapphire	<i>Heliophorus epicles</i>	Lycaenidae
49.	Red Helen	<i>Papilio helenus</i>	Papilionidae
50.	Red Lacewing	<i>Cethosia biblustrisamena</i>	Nymphalidae

51.	Redbreast	<i>Papilio alcmenor</i>	Papilionidae
52.	Rice Swift	<i>Borbo cinnara</i>	Hesperiidae
53.	Spotted sawtooth	<i>Prioneris thestylis</i>	Pieridae
54.	Spotted Snow Flat	<i>Tagiades menaka</i>	Hesperiidae
55.	Striped Tiger	<i>Danaus genutia</i>	Nymphalidae
56.	Tailed Jay	<i>Graphium agamemnon</i>	Papilionidae
57.	Tailed Judy	<i>Abisara fylla</i>	Riodinidae
58.	Tiger Hooper	<i>Ochus subvittatus</i>	Hasperiidae
59.	Water Snow Flat	<i>Tagiades litigiosa</i>	Hesperiidae
60.	Yamfly	<i>Loxura atymnus</i>	Lycaenidae
61.	Yellow Helen	<i>Papilio nephelus</i>	Papilionidae
62.	Yellow Orange Tip	<i>Ixias pyrene</i>	Peiridae

DISCUSSION

The Sokpay Reserved Forest and adjacent area remain unexplored till date, which, during the present study, found to be rich in terms of the diversity of the species. Forest density also observed very high in most of the areas, followed by moderately dense (Table). Forest being wet temperate type, trees is the most predominant taxa in the area, followed by herbs, shrubs and shrublets, ferns, climbers and epiphytes. The area constitutes a diverse habitat for both flora and fauna. The area is highly dominated with the trees and small trees species namely *Quercus lamellose*, *Elaeocarpus lanceaefolius*, *Symplocos lucida*, *Machilus odoratissimus*, *Machilus gammieana*, *Machilus gamblei*, *Machilus edulis*, *Quercus pachyphylla*, , *Michelia excelsa*, *Michelia cathcartii*, *Gynocardia odorata*, *Castanopsis tribuloides*, *Castanopsis hystrix*, *Brassaiopsis mitis*, *Pyrularia edulis*, *Pieris ovalifolia*, *Michelia cathcartii*, *Maesa chisia*, *Antidesma acuminatum*, *Acer pectinatum* etc. Common shrub species recorded from the area are *Rubus ellipticus*, *Rubus niveus*, *Rubus paniculatus*, *Viburnum erubescens*, *Dichroa febrifuga*, *Maesa chisia*, *Oxyspora paniculata*, *Polygala arillata*, *Osbeckia stellata* etc. Diversity of the ground covering herbs species in the area recorded high, but in terms of density, in term of the percentage of ground cover, was comparatively less. In addition, the area also provide diverse habitat for the faunal species, especially avifauna.

CONCLUSION AND RECOMMENDATIONS

The area is not much impacted by the natural as well as anthropogenic disturbance. Intensity of threats to the biodiversity of the area due to grazing pressure by cow was observed in the area for which action should be taken. The unsustainable extraction of plants especially for firewood and livestock feed by the local inhabitants are the general disturbances resulted in the building up considerable pressure on the survival of the species. Other major threats are obviously, the effect of drastic changes in climate, hence studies on the impact of climate change on the biodiversity of the area is recommended, which will be helpful in framing conservation and management strategies. Since the diversity of birds species appear very high in the area, the area can be recommended for eco-tourism potential zone, especially for birds watching.



Cave (Musay Odar) at Sokpay RF, South Sikkim

Soreng Reserve Forest, West Sikkim

Sanjyoti Subba, Sanchi Subba & Sumitra Nepal

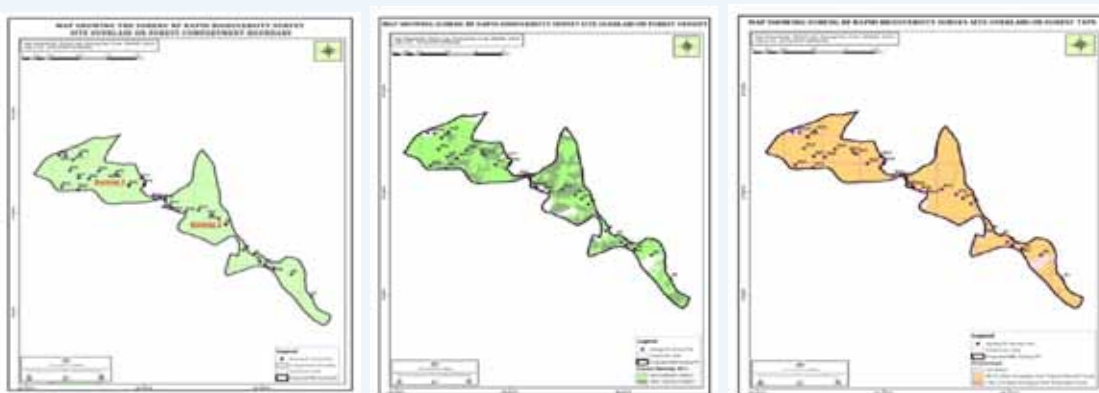


INTRODUCTION

Soreng Reserve forest is located in the west district between latitude 27°09'18.5"N to 27°10'42.3"N and longitude 88°11'55.3"E to 88°14'09.7"E. The present study is represented of sub-tropical & wet temperate forest of Soreng Reserve Forest. It is a biologically diverse reserve forest and famous for its *Magnolia* species such as *Magnolia doltsopa*, *Magnolia velutina*, *Magnolia cathcartii* which blooms usually between April to May and pure and dense patches of *Oak* species such as *Castanopsis hystrix*, *Castanopsis indica*, *Castanopsis tribuloides*, *Lithocarpus fenestratus*, etc., and many other main vegetation of the reserve forest in sub-tropical forest are represented by *Terminalia myriocarpa*, *Schima wallichii*, *Duabanga sonneratiodes*, *Jambosa formosa*, *Juglans regia*, *Erythrina arborescens*, *Betula* sp., *Choerospondias axillaris*, *Cryptomeria japonica*, *Exbucklandia populnea*, *Hovenia dulcis*, *Macaranga pustulata*, *Machilus* sp., *Tetradium fraxinifolia*, *Ailanthus grandis*, etc., were dominated in the forest. The common small tree species of the sub-tropical forest includes *Pandanus furcatus*, *Leucosceptrum canum* & *Zanthoxylum acanthopodium* and in wet temperate forest includes *Symplocos lucida* & *Symplocos glomerata* etc. The most common shrub viz., *Lucilia gratissima*, *Vibrunum erubescens*, *Rubus ellipticus*, *Boehmeria* sp., *Polygonum molle*, *Osbeckia stellata*, *Osbeckia nepalensis*, *Edgeworthia gardenieri*, *Oxyspora paniculata*, *Dichroa*

febrifuga, *Maesa chisia*, *Dobinea vulgaris*, etc., and the forest floor below the dense canopy is covered by herbaceous plant species such as *Biden pilosa*, *Pilea umbrosa*, *Heacleum wallichii*, *Drymaria cordata*, *Oxalis corniculata*, *Hedychium spicatum*, *Persicaria capitata*, *Fragaria nubicola*, *Swertia bimaculata*, *Centella asiatica*, *Viola* sp., *Hydrocotyle javanica*, *Rubus calycinus*, *Gynura nepalense*, etc. The area also harbors many climber species such as *Rubia cordifolia*, *Dinetus racemosus*, *Smilax* sp., other ferns and fern-allies, mosses, and lichens too.

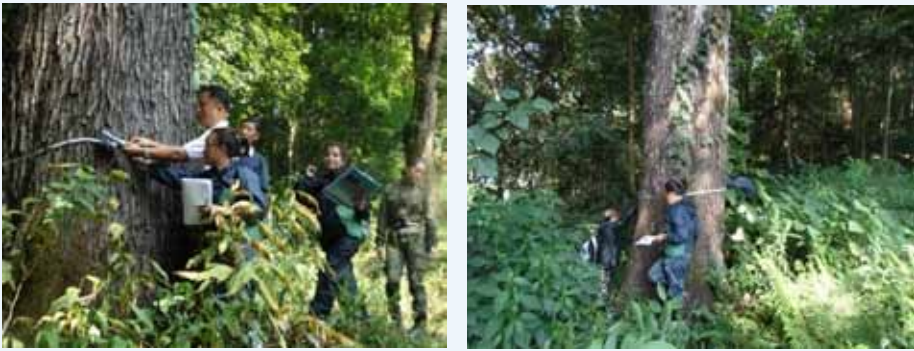
The reserve forest is home to many faunal species, viz., Wild Boar, Barking Deer, Flying squirrel, Wild dog, and Red fox etc. Due to dense forest provides shelter as well as abundant fruits/feed and as such are good indicator of faunal presence and richness.



Showing the forest compartment boundary, forest density & forest types along the sampling plots of Soreng Reserve Forest, West Sikkim

STUDY AREA

Soreng Reserve forest is sharing its border with Singling in the north, Parigaon in the south, Chakung in the east and Mangarjong in the west over the Roathok Khola in the Western Sikkim. The study area its elevation ranges from 1021-1709 meters asl. This reserve forests are very rich in floral and faunal diversity. The reserve forest showing the aspects of E, N and NE with the slope angle falling between 5 to 80 degree inclinations and the humus depth is not less than 0.5 and the average humus depth is 1.5 cm depth. Reserve forest can be broadly categorized into two types of forest wet temperate and sub-tropical forest. The field survey was conducted during October 2017.



Measuring CBH of *Choerospondias axillaris*



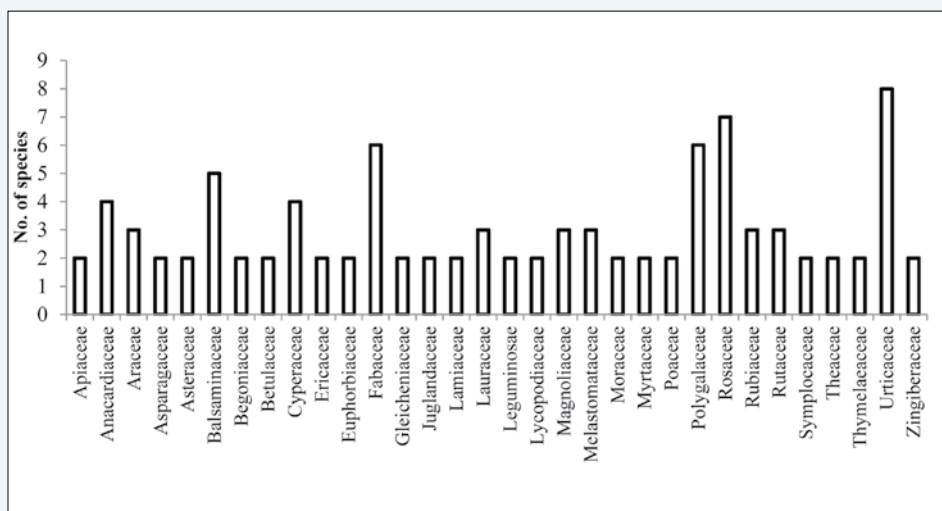
Survey team with forest field staff at Soreng Reserve forest, West Sikkim

FINDINGS AND DISCUSSION

A total of 135 species were recorded in entire 34 sampling plot, covering an area of 0.34 ha in entire sampling plot. Of which 47 tree species belonging to 36 genera and 24 families and 4 unidentified were recorded. Similarly, 23 species of shrubs (20 genera and 15 families), 43 herb species (34 genera and 20 families), 11 climbers/epiphytic species (10 genera and 10 families) and 9 fern and fern-allies (9 genera and 7 families) were inventoried. Besides, numerous orchid species *Calanthe biloba*, *Vanda* sp., *Coelogyne*, *Cymbidium* sp., were recorded along the study area.

In the forest density (dense) forest, randomly laid (1-5) & (11-25) sampling plots and other remaining sampling plots were randomly laid for moderate dense forest. However, in the forest types, the sampling plots 12, 30 & 32 were randomly laid in the wet temperate forest and other remaining were laid in the sub-tropical forest. Forest compartment boundary, randomly laid 15-17 and 22-34 random sampling plots for compartment 1 and other remaining sampling plots such as 1-14 and 18-21 for compartment 2.

The present study of reserve forest was dominated by Urticaceae (8 species), followed by Rosaceae (7 species), Polygalaceae & Fabaceae (6 species each), Balsaminaceae (5 species), Anacardiaceae (4 species), respectively. The family included several species belonging to the genus *Boehmeria platyphylla*, *Boehmeria* sp., *Elatostema platyphyllum*, *Elatostema sessile*, *Gerardiana diversifolia*, *Laportea terminalis*, *Pilea umbrosa*, *Pilea* sp., etc., It is well known fact that these species are a very important species and widely distributed in the sub-tropical to temperate forest in study area.



Family-wise species composition

The minimum no. of species were recorded for Acanthaceae, Adoxaceae, Araliaceae, Aspleniaceae, Athyriaceae, Berberidaceae, Combretaceae, Commelinaceae, Compositae, Convolvulaceae, Cucurbitaceae, Gentianaceae, Hamamelidaceae, Hydrangaceae, Lardizabalanceae, Liliaceae, Lythraceae, Malvaceae, Menispermaceae, Myrsinaceae, Oxalidaceae, Pandanaceae, Phyllanthaceae, Piperaceae, Plagiogyriaceae, Plantaginaceae, Saxifragaceae, Selaginellaceae, Simarubaceae, Taxodiaceae, Verbenaceae and Vitaceae etc., were represented by single species including the climber species in the study area.

SIGNIFICANCE OF SORENG RESERVE FOREST

1. *Herpysma longicaulis* and *Calanthe biloba* were recorded in Soreng RF
2. *Leucosceptrum canum* is highly dominated in the Soreng RF, which have only known colored nectar plants and have as essential ecosystem services in the forest.
3. Birds and butterflies were encountered.

The present study clearly observed that the Sikkim forest having rich diversity of orchid species. Soreng reserve forests have more than 30 orchid species were inventoried in non-flowering stage. Some of the species were recorded in full blooming stage. The orchid species like *Herpysma longicaulis* was recorded at elevation 1215 m asl. *Calanthe biloba* was reported at 1800 m asl in entire sampling plot.

The Pleione orchid species was reported in small patches at 1900 m asl. The *Pleione praecox* (pink form) is significantly associated with host tree species are *Castanopsis* sp., *Magnolia* sp., *Juglans regia*, *Engelhardtia* sp., *Elaeocarpus* sp., *Symplocos lucida* and *Symplocos glomerata*, etc., in the study area. Associates between epiphytes and their host tree species are among the major factors influencing the biodiversity and distribution of epiphytic species. Epiphytic orchids and their hosts were recorded in the entire study area. Some of the orchid species were non-flowering stage were also recorded.

Leucosceptrum canum locally called “Gurpis” that the floral nectar is an important food resource for birds.



Herpysma longicaulis



Calanthe biloba



Dinetus racemosus



Luculia gratissima



Hemiphragma heterophyllum



Chlorophytum nepalense

Site Characteristics of Soreng Reserve Forest in West Sikkim

Site Code	Forest types	Altitude (m) asl	Coordinates	Slope Angle (°)	Slope Aspect	Humus depth (cm)	Disturbance	Natural
			Lat(N) Long(E)				Anthropogenic	Natural
SRF1	Sub-tropical forest	1455	27°09'18.5"	30	SE	0.5		Natural
SRF2	Sub-tropical forest	1466	27°09'28.7"	40	E	1		Natural
SRF3	Sub-tropical forest	1480	27°09'32.7"	45	E	1		Natural
SRF4	Sub-tropical forest	1489	27°09'32.1"	25	N	0.5		Natural
SRF5	Sub-tropical forest	1215	27°09'45.0"	35	W	1		Natural
SRF6	Sub-tropical forest	1561	27°09'46.5"	40	N	1		Natural
SRF7	Sub-tropical forest	1583	27°09'50.5"	40	E	0.5		Natural
SRF8	Sub-tropical forest	1614	27°09'53.5"	30	N	0.5		Natural
SRF9	Sub-tropical forest	1618	27°09'59.1"	40	NE	0.5		Natural
SRF10	Sub-tropical forest	1606	27°10'02.4"	50	NE	1		Natural
SRF11	Sub-tropical forest	1590	27°10'04.6"	25	E	1		Natural
SRF12	Wet temperate forest	1601	27°10'07.8"	30	N	1		Natural
SRF13	Sub-tropical forest	1599	27°10'08.5"	55	NE	2		Natural
SRF14	Sub-tropical forest	1631	27°10'14.2"	85	E	1		Natural
SRF15	Sub-tropical forest	1623	27°10'15.6"	30	S	2		Natural
SRF16	Sub-tropical forest	1656	27°10'23.5"	30	SE	0.5		Natural
SRF17	Sub-tropical forest	1566	27°10'26.8"	30	SW	0.5		Natural

SRF18	Sub-tropical forest	1625	27°10'06.8"	88°12'59.3"	35	SW	1		Natural
SRF19	Sub-tropical forest	1634	27°10'07.0"	88°12'55.4"	25	S	1		Natural
SRF20	Sub-tropical forest	1638	27°10'06.7"	88°12'51.8"	40	SW	1		Natural
SRF21	Sub-tropical forest	1640	27°10'16.2"	88°12'42.7"	30	E	0.5		Natural
SRF22	Sub-tropical forest	1649	27°10'23.0"	88°12'30.7"	50	SE	1		Natural
SRF23	Sub-tropical forest	1634	27°10'29.8"	88°12'24.0"	60	E	2		Natural
SRF24	Sub-tropical forest	1661	27°10'28.6"	88°12'25.5"	50	NE	0.5		Natural
SRF25	Sub-tropical forest	1618	27°10'31.7"	88°12'15.4"	35	NE	1		Natural
SRF26	Sub-tropical forest	1645	27°10'26.9"	88°12'10.5"	40	N	1		Natural
SRF27	Sub-tropical forest	1646	27°10'27.6"	88°12'05.2"	35	N	1		Natural
SRF28	Sub-tropical forest	1709	27°10'41.8"	88°11'55.3"	40	W	1		Natural
SRF29	Sub-tropical forest	1672	27°10'41.7"	88°11'58.7"	45	E	1		Natural
SRF30	Wet temperate forest	1021	27°10'42.3"	88°12'06.0"	50	W	1		Natural
SRF31	Sub-tropical forest	1625	27°10'38.9"	88°12'02.3"	10	NE	1		Natural
SRF32	Wet temperate forest	1615	27°10'32.2"	88°12'00.7"	50	N	0.5		Natural
SRF33	Sub-tropical forest	1617	27°10'22.4"	88°11'56.4"	20	NE	1		Natural
SRF34	Wet temperate forest	1618	27°10'19.3"	88°11'64.7"	20	E	0.5		Natural

Checklist of floral species of Soreng Reserve Forest in west Sikkim

	BOTANICAL NAME	LOCAL NAME	FAMILY	Altitudinal gradients	IUCN Status
Sl. No	TREE				
1	<i>Ailanthus grandis</i> Prain.	Gokul	Simarubaceae		
2	<i>Albizzia procera</i> Benth.	Seto siris	Fabaceae		
3	<i>Alnus nepalensis</i> Don.	Utis	Betulaceae	200-2800	LC
4	<i>Betula cylindrostachya</i> Lindl. ex Wall.	Saur	Betulaceae	1400-2800	LC
5	<i>Bombax ceiba</i> L.	Simal	Malvaceae		
6	<i>Castanopsis hystrix</i> Hook. & Thomson ex. A. DC.	Patley katush	Fagaceae	1600-1600	NA
7	<i>Castanopsis tribuloides</i> (Smith) A. DC	musre Katush	Fagaceae	450-2300	NA
8	<i>Castanopsis indica</i> (Roxb. ex Lindl.) A.DC.	Dalney katus	Fagaceae	1500-1500	NA
9	<i>Choerospondias axillaris</i> (Roxb.) B.L.Burt & A.W.Hill	Lapsi	Anacardiaceae	900-2500	NA
10	<i>Cryptomeria japonica</i> (Thunberg ex. Linn. F.) D. Don	Dhupi	Taxodiaceae	1100-2500	NT
11	<i>Duabanga grandiflora</i> (DC.) Walp.	Lampate	Lythraceae		
12	<i>Engelhardtia spicata</i> Lechen ex Blume.	Mauwa	Juglandaceae	500-2100	LC
13	<i>Erythrina arborescens</i> Roxb.	Phalado	Fabaceae	400-2100	NA
14	<i>Eurya acuminata</i> DC.	Jhingni	Theaceae	700-3000	NA
15	<i>Exbucklandia populnea</i> (R. Br. Ex Griff) R. W. Br	Piplee	Hamamelidaceae	1200-2000	NA
16	<i>Ficus nemarolis</i> Wall.	Dudhilo	Moraceae		
17	<i>Hovenia dulcis</i> Thunb.	Bangi	Thymelaeaceae		
18	<i>Jambosa formosa</i> (Wall.) G. Don.	Ambakey	Myrtaceae		
19	<i>Juglans regia</i> L.	Okhar	Juglandaceae	500-1800	LC
20	<i>Leucosceptrum canum</i> Sm.	Gurpis	Lamiaceae	1000-2600	NA
21	<i>Lithocarpus fenestratus</i> (Roxb.) Rehde	Arkowlo	Fagaceae		
22	<i>Litsaea polyantha</i>	Kuthmero	Lauraceae		
23	<i>Lyonia ovalifolia</i> var. <i>ovalifolia</i>	Angeri	Ericaceae	200-3400	NA
24	<i>Macaranga denticulata</i> (Blume) Müll.Arg.	Malata	Euphorbiaceae	100-1300	NA
25	<i>Machilus</i> sp.	Kawlo	Lauraceae	100-1300	NA
26	<i>Maesa</i> sp.	Bilauney	Myrtaceae		
27	<i>Magnolia velutina</i> DC.	Phusrey champ	Magnoliaceae	1500-2400	NA
28	<i>Magnolia doltsopa</i> (Buch.-Ham. ex DC.) Figlar	Ranichamp	Magnoliaceae	1500-2400	
29	<i>Magnolia cathcartii</i> (Hook. f. & Thomson) Noot.	Titey champ	Magnoliaceae	1400-2700	LC
30	<i>Ostodes paniculata</i> Blume	Bepari	Euphorbiaceae	100-2500	NA
31	<i>Pandanus furcatus</i> Roxb	Tarika	Pandanaceae	300-1500	NA
32	<i>Persea odoratissima</i> (Nees) Kosterm.	Kawlo	Lauraceae	1500-2100	NA

33	<i>Prunus bracteopadus</i> Koehne	Arupatey	Rosaceae	1200-1600	NA
34	<i>Rhododendron arboreum</i> ssp. <i>arboreum</i> (CB Clarke) Ridley	Guras	Ericaceae	1500-4500	NA
35	<i>Rhus chinensis</i> Mill.	Bhakimlo	Anacardiaceae	2800	NA
36	<i>Rhus succedanea</i> Linn.	Rani bhalayo	Anacardiaceae	100-1500	NA
37	<i>Schima wallichii</i> Choisy	Chilaune	Theaceae	800-1800	NA
38	<i>Symplocos glomerata</i> King ex C.B. Clarke	Kholme	Symplocaceae	1200-2700	NA
39	<i>Symplocos lucida</i> (Thunb.) Siebold & Zucc	Kharane	Symplocaceae	1500-3000	NA
40	<i>Terminalia myriocarpa</i> Van Heurck & Müll. Arg	Panisaj	Combretaceae		
41	<i>Tetradium fraxinifolium</i> (Hook. f.) T.G. Hartley	Khanakpa	Rutaceae	1200-2500	NA
42	Unidentified	Phalamay			
43	Unidentified	Checkrasay			
44	Unidentified	Jammuna			
45	Unidentified	Kawmuna			
46	<i>Zanthoxylum acanthopodium</i> DC	Boke timmur	Rutaceae		
	SHRUB				
1	<i>Ardisia macrocarpa</i> Wall.	Damai phal	Myrsinaceae	1500-2400	NA
2	<i>Boehmeria platyphylla</i> D. Don.	Kamley	Urticaceae	700-1500	NA
3	<i>Boehmeria</i> sp.	Kamley	Urticaceae		
4	<i>Brassaiopsis mitis</i> Clarke	Chuletro	Araliaceae		
5	<i>Dichroa febrifuga</i> Lour.	Basak	Hydrangaceae	200-2000	NA
6	<i>Dobinea vulgaris</i> Buch.-Ham. ex D. Don		Anacardiaceae		
7	<i>Edgeworthia gardenerii</i> Meissn	Algeri	Thymeleaceae	1000-2500	NA
8	<i>Lantana camara</i> Linn.	Banmara	Verbenaceae		
9	<i>Luculia gratissima</i> (Wall.) Sweet		Rubiaceae		
10	<i>Mahonia napaulensis</i> DC.	Kesar	Berberidaceae	1500-2500	NA
11	<i>Mussaenda roxburghii</i> Hook. f.	Dhobini phul	Rubiaceae		
12	<i>Neillia rubiflora</i> D. Don	Kirkeray	Rosaceae		
13	<i>Osbeckia stellata</i> Buch.-Ham. ex D. Don	Lote Jhar	Melastomataceae	200-2300	NA
14	<i>Osbeckia nepalensis</i> Hook. f	Lote Jhar	Melastomataceae		
15	<i>Oxyspora paniculata</i> (D. Don) DC	Chulesee	Melastomataceae	500-2000	NA
16	<i>Phyllanthus emblica</i> L.	Amla	Phyllanthaceae		
17	<i>Pilea</i> sp.	Chipley	Urticaceae		
18	<i>Polygala arillata</i> Buch.-Ham. ex D. Don	Marcha Jhar	Polygalaceae	1000-2800	NA
19	<i>Polygonum</i> sp.	Rani thotney	Polygonaceae		
20	<i>Rubus ellipticus</i> Sm.	Aiselu	Rosaceae	1000-2600	NA
21	<i>Rubus paniculatus</i> Sm.	Aiselu	Rosaceae		
22	<i>Strobilanthes</i> sp.	kebu	Acanthaceae		

23	<i>Viburnum erubescence</i> Wall. ex D	Asarey	Adoxaceae		
	HERB				
1	<i>Arisaema intermedium</i> Blume	Larua/Banko	Araceae	2600-3400	NA
2	<i>Artemisia vulgaris</i> L.	Titey pate	Compositae	1500-3800	NA
3	<i>Astilbe rivularis</i> Buch.-Ham. ex D. Don	Budi okhati	Saxifragaceae	900-3200	NA
4	<i>Begonia rubella</i> Buch.-Ham. ex D. Don	Magarkachi	Begoniaceae	1000-1900	NA
5	<i>Begonia</i> sp.	Magarkachi	Begoniaceae		
6	<i>Bidens pilosa</i> Linn.	Kuro	Asteraceae	200-1900	NA
7	<i>Boenninghausenia albiflora</i> (Hook.) Rchb. ex Meisn.		Rutaceae		
8	<i>Carex</i> sp.	Harkatto	Cyperaceae	1500-2000	
9	<i>Carex baccans</i> Nees	Harkatto	Cyperaceae		
10	<i>Chlorophytum nepalense</i> (Lindl.) Baker		Asparagaceae		
11	<i>Commelina benghalensis</i> Linn.	Kaney jhar	Commelinaceae		
12	<i>Crotalaria</i> sp.		Leguminosae		
13	<i>Cyperus eragrostis</i> Lam	Harkatto	Cyperaceae		
14	<i>Cyperus scariosus</i> R.Br.	Harkatto	Cyperaceae		
15	<i>Desmodium</i> sp.		Leguminosae		
16	<i>Digitaria</i> sp.	Banso	Poaceae		
17	<i>Elatostema platyphyllum</i> Weddell.	Gagleto	Urticaceae		
18	<i>Elatostema sessile</i> J.R.Forst. & G.Forst.	Galato	Urticaceae		
19	<i>Eragrostis</i> sp.		Poaceae	1500-2500	
20	<i>Eupatorium adenophorum</i> Spreng.	Kalijhar	Asteraceae		
21	<i>Fragaria nubicola</i> Lindley ex Lacaita	Vui Aiselu	Rosaceae	2500-3900	NA
22	<i>Gerardiana diversifolia</i> (Link) Friis	Bhangre sisnu	Urticaceae		
23	<i>Globba sessiliflora</i> Sims	Sara	Zingiberaceae		LC
24	<i>Hedychium spicatum</i> Smith	Sara	Zingiberaceae	1800-2800	NA
25	<i>Heracleum wallichii</i> DC	Chimphing	Apiaceae	1900-2700	NA
26	<i>Hemiphragma heterophyllum</i> Wall.		Plantaginaceae		
27	<i>Impatiens arguta</i> Hook.f. & Thomson	Mujuro	Balsaminaceae		
28	<i>Impatiens dolichoceras</i> Pritz. ex Diels	Mujuro	Balsaminaceae		
29	<i>Impatiens latiflora</i> Hook.f. & Thomson	Mujuro	Balsaminaceae		
30	<i>Impatiens</i> sp.		Balsaminaceae		
31	<i>Impatiens stenantha</i> Hook.f.	Mujuro	Balsaminaceae		
32	<i>Laportea terminalis</i> Wight.	Patle sisnu	Urticaceae		
33	<i>Nepeta</i> sp.		Lamiaceae		
34	<i>Oxalis corniculata</i> Linn	Amilo jhar	Oxalidaceae		
35	<i>Ophiorrhiza mungos</i> L.		Rubiaceae		

36	<i>Persicaria capitata</i> (Buch.Ham.ex D.Don) Gross	Ratneulo	Polygonaceae	1500-2300	NA
37	<i>Persicaria nepalensis</i> (Meisn.) Miyabe	Ratneulo	Polygonaceae		
38	<i>Pilea umbrosa</i> Wall. ex Blume	Chipley ghans	Urticaceae	1200-2500	NA
39	<i>Polygonum molle</i> D. Don	Thotney	Polygonaceae		
40	<i>Potentilla penduncularis</i> D. Don		Rosaceae		
41	<i>Rohdea nepalensis</i> (Raf.) N.Tanaka	Janglee Nakima	Asparagaceae		
42	<i>Rubus calycinus</i> Wall. ex D. Don		Rosaceae		
43	<i>Rumex nepalensis</i> Sprengel	Halhalley	Polygonaceae		
44	<i>Selinum</i> sp.		Apiaceae		
45	<i>Swertia bimaculata</i> (Siebold & Zucc.) Hook. f. & Thomson ex C.B. Clarke	Chirito	Gentianaceae	200-3500	NA
CLIMBER & EPIPHYTE					
1	<i>Clematis buchananiana</i> DC.	Pinasey lahara	Ranunculaceae		
2	<i>Dinetus racemosus</i> (Roxb.) Buch.-Ham. ex Sweet		Convolvulaceae		
3	<i>Herpetospermum pedunculatum</i> (Seringe.) C.B. Clarke	Ban karela	Cucurbitaceae	2300-2500	NA
4	<i>Holboellia angustifolia</i> Wall.	Gulfa	Lardizabalaceae	1000-2700	NA
5	<i>Piper boechmeriaefolium</i> (Miq.) DC.	Chambo	Piperaceae	1000-2700	NA
6	<i>Rhaphidophora decursive</i> (Roxb.) Scott	Kanchirna	Araceae	2000	NA
7	<i>Rhaphidophora</i> sp.	Kanchirna	Araceae		
8	<i>Rubia cordifolia</i> L	Manjith	Rubiaceae	300-2800	NA
9	<i>Smilax zeylanica</i> Linn.	Kukur dainey	Liliaceae		
10	<i>Stephania</i> sp.	Tamarkey	Menispermaceae	1500-2300	NA
11	<i>Tetrastigma serrulatum</i> (Roxb.) Planch	Charcharay lahara	Vitaceae	1800-2500	NA
FERN & FERN-ALLIES					
1	<i>Asplenium lacinatedum</i> D.Don		Aspleniaceae	1000-2500	NA
2	<i>Cyathea</i> sp.		Cyatheaceae		
3	<i>Dicranopteris</i> sp.	Sottar	Gleicheniaceae		
4	<i>Diplazium</i> sp.	Sauney ningro	Athyriaceae	1700-2500	NA
5	<i>Gleichenia gigantean</i> Wall. ex Hook		Gleicheniaceae		
6	<i>Huperzia</i> sp.		Lycopodiaceae		
7	<i>Lycopodium japonicum</i> Thunb.	Nagbelli	Lycopodiaceae		
8	<i>Plagiogyria pycnophylla</i> (Kunze) Mett		Plagiogyriaceae		
9	<i>Selaginella</i> sp.		Selaginellaceae	2500	NA

FAUNA

During the survey, 7 species of animal were recorded from Soreng Reserve Forest. Further, a total of 22 bird species belonging to 14 families were recorded. The family-wise bird species composition were recorded for Turdidae & Corvidae (3 species each) followed by Dicaeidae, Paridae, Phasinidae (2 species each) from this particular transect. The other remaining family represented by single species.

Checklist of Fauna & avifauna species were encountered at Soreng Reserve Forest, West Sikkim.

Sl. No	Scientific Name	Family	Common Name	Local Name	Evidence (Direct & Indirect)
FAUNA					
1.	<i>Muntiacus muntjak</i>	Cervidae	Barking deer	Mirga	Pellets
2.	<i>Ursus thibetanus</i>	Carnivora	Himalayan Black bear	Ban kukur	Scat
3.	<i>Cuon alpinus</i>	Carnivora	Wild dog	Bhalu	Scat
4.	<i>Sus scrofa</i>	Suidae	Wild Boar	Bodyal	Scat
5.	<i>Canis sp</i>	Carnivora	Common Jackal	Syall	Scat
6.	<i>Naemorhedus goral</i>	Bovidae	Goral	Goral	Scat
7.	<i>Panthera pardus</i>	Felidae	Common Leopard	Leopard	Strech Mark
AVI-FAUNA					
1	<i>Aegoithalos louschistos</i>	Paridae	Rufous-fronted Tit	Fista	Direct Sighting
2	<i>Cettia major</i>	Sylviidar	Chestnut Crowned Warbler	Fista	Direct Sighting
3	<i>Fulvetta vinipectus</i>	Paridae	Coal Tit	Fista	Direct Sighting
4	<i>Corvus macrorhyncus</i>	Corvidae	Jungle Crow	Khag	Direct Sighting
5	<i>Cuculus canorus</i>	Cuculidae	Eurassian	Cuckoo	Direct Sighting
6	<i>Dendrocopos darjellensis</i>	Picidae	Darjeeling Woodpecker	Laachey	Direct Sighting
7	<i>Dicrurus leucophaeus</i>	Dicaeidae	Ashy Drongo	Chibey	Direct Sighting
8	<i>Dicrurus macrocerus</i>	Dicaeidae	Black Drongo	Chibey	Direct Sighting
9	<i>Garrulax leucolophus</i>	Turdidae	White-crested Laughingth-rush	Kolkoley	Direct Sighting
10	<i>Garrulax ocellatus</i>	Turdidae	Spotted Laughing Thrush	Kolkoley	Direct Sighting
11	<i>Gypaetus barbatus</i>	Accipitridae	Lammergeier	Chill	Direct Sighting
12	<i>Lophura leucomelana</i>	Phasinidae	Kalij pheasant	Kalij	Direct Sighting
13	<i>Megalaima virens</i>	Megalaimidae	Great Barbet	Neual	Direct Sighting
14	<i>Myophonus caeruleus</i>	Turdidae	Blue Whistling Thrush	Kalchura	Direct Sighting
15	<i>Passer rutilans</i>	Passeridae	Russet Sparrow	Bhangera	Direct Sighting
16	<i>Pycnonotus cafer</i>	Pycnonotidae	Red Vented Bulbull	Jureli	Direct Sighting
17	<i>Streptopelia orientails</i>	Columbidae	Oriental Turtle Dove	Dhukur	Direct Sighting

18	<i>Urocissa ornata</i>	Corvidae	Yellow Billed Blue Magpie	Lampucharey	Direct Sighting
19	<i>Corvus macrorhynacus</i>	Corvidae	Large billed Crow	Kag	Direct Sighting
20	<i>Arborophila torqueola</i>	Phasinidae	Hill Partridge	Peura	Direct Sighting
21	<i>Aethopyga ignicauda</i>	Nectariniidae	Fire-tailed sunbird	Balchi	Direct Sighting



Red vented Bulbull



Himalayan five ring

CONSERVATION RECOMMENDATION AND CONCLUSIONS

During the present study observed, *Leucospectrum canum* (Lamiaceae family) is small tree species is found growing abundantly in Soreng Reserve forest, West Sikkim. Many species of birds were attracted in this floral nectar, considering significant role as food resource and having rich diversity of avian species. Hence, it is recommended and concluded that the *Leucospectrum canum* is one of the important tree species in Sikkim which is need to plant during “Green Mission Programme” in Sikkim. Conservation of biological diversity must be devise for long-term adequate protection of some of the important species.

Sumbuk Reserve Forest, South Sikkim

Sanjyoti Subba, Sanchi Subba & Sumitra Nepal



Overview of Reserve Forest

INTRODUCTION

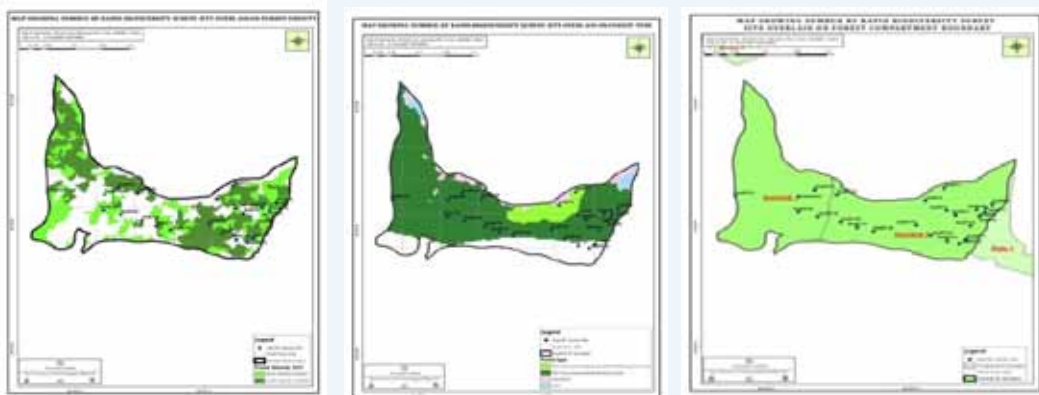
The present study is representative of East Himalayan Moist mixed deciduous forest and very moist sal bearing forest of Sumbuk Reserve Forest, South Sikkim. The main vegetation of this reserve forest viz., *Albizia procera* (Roxb.) Benth, *Alstonia scholaris* (L.) R. Br, *Artocarpus lacucha* Buch.-Ham, *Bambax ceiba* L., *Bischofia javanica* Blume, *Bixa* sp, *Daubanga grandiflora* (Roxb. ex. Candolle), *Diploknema butyracea* (Roxburgh) H. J. Lam, *Ficus religiosa* L., *Macaranga denticulata* (Blume) Mull. Arg, *Mangifera indica* L., *Phyllanthus emblica* Linn., *Pinus roxburghii* Sarg, *Schima wallichii* Choisy, *Shorea robusta* Gaertn., *Syzygium cumini* Linn., *Syzygium nervosum* A. Cunn. Ex DC, *Tectona grandis* Linn, *Terminalia bellirica* (Gaertner) Roxb, *Terminalia chebula* Retz., *Terminalia myriocarpa* Van Heurck & Muller, *Toona ciliata* M. Roem, *Toxicodendron hookeri* (K.C. Sahni & Bahadur) C.Y.Wu & T.L.Ming etc., were form a dense forest in the study area.

The prominent shrub species includes viz., *Cycas pectinata* Buch.-Ham, *Colebrookea oppositifolia* Sm, *Flemingia strobilifera* (L.) W.T.Aiton, *Desmodium heterocarpon* Linn., *Jasminum* sp., *Lantana camara* L., *Justicia* sp., *Leea* sp., *Woodfordia fruticosa* (L.) Kurtz, *Boehmeria platyphylla* D.Don, *Rubus ellipticus* Sm., *Triumfetta rhomboidea* Jacq., etc. Besides, numerous herb species such as, *Acheyanthus aspera* L., *Ageratum* sp., *Ageratum conyzoides* L., *Bidens pilosa* L., *Cyperus compressus* L., *Commelina benghalensis* L., *Drymaria cordata* (L) Roem & Schutt, *Fagopyrum* sp., *Gonestegia hirta* (Blume) Miq, *Imperata cylindrica* L., *Oxalis corniculata* L., *Thysanolaena maxima* (Roxb) Kuntze, etc., are distributed in this forest. In addition, there exists various species of *Dioscorea*, *Asparagus* & *Bauhinia*, etc., were dominated in the forest and other fern and fern-allies, mosses, and lichens too.

The beauty and variety of biodiversity in the reserve forest is reinforced by the diversity of wildlife diversity. The reserve forest is home to many faunal species, viz., Wild Boar, Barking Deer, Flying squirrel, Wild dog, and Red fox etc. Due to dense forest provides shelter as well as abundant fruits/feed and as such are good indicator of faunal presence and richness.

STUDY AREA

Sumbuk Reserve forest is located in the south district, lying between latitude to 27°10'42.3"N and longitude 88°11'55.3"E to 88°14'09.7"E, its height ranges from 1021-1709 meters asl. This reserve forests are very rich in floral and faunal diversity. The reserve forest showing the aspects of E, N and NE with the slope angle falling between 5 to 80 degree inclinations and the humus depth is not less than 0.5 and the average humus depth is 1.5 cm depth. The field survey was conducted during January 2018.



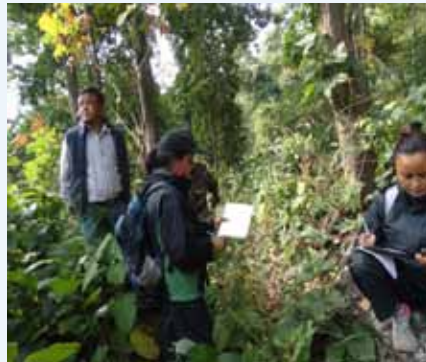
Showing the forest compartment boundary, forest density & forest types along the sampling plots of Sumbuk Reserve Forest, South Sikkim



Measuring circumference breast height of tree species and laying sampling plots



Inventory of plant species



Inventory of plant species

Laying sampling plots & measured circumference breast height at Sumbuk Reserve Forest, South Sikkim

FINDINGS AND DISCUSSION

A total of 58 plant species were recorded long in 24 sampling plot, and covering an area 0.24 ha. Of which 23 tree species belonging to 20 genera, 17 families and 12 shrubs species belonging to 12 genera & 12 family, 15 herb species belonging to 11 genera and 12 families. The highest plant species were recorded for tree species followed by herb and shrub species.

Regarding forest compartment boundary, randomly laid 19-23 sampling plots for compartment 1 and other remaining 1-18 & 24 sampling plots for compartment 2. In the forest density (dense) forest, randomly laid (1,2,4 & 11-18, 23-24) sampling plots and other remaining sampling plots were randomly laid for moderate dense forest. However, in the forest types, the sampling plots (Plot 1 & 2) were randomly laid in the East Himalayan Moist Mixed deciduous forest and other remaining was laid in the Very moist Sal bearing forest.

SIGNIFICANCE OF THE RESERVE FOREST

1. *Shorea robusta* & *Tectona grandis* –High timber value from tropical to subtropical forest
2. *Bauhinia vahlii* -Habitat (for making various purpose)

During rapid biodiversity survey, it has been observed that, the highly dominant tree species are *Shorea robusta* (sal) and *Tectona grandis* (teak) in the Sumbuk Reserve forest at elevation 519 - 696 m asl, mixed with other tree species viz., *Phyllanthus emblica*, *Diploknema butyracea*, *Macaranga denticulata*, *Bischofia javanica*, *Mangifera indica*, etc in the entire sampling plots. These species are found growing mostly in all along the Teesta Range in the sub-tropical zone of Sikkim. Generally, it has been distributed in the lower valley of the Sikkim Himalayan Region. *Sal* is one of the most important sources of hardwood timber in India even in Sikkim too. The wood is especially suitable for constructing frames for doors and windows.

Tectona grandis (teak) is large deciduous plant species is used in the manufacture of furniture like cutting boards, indoor flooring & decks etc. Other tree species viz., *Daubanga grandiflora* & *Terminalia myriocarpa* etc., were recorded along the sampling plot.

Additionally, the fruits giving tree species *Phyllanthus emblica* was encountered at Sumbuk reserve forest which is commonly known as” Indian Gooseberry” (Euphorbiaceae). This species was reported all along the sampling plots in the study area. It is an important herbal drug and ayurvedic systems of medicine. This plant is used both as a medicine and as a tonic to build up lost vitality and vigor. It is highly nutritious and could be an important dietary source of vitamin C, amino acids, and minerals.

However, for the lianas species *Bauhinia vahlii* was found growing in the Sumbuk reserve forest. It is dominated in the forest area under the canopy of *Shorea robusta* tree species. Which is locally called *Bhora* in Nepali, having huge climber with many tendrils, grow up to 20-30 cm long, branch lets hairy; leaves alternate, petiolate, simple, 2-cleft (big size),flowers bracteates

and the fruit is 7 to 12 seeded. The local people make *Ghums* (raincoats) for the use of leaves which is large and durable during rainy season in the nineteenth century but this is not continue practice in the 20th century. While working in the paddy fields during the rainy season it is easy to work in the field. The bark is use for firewood due to strong variety of fibre.

Similarly, the various forest species provide fruits, wood, fibre, leaves and grasses for faunal and human being. This is one of the species which can use the various purposes like making *Ghums*, leaves plate, roof of the house and many more. The roots part is also used for medicinal purposes during antibacterial and antifungal problems.



Bauhinia vahlii

Site characteristics of Sumbuk Reserve Forest, South Sikkim

Site Code	Forest types	Altitude (m) asl	Coordinates	Slope Angle (°)	Slope Aspect	Humus depth (cm)	Disturbance
			Lat(N)				Long(E)
SRF1	Moist Mixed deciduous forest	765	27°06'27.73"	45	N	0.5	Natural
SRF2	Moist Mixed deciduous forest	748	27°06'21.48"	30	SW	0.5	Natural
SRF3	Very moist Sal bearing forest	648	27°06'16.84"	30	NW	1.5	Natural
SRF4	Very moist Sal bearing forest	593	27°06'14.5"	26	SW	0.5	Natural
SRF5	Very moist Sal bearing forest	532	27°06'17.13"	36	S	0.5	Natural
SRF6	Very moist Sal bearing forest	528	27°06'19.51"	33	E	0.5	Natural
SRF7	Very moist Sal bearing forest	519	27°06'18.04"	35	N	0.5	Natural
SRF8	Very moist Sal bearing forest	495	27°06'16.05"	45	S	0.5	Natural
SRF9	Very moist Sal bearing forest	500	27°06'13.76"	42	E	0.8	Natural
SRF10	Very moist Sal bearing forest	488	27°06'09.02"	50	S	1.5	Natural
SRF11	Very moist Sal bearing forest	476	27°06'02.35"	60	E	1.5	Natural
SRF12	Very moist Sal bearing forest	450	27°06'00.58"	55	SE	0.5	Natural

SRF13	Very moist Sal bearing forest	475	27°06'01.85"	88°23'02.03"	25	S	1.5		Natural
SRF14	Very moist Sal bearing forest	512	27°06'04.62"	88°22'55.33"	30	S	1.2		Natural
SRF15	Very moist Sal bearing forest	550	27°06'09.47"	88°22'49.31"	35	SW	1.5		Natural
SRF16	Very moist Sal bearing forest	521	27°06'06.83"	88°22'31.49"	45	W	0.5		Natural
SRF17	Very moist Sal bearing forest	492	27°06'08.76"	88°22'24.78"	65	SW	1.2		Natural
SRF18	Very moist Sal bearing forest	518	27°06'11.50"	88°22'18.14"	45	NW	1.3		Natural
SRF19	Very moist Sal bearing forest	538	27°06'14.30"	88°22'08.44"	40	W	0.5		Natural
SRF20	Very moist Sal bearing forest	551	27°06'16.60"	88°22'00.52"	50	E	1.5		Natural
SRF21	Very moist Sal bearing forest	578	27°06'24.84"	88°21'34.62"	60	NE	0.5		Natural
SRF22	Very moist Sal bearing forest	640	27°06'24.34"	88°22'00.95"	40	NE	1.5		Natural
SRF23	Very moist Sal bearing forest	683	27°06'27.41"	88°22'07.49"	55	NW	0.5		Natural
SRF24	Very moist Sal bearing forest	696	27°06'24.98"	88°22'16.64"	65	W	1.5		Natural

Checklist of floral species encountered were in Sumbuk Reserve Forest, South Sikkim

Sl. No	Botanical Name	Local Name	Family	Altitudinal ranges (m) asl	IUCN Status
	TREE				
1	<i>Albizia procera</i> (Roxb.) Benth	Seto siris	Leguminosae	100-600	NA
2	<i>Alstonia scholaris</i> (L.) R. Br	Chhatiwan	Apocynaceae	200-1000	LC
3	<i>Artocarpus lacucha</i> Buch.-Ham	Badahara	Moraceae	100-1300	NA
4	<i>Bambax ceiba</i> L.	Simal	Bambacaceae	below 1400	NA
5	<i>Bischofia javanica</i> Blume	Kanjol	Euphorbiaceae	below 800	NA
6	<i>Bixa</i> sp	Sindhure	Bixaceae	below 801	
7	<i>Daubanga grandiflora</i> (Roxb. ex. Candolle).	Lampatey	Lythraceae	900-1500	NA
8	<i>Diploknema butyracea</i> (Roxburgh) H. J. Lam	Chewri	Sapotaceae	below 1600	NA
9	<i>Ficus religiosa</i> L.	pipal	Moraceae	Below 1000	
10	<i>Macaranga denticulata</i> (Blume) Mull. Arg	malato	Euphorbiaceae	100-1300	NA
11	<i>Mangifera indica</i> L.	Mango	Anacardiaceae	200-1400	NA
12	<i>Phyllanthus emblica</i> Linn.	Ruk amla	Phyllanthaceae	200-2300	NA
13	<i>Pinus roxburghii</i> Sarg	Chir pine	Pinaceae	2100-2200	LC
14	<i>Schima wallichii</i> Choisy	Chilaune	Theaceae	800-1800	
15	<i>Shorea robusta</i> Gaertn.	Sal	Dipterocarpaceae	below 800	NA
16	<i>Syzygium cumini</i> Linn.	Jamuna	Myrtaceae	100-1200	NA
17	<i>Syzygium nervosum</i> A. Cunn. Ex DC	Kyammuna	Myrtaceae	200-600	NA
18	<i>Tectona grandis</i> Linn	Teak	Verbenaceae	below 900	NA
19	<i>Terminalia bellirica</i> (Gaertner) Roxb	Barra	Combretaceae	500-1400	NA
20	<i>Terminalia chebula</i> Retz.	Harra	Combretaceae	500-1800	NA
21	<i>Terminalia myriocarpa</i> Van Heurck & Muller	Pani sas	Combretaceae	600-2100	NA
22	<i>Toona ciliata</i> M. Roem	Tooni	Meliaceae	400-2800	LC
23	<i>Toxicodendron hookeri</i> (K.C. Sahni & Bahadur) C.Y.Wu & T.L.Ming	Bhalayo	Anacardiaceae	700-2400	NA
24	unidentified	Guawlo			
25	unidentified	swami			
26	unidentified	Phutli khat			
27	unidentified	Dhanguri			
28	unidentified	Chakrasey			
	SHRUBS				
1	<i>Cycas pectinata</i> Buch.-Ham	Thakal	Cycadaceae	1000-1800	Vulnerable
2	<i>Colebrookea oppositifolia</i> Sm	Dhasure	Lamiaceae	200-2200	NA
3	<i>Flemingia strobilifera</i> (L.) W.T.Aiton	Bhatmase	Leguminosae	200-1600	NA

4	<i>Desmodium heterocarpon</i> Linn.	Bakhre Ghans	Fabaceae	300-1800	NA
5	<i>Jasminum</i> sp.		Oleaceae		NA
6	<i>Lantana camara</i> L.	Banmara	Verbenaceae	100-1500	NA
7	<i>Justicia</i> sp.	Asuro	Acanthaceae		NA
8	<i>Leea</i> sp.	Kaknasika	Leeaceae		NA
9	<i>Woodfordia fruticosa</i> (L.) Kurtz	Amarphul	Lythraceae	100-1500	LC
10	<i>Boehmeria platyphylla</i> D.Don	Kamley	Urticaceae	700-1500	LC
11	<i>Rubus ellipticus</i> Sm.	Aiseule	Rosaceae	1000-2600	NA
	<i>Triumfetta rhomboidea</i> Jacq.		Malvaceae	100-1500	NA
HERBS					
1	<i>Acheyanthus aspera</i> L.	Datiwan	Amaranthaceae	800-2300	NA
2	<i>Ageratum</i> sp.		Asteraceae		
3	<i>Ageratum conyzoides</i> L.	llame	Asteraceae	1000-1500	NA
4	<i>Bidens pilosa</i> L.	Kuro	Asteraceae	200-1900	NA
5	<i>Cyperus compressus</i> L.	mothe jhar	Cyperaceae	900-1600	LC
6	<i>Commelina benghalensis</i> L.	Kane jhar	Commelinaceae	Below 2300	NA
7	<i>Drymaria cordata</i> (L) Roem & Schutt	Amile jhar	Caryophyllaceae	200-2400	NA
8	<i>Fagopyrum</i> sp.	Ban faper	Polygoniaceae		
9	<i>Gonestegia hirta</i> (Blume) Miq	Chiple	Urticaceae	100-1000	NA
10	<i>Imperata cylindrica</i> L.	Siru	Poaceae	Below 1000	NA
11	<i>Oxalis corniculata</i> L.	Chari amilo	Oxalidaceae	500-3400	NA
12	<i>Thysanolaena maxima</i> (Roxb) Kuntze	Thulo vanso	Poaceae	600-1300	NA
13	<i>Acmella uliginosa</i> (Sw.) Cass		Compositae		LC
14	<i>Anisomeles indica</i> (L.) Kuntze		Lamiaceae	UP TO 2400	NA
15	<i>Barleria</i> sp.		Acanthaceae		
LIANAS/CLIMBERS/EPIPHYTE					
1	<i>Asparagus</i> sp.	Kurilo	Liliaceae		
2	<i>Dioscorea bulbifera</i> L.	Gitta	Dioscoraceae		
3	<i>Bauhinia vahlii</i> Wight & Arn	Bhorla	Leguminosae		

AVI-FAUNA

Checklist of avi-fauna encountered along the Sumbuk Reserve Forest, South Sikkim

SL. NO	SCIENTIFIC NAME	COMMON NAME	LOCAL NAME	FAMILY	Evidence (Direct & Indirect)
1	<i>Acridotheres tristis</i>	Common Myna	Ruppi	Sturnidae	Direct Sighting
2	<i>Aegithalos louschistos</i>	Rufous- fronted Tit	Fista	Paridae	Direct Sighting
3	<i>Corvus macrorhynsus</i>	Jungle Crow	Khag	Corvidae	Direct Sighting
4	<i>Cuculus canorus</i>	Eurassian Cuckoo	Cuckoo	Cuculidae	Direct Sighting
5	<i>Dendrocopos darjellensis</i>	Darjeeling Woodpecker	Laachey	Picidae	Direct Sighting
6	<i>Garrulax affinis</i>	Black Faced Laughing Thrush	Kolkoley	Turdidae	Direct Sighting
7	<i>Garrulax leucolophus</i>	White-crested Laughinthrush	Kolkoley	Turdidae	Direct Sighting
8	<i>Dicrurus macrocerus</i>	Black Drongo	Chibey	Dicaeidae	Direct Sighting
9	<i>Lophura leucomelana</i>	Kalij pheasant	Kalij	Phasinidae	Direct Sighting
10	<i>Pericrocotus (flammeus) speciosus</i>	Scarlet Minivet	Rani chari	Campephagidae	Direct Sighting
11	<i>Pycnonotus cafer</i>	Red Vented Bulbull	Jureli	Pycnonotidae	Direct Sighting
12	<i>Pycnonotus striatus</i>	Straited Bulbull	Jureli	Pycnonotidae	Direct Sighting
13	<i>Urocissa ornata</i>	Yellow Billed Blue Magpie	Laampucharey	Corvidae	Direct Sighting
14	<i>Passer domesticus</i>	House Sparrow	Bhangera	Passeridae	Direct Sighting
15	<i>Passer rutilans</i>	Russet Sparrow	Bhangera	Passeridae	Direct Sighting
16	<i>Streptopelia orientalis</i>	Oriental Turtle Dove	Dhukur	Columbidae	Direct Sighting
17	<i>Megalaima virens</i>	great Barbet	Neual	Megalaimidae	Direct Sighting
18	<i>Myophonus caeruleus</i>	Blue Whistling Thrush	Kalchura	Turdidae	Direct Sighting
19	<i>Ictinetus malayensis</i>	Black Eagle	Cheel	Accipitridae	Direct Sighting
20	<i>Parus monticolus</i>	Green Blacked Tit	Chichingotey	Paridae	Direct Sighting

Yampung Reserve Forest, West Sikkim

Suraj Subba



INTRODUCTION

Yampung Reserve Forest located in the western district of Sikkim is one of the major tourist destinations of Sikkim. Yampung Singalila trek is one of the rare spot on earth where the view embraces five summits rising above 7000m, amongst them are Mt. Everest, Mt. Makalu and Mt. Lotse of Nepal and Mt. Khangchendzonga and Mt. Siniolchu of Sikkim. It is a treasure mountain in Singalila range; this valley also forms the border line between West Bengal, Nepal and Western part of Sikkim. Previously Nambu village situated at an altitude of 1800m marked the trek start point but now with the development of jeepable road up to Sangkhola village it eases the trek by a difference of one day. The trek goes up to a height of 5,100 meter at Dafey Bheer also called as *devil's pass*.

With the development and recognition of Yampung as one of the trekking route it has benefited the local communities of Nambu, Rimbi, Sindrabong, Topung and Singpheng who were once dependent only on pastoralism (Yak and Sheep herding) for livelihood.

The present study area is represented by Wet temperate forest, mixed coniferous forest, sub-alpine Birch/Fir forest and Birch-Rhododendron scrub forest.

The main vegetation of the reserve forest is represented by tree species viz., *Abies densa*, *Tsuga dumosa*, *Lithocarpus pachyphyllus*, *Acer campbellii*, *Actinodaphne sikkimensis*, *Alnus nepalensis*, *Beilschmiedia sikkimensis*, *Betula cylindrostachya*, *Choerospondias axillaris*, *Cordia myxa*, *Sloanea dasycarpa*, *Elaeocarpus lanceifolius*, *Engelhardtia spicata*, *Erythrina arborescens*, *Eurya acuminata*, *Exbucklandia populnea*, *Glochidion acuminatum*, *Leucoscepttrum canum*, *Litsea cubeba*, *Macaranga denticulate*, *Persea odoratissima*, *Mahonia napaulensis*, *Magnolia cathcartii*, *Magnolia doltsopa*, *Myrica esculenta*, *Nyssa javanica*, *Lyonia ovalifolia*, *Prunus bracteopadus*, *Quercus lamellosa*, *Quercus lineata*, *Rhododendron arboreum*, *Schima wallichii*, *Symplocos glomerata*, *Symplocos lucida*, etc., form the dense forest with common shrubs such as *Rubus ellipticus*, *Oxyspora paniculata*, *Viburnum erubescence*, *Boehmeria* sp., *Hypericum* sp., etc., many other herbs species too.

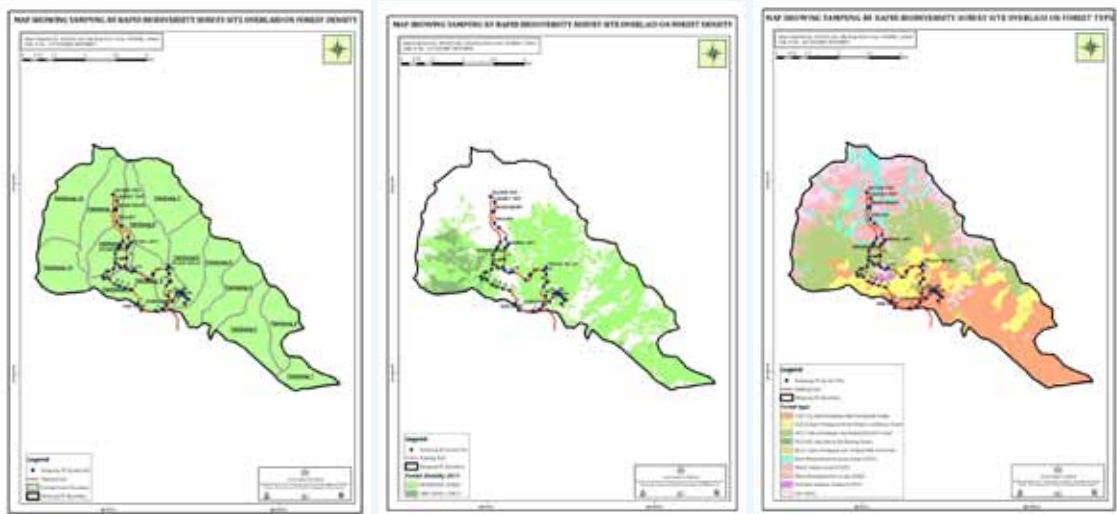
At ca 3000 m, broad-leaved semi-evergreen forest is gradually replaced by conifer species like *Tsuga dumosa*, *Abies densa*, dwarf *Rhododendron spp.* and *Juniperus spp.* Along with *Betula utilis*, *Magnolia campbellii*, *Acer caudatum*, *Rhododendron falconeri*, *Prunus sp.*, *Rhododendron arboretum*, etc. *Rosa sericea*, *Daphne cannabina*, *Viburnum cordifolium*, *Berberis insignis*, etc., are common shrubs. The ground surface is covered with variety of fern species.

The reserve forest is home to many faunal species, viz., Wild Boar (*Sus scrofa*), Barking Deer (*Muntiacus muntjak*), Himalayan Tahr (*Hemitragus jemlahicus*), Serow (*Capricornis thar*) Particolored Flying squirrel (*Hylopetes alboniger*), Wild dog (*Cuon alpinus*), and Red fox (*Vulpes vulpes*), Red panda (*Ailurus fulgens*), Blue Sheep (*Pseudois nayaur*), Himalayan Black Bear (*Ursus thibetanus*) and pheasants like Satyr Tragopan (*Tragopan satyra*), Blood Pheasant (*Ithaginis cruentus*) and Himalayan monal (*Lophophorus impejanus*).

Goral (*Naemorhedus goral*) was once found in good numbers but ultimately its population has declined over a period of 10 years due to a communicable disease. Nowadays it is hard to sight a single individual as if the whole population was wiped out due to the disease.

STUDY AREA

Yampung Reserve Forest lies between Latitude 27°21'37.6" N to 27°22'05.2" N and Longitude 88°06'25.1"E to 88°07'02.9"E. The total area of the reserve forest is 71.98 sq.km and the altitudinal ranges between 2200 to 4500 m asl. The field survey was conducted during November 2017.



Showing the forest compartment boundary, forest density & forest types along the sampling plots Yampung Reserve Forest, West Sikkim



Measuring circumference at breast height in Yampung Reserve Forest, West Sikkim

FINDINGS AND DISCUSSION

A total of 103 plant species were recorded by laying 27 sampling plots, covering an area 0.27 ha. Out of these 34 trees species, 21 shrubs, 26 herbs, 10 ferns & fern-allies, 10 climbers and epiphytes and, 2 bamboo species.

IMPORTANCE OF THE YAMPUNG RESERVE FOREST

- Yampung-Dzongri round trek route: It is considered as one of the best trekking route which provides ample of employment opportunities to the local people.
- Griffon vulture is encountered in very good numbers.

Site characteristics of the sampling plots along Yampung Reserve Forest, West Sikkim

Site Code	GPS Coordinates		GPS Error (In meter)	Elevation (m) asl	Broad Forest Type	Aspect	Slope Angle (°)	Canopy Cover (%)
	Latitude	Longitude						
YRF1	27°21'37.6"	88°06'25.1"	5	2244	Wet Temperate mixed broadleaved	W	45	30
YRF2	27°21'49.5"	88°05'49.5"	3	2474	Wet Temperate mixed broadleaved	W	30	35
YRF3	27°22'10.3"	88°05'44.5"	4	2647	Wet Temperate mixed broadleaved	SW	30	60
YRF4	27°22'13.2"	88°05'32.4"	5	2779	Wet Temperate mixed broadleaved	S	25	45
YRF5	27°22'17.0"	88°05'22.1"	5	2856	Wet Temperate mixed broadleaved	E	30	35
YRF6	27°22'19.9"	88°05'14.4"	3	2949	Wet Temperate mixed broadleaved	SW	35	40
YRF7	27°22'27.9"	88°05'04.8"	4	3029	Sub-Alpine	NE	45	25
YRF8	27°22'28.4"	88°04'55.8"	4	3107	Sub-Alpine	NE	40	50
YRF9	27°22'37.6"	88°04'53.5"	4	3179	Sub-Alpine	E	30	45
YRF10	27°22'40.2"	88°05'03.3"	3	3283	Sub-Alpine	NE	35	15
YRF11	27°23'00.6"	88°05'35.5"	5	3618	Sub-Alpine	N	30	50
YRF12	27°22'38.7"	88°05'44.4"	6	3286	Sub-Alpine	E	60	10
YRF13	27°22'40.0"	88°05'49.6"	4	3175	Sub-Alpine	E	45	50
YRF14	27°22'26.8"	88°06'13.3"	6	2886	Wet Temperate mixed broadleaved	E	15	45

YRF15	27°22'35.6"	88°06'21.7"	4	2724	Wet Temperate mixed broadleaved	E	30	60
YRF16	27°22'42.2"	88°06'45.8"	6	2463	Wet Temperate mixed broadleaved	W	15	30
YRF17	27°22'36.0"	88°06'50.0"	5	2466	Wet Temperate mixed broadleaved	SE	20	45
YRF18	27°22'23.3"	88°06'50.5"	6	2471	Wet Temperate mixed broadleaved	E	40	70
YRF19	27°22'16.8"	88°06'45.1"	4	2563	Wet Temperate mixed broadleaved	E	10	55
YRF20	27°22'01.0"	88°06'47.8"	6	2383	Wet Temperate mixed broadleaved	SE	45	50
YRF21	27°21'46.6"	88°06'44.6"	6	2125	Wet Temperate mixed broadleaved	SE	30	30
YRF22	27°22'05.2"	88°07'02.9"	3	2285	Wet Temperate mixed broadleaved	NE	45	50
YRF23	27°22'05.8"	88°07'08.4"	5	2399	Wet Temperate mixed broadleaved	NE	40	40
YRF24	27°22'02.6"	88°07'10.7"	4	2448	Wet Temperate mixed broadleaved	N	5	25
YRF25	27°22'05.0"	88°07'14.2"	4	2507	Wet Temperate mixed broadleaved	NE	25	30
YRF26	27°21'58.3"	88°07'18.1"	6	2594	Wet Temperate mixed broadleaved	NE	30	50
YRF27	27°21'48.5"	88°07'16.8"	6	2599	Wet Temperate mixed broadleaved	SW	35	25

Note: E=East, N=North, NE=North East, SW=South West, SE=South East

Checklist of Flora species in Yampung Reserve Forest in West Sikkim

Sl. No.	Botanical Name	Local Name	Family
	TREE		
1.	<i>Abies densa</i> Griffith. ex Parker	Gobre salla	Pinaceae
2.	<i>Acer campbellii</i> Hook. & Thom. Ex Hiern.	Kapasey	Sapindaceae
3.	<i>Acer caudatum</i> Wallich.	Kapasey	Sapindaceae
4.	<i>Acer stachyophyllum</i> Heirn.	Dalle kapasey	Sapindaceae
5.	<i>Alnus nepalensis</i>	Utis	Betulaceae
6.	<i>Betula alnoides</i> Buch. Ham. Ex D. Don	Saur	Betulaceae
7.	<i>Betula utilis</i> D. Don	Saur	Betulaceae
8.	<i>Cinnamomum obtusifolium</i> Nees.	Bhaley sinkoli	Lauraceae
9.	<i>Eurya acuminata</i> DC	Sanu Jhingni	Theaceae
10.	<i>Ilex sikkimensis</i> Kurz.	Lise	Aquifoliaceae
11.	<i>Lithocarpus fenestrata</i> Roxb.	Arkaulo	Fagaceae
12.	<i>Machilus edulis</i> King ex Hook. f.	Pomsi	Lauraceae
13.	<i>Machilus odoratissima</i> Nees.	Lali kawla	Lauraceae
14.	<i>Magnolia campbellii</i> Hook.f. & Thom.	Ghogeys champ	Magnoliaceae
15.	<i>Pieris ovalifolia</i> D Don.	Angeri	Ericaceae
16.	<i>Prunus nepalensis</i> (Ser) Stendel	Arupatey	Rosaceae
17.	<i>Quercus glauca</i> Thunb.	Phlant	Fagaceae
18.	<i>Quercus lamellosa</i> Smith.	Buk/Bajranth	Fagaceae
19.	<i>Rhododendron arboreum</i> ssp. <i>arboreum</i> (CB Clarke) Ridley	Lali gurans	Ericaceae
20.	<i>Rhododendron barbatum</i> Wallich ex G. Don	Lal chimal	Ericaceae
21.	<i>Rhododendron falconeri</i> Hook. f.	Korlinga	Ericaceae
22.	<i>Rhododendron grande</i> Wight	Patle korlinga	Ericaceae
23.	<i>Rhododendron hodgsonii</i> Hook. f.	Korlinga	Ericaceae
24.	<i>Rhus insignis</i> Hook. f.	Kag Bhalayo	Anacardiaceae
25.	<i>Saurauia napaulensis</i> DC	Gagun	Actinidaceae
26.	<i>Sorbus cuspidata</i> (Spach) Hedl.	Tenga	Rosaceae

27.	<i>Sorbus foliolosa</i> (Wallich) Spach	Thulo pasi	Rosaceae
28.	<i>Symplocos glomerata</i> King ex C. B. Clarke	Kholmey	Symplocaceae
29.	<i>Symplocos lucida</i> D. Don	Kharaney	Symplocaceae
30.	<i>Tetradium fraxinifolia</i> Hook. f.	Khanakpa	Rutaceae
31.	<i>Tsuga dumosa</i> (D. Don) Eichler	Tengre salla	Pinaceae
32.	<i>Zanthoxylum acanthopodium</i> DC	Boke timmur	Rutaceae
33.	<i>Magnolia cathcartii</i> (Hook.f. & Thomson) Noot	Titey champ	Magnoliaceae
34.	<i>Leucosceptrum canum</i> Sm.	Gurpis	Lamiaceae
	SHRUB& SHRUB LET		
1	<i>Berberis insignis</i> Hook. f. & Thoms.	Chutro	Berberidaceae
2	<i>Daphne cannabina</i> Wall.	Kalo argayle/Loktee	Thymelaeaceae
3	<i>Dichroa febrifuga</i> Lour.	Basak	Hydrangaceae
4	<i>Edgeworthia gardneri</i> Meissn.	Argayle/Kagate	Thymelaeaceae
5	<i>Fragaria nubicola</i> Lindley ex Lacaïta	Vui Aiselu	Rosaceae
6	<i>Gaultheria</i> sp.	Dhasingre,	Ericaceae
7	<i>Gaultheria nummularioides</i> D. Don	Dhasingre,	Ericaceae
8	<i>Gaultheria pyrolloides</i> Hook. f. & Thoms. ex Miq.	Dhasingre,	Ericaceae
9	<i>Hypericum hookerianum</i> Wight & Arn.	Urilo	Guttiferae
10	<i>Juniperus indica</i> Bertol.	Gokul dhup	Cupressaceae
11	<i>Juniperus recurva</i> Buch. Ham. ex D. Don	Shukpa dhup	Cupressaceae
12	<i>Mahonia sikkimensis</i> Takeda	Kesari/Chutro	Berberidaceae
13	<i>Rosa sericea</i> Lindl.	Bhote gulab	Rosaceae
14	<i>Rubus ellipticus</i> Smith	Ainselu	Rosaceae
15	<i>Rubus lineatus</i> Reinw. ex Blume	Ainselu	Rosaceae
16	<i>Rubus nepalensis</i> (Hook. f.) Kuntze	Bhui ainselu	Rosaceae
17	<i>Rubus splendidissimus</i> H. Hara	Phusre Ainselu	Rosaceae
18	<i>Viburnum erubescence</i> Wallich ex DC	Asare	Caprifoliaceae

19	<i>Viburnum nervosum</i> D. Don	Asare	Caprifoliaceae
20	<i>Vaccinium nummularia</i> Hook. & Thoms ex C. B. Clarke		Ericaceae
21	<i>Strobilanthus wallichii</i> Nees.	Kibu	Thymeleaceae
	HERB		
1	<i>Aconogonum molle</i> (D. Don) H. Hara	Thotne	Polygonaceae
2	<i>Anaphalis adnata</i> Wall. ex DC	Buki phul	Compositae
3	<i>Anaphalis busua</i> (Buch. - Ham. ex D. Don) DC	Buki phul	Compositae
4	<i>Anaphalis contorta</i> (D. Don) Hook. f.	Buki phul	Compositae
5	<i>Anaphalis margaritacea</i> (L.) Benth	Buki phul	Compositae
6	<i>Anaphalis triplinervis</i> var. <i>triplinervis</i> (Sims) C. B. Clarke	Buki phul	Compositae
7	<i>Anaphalis virgata</i> Thoms. x Clarke	Buki phul	Compositae
8	<i>Arisaema griffithii</i> Schott	Laura/Banko	Araceae
9	<i>Carex baccans</i> Nees.	Harkatto	Cyperaceae
10	<i>Carex cruciata</i> var. <i>argocarpus</i> Clarke	Harkatto	Cyperaceae
11	<i>Carex decora</i> Boott.	Harkatto	Cyperaceae
12	<i>Astilbe rivularis</i> Buch.-Ham. ex D. Don	Budi okhati	Saxifragaceae
13	<i>Rohdea verruculosa</i> (Q.H.Chen) N. Tanaka	Jungali Nakima	Asparagaceae
14	<i>Hedychium gardnerianum</i> Sheppard ex Ker-Gawler		Zingiberaceae
15	<i>Hedychium spicatum</i> Buch. Ham.	Saro	Zingiberaceae
16	<i>Impatiens stenantha</i> Hook. f.		Balsaminaceae
17	<i>Juncus benghalensis</i> Kunth		Juncaceae
18	<i>Juncus concinnus</i> D. Don		Juncaceae
19	<i>Persicaria capitata</i> (Buch. Ham. ex D. Don) Gross	Ratnaulo	Polygonaceae
20	<i>Rumex nepalensis</i> Sprengel	Halhalley	Polygonaceae
21	<i>Solanum nigrum</i> Linn.	Junglee bihee	Solanaceae

22	<i>Laportea terminalis</i> Wight.	Patley sisnu	Urticaceae
23	<i>Urtica dioica</i> Linn.	Gharia sisnu	Urticaceae
24	<i>Gerardiana diversifolia</i> (Link) Friis	Bhangre sisnu	Urticaceae
25	<i>Heracleum wallichii</i> DC	Chimphing	Apiaceae
26	<i>Swertia bimaculata</i> (Siebold & Zucc.) Hook. f. & Thomson ex C.B. Clarke	Bhaley chirowto	Gentianaceae
	CLIMBER & EPIPHYTE		
1	<i>Clematis b Buchananiana</i> DC	Pinasey lahara	Rununculaceae
2	<i>Piper boehmeriifolium</i> (Miquel) Wallich ex C. DC	Chambo	Piperaceae
3	<i>Rhapidiphora decursiva</i> (Roxb.) Schott.	Kanchirno	Araceae
4	<i>Trichosanthes lepiniana</i> (Naud.) Cogn.	Indreni	Cucurbitaceae
5	<i>Rubia manjith</i> Roxb. ex Fleming	Majito	Rubiaceae
6	<i>Holboellia angustifolia</i> Wall.	Gulfa	Lardizabalaceae
7	<i>Herpetospermum pedunculatum</i> (Seringe.) C.B. Clarke	Ban karela	Cucurbitaceae
8	<i>Tetrastigma serrulatum</i> (Roxb.) Planch	Charcharay lahara	Vitaceae
9	<i>Smilax zeylanica</i>	Kukur dainey	Liliaceae
10	<i>Pleione praecox</i>		Orchidaceae
	FERNS & FERN-ALLIES		
1	<i>Selaginella</i> sp.	Sindure	Selaginellaceae
2	<i>Lycopodium</i> sp	Nagbeli	Lycopodiaceae
3	<i>Diplazium</i> sp.	Sauney ningro	Athyriaceae
4			
5	<i>Oleandra pistillaris</i> (Sw.) C. Chr.		Oleandraceae
6	<i>Pteris wallichiana</i> J. Agardh.	Chatey uniu	Pteridaceae
7	<i>Athyrium foliolosum</i> T. Moore ex R. Sim.		Woodsiaceae
8	<i>Lepisorus loriformis</i> (Wall. ex Mett.) Ching		Polypodiaceae

9	<i>Dennstaedtia scabra</i> (Wall. ex Hook) T. Moore		Dennstaedtiaceae
10	<i>Arthromeris wallichiana</i> (Spreng.) Ching		Polypodiaceae
11	<i>Dryopteris redactopinnata</i>	Thumse ningro	Dryopteridaceae
	BAMBOO		
1	<i>Arundinaria maling</i> Gamble	Jaat malingo	Poaceae
2	<i>Yushani maling</i>	Hangey malingo	Poaceae



FAUNA

During the survey, 11 species of animal were recorded from Yampung Reserve Forest. Further, a total of 21 bird species belonging to 14 families were recorded. The family-wise bird species composition were recorded for Turdidae & Corvidae (3 species each) followed by Dicaeidae, Paridae, Phasianidae (2 species each) from this particular transect. The other remaining family represented by single species.

Checklist of fauna & avifauna species of Yampung Reserve Forest

Sl. No	Common Name	Scientific Name	Family	Local Name
FAUNA				
	Barking deer	<i>Muntiacus muntjak</i>	Cervidae	Mirga
	Wild dog	<i>Cuon alpinus</i>	Canidae	Ban kukur
	Himalayan tahr	<i>Hemitragus jemlahicus</i>	Bovidae	Jharal
	Musk Deer	<i>Moschus sp.</i>	Moschidae	Kasturi Mriga
	Red panda	<i>Ailurus fulgens</i>	Ailuridae	Pudey kudo
	Himalayan Black Bear	<i>Ursus thibetanus</i>	Ursidae	Bhalu
	Serow	<i>Capricornis thar</i>	Bovidae	Thar
	Wild Boar	<i>Sus scrofa</i>	Suidae	Bodyal
	Blue Sheep	<i>Pseudois nayaur</i>	Bovidae	Ban Bhera
	Red fox	<i>Vulpes vulpes</i>	Canidae	Syall
	Particolored Flying Squirrel	<i>Hylopetes alboniger</i>	Sciuridae	
AVIFAUNA				
	Rufous-fronted Tit	<i>Aegithalos louschistos</i>	Paridae	Fista
	Chestnut Crowned Warbler	<i>Cettia major</i>	Sylviidae	Fista
	Coal Tit	<i>Fulvetta vinipectus</i>	Paridae	Fista

Jungle Crow	<i>Corvus macrorhyncus</i>	Corvidae	Khag
Eurassian	<i>Cuculus canorus</i>	Cuculidae	Cuckoo
Darjeeling Woodpecker	<i>Dendrocopos darjellensis</i>	Picidae	Laachey
Ashy Drongo	<i>Dicrurus leucophaeus</i>	Dicaeidae	Chibey
Black Drongo	<i>Dicrurus macrocercus</i>	Dicaeidae	Chibey
White-crested Laughingthrush	<i>Garrulax leucolophus</i>	Turdidae	Kolkoley
Spotted Laughing Thrush	<i>Garrulax ocellatus</i>	Turdidae	Kolkoley
Lammergeier	<i>Gypaetus barbatus</i>	Accipitridae	Chill
Kalij pheasant	<i>Lophura leucomelana</i>	Phasianidae	Kalij
Great Barbet	<i>Megalaima virens</i>	Megalaimidae	Neual
Blue Whistling Thrush	<i>Myophonus caeruleus</i>	Turdidae	Kalchura
Russet Sparrow	<i>Passer rutilans</i>	Passeridae	Bhangera
Red Vented Bulbull	<i>Pycnonotus cafer</i>	Pycnonotidae	Jureli
Oriental Turtle Dove	<i>Streptopelia orientails</i>	Columbidae	Dhukur
Yellow Billed Blue Magpie	<i>Urocissa ornata</i>	Corvidae	Lampucharey
Large billed Crow	<i>Corvus macrorhyncus</i>	Corvidae	Kag
Hill Partridge	<i>Arborophila torqueola</i>	Phasianidae	Peura
Fire-tailed sunbird	<i>Aethopyga ignicauda</i>	Nectariniidae	Balchi



Migration of Juniper at Gurasey Dara, Yampung RE, West Sikkim



Dense Oak Temperate Forest



Regeneration of Silver fir.

INVENTORY OF BIODIVERSITY

RAPID BIODIVERSITY SURVEY REPORT - IV



Primula sapphirina Hook. f
Photo Credit: Suraj Subba



Sikkim Biodiversity Conservation and Forest Management Project (SBFP)
Forest, Environment and Wildlife Management Department
Government of Sikkim



Fire-tailed Sunbird
Photo Credit: Suraj Subba

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