



Baseline Biodiversity Report 2021



**Gedu Forest Division
Department of Forest and Park Services
Ministry of Agriculture and Forests
Royal Government of Bhutan**



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ICIMOD

Baseline Biodiversity Report

Analysis and Report Preparation

Rinzin Dorji, Sr. Forestry Officer, Gedu Forest Division (GFD)

Pema Gyeltshen, Sr. Forest Ranger I, GFD

Lhab Dorji, Forest Ranger II, GFD

Letro, Sr. Forestry Officer, Nature Conservation Division

Tandin, Sr. Forestry Officer, Nature Conservation Division

Pema Wangda, Chief Forestry Officer, GFD

Contributors

Karma, Sr. Forestry Officer, UWICER Substation, Darla

Tshethup Tshering, UWICER, Bumthang

Karma Wangdi, UWICER, Bumthang

Pasang, Sr. Forestry Officer, GFD

Sangay Wangmo, Data Manager, GFD

Tshering Phuntsho, FO, GFD

Jigme Lharig, FO, GFD

Phub Tshering, Forest Ranger I, GFD

Tshering Gyeltshen, Forest Ranger I, GFD

Nagphel, Sr. Forest Ranger, GFD

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FOREWORD

Bhutan is a biologically diverse country with incredible diversity of wildlife species and ecosystems, maintaining a level of ecological integrity unparalleled for a biodiversity hotspot. Environmental conservation is one of the four pillars of Gross National Happiness, a holistic and sustainable approach to development, which balances material and non-material values with the conviction that humans want to search for happiness.

More than 50% of Bhutan's land area is formally protected and the constitution of Bhutan commits to maintaining at least 60% of the country under forest cover in perpetuity. The existing protected areas hold globally significant populations of many plant and animal species, including endangered and charismatic species like tigers, elephants and snow leopards. However, there are a number of other sites of global biodiversity significance that are beyond the protected area network that are under increasing threat from various anthropogenic activities and have greater risk of losing the species. Therefore, there is an urgent need to ensure that all sites of importance for biodiversity are identified, mapped and documented.

The Baseline Biodiversity Report has been developed by Gedu Forest Division of the Department of Forests & Park Services to document and maintain baseline biodiversity through a checklist of species recorded through primary and secondary data.

I am very pleased and encouraged that Gedu Forest Division has come up with such an important baseline biodiversity report to enable evidence based decision making for preservation, protection, conservation and sustainable forest management. I am optimistic that this important report will help not only the Division and Department at large for implementation of any forestry and environmental activities, but also serve as a reference for decision makers, planners, researchers, academicians and students.

Lastly, I would like to take this opportunity to sincerely acknowledge the collective efforts put in by the colleagues of Gedu Forest Division, NCD and UWICER in bringing out this publication. Also, I would like to express my sincere gratitude to ICIMOD for funding the field survey and publication of this important document.

Tashi Delek!

Lobzang Dorji

DIRECTOR

Department of Forests and Park Services

ACKNOWLEDGEMENT

The Baseline Biodiversity Report of Gedu Forest Division is the first of its kind for Gedu Forest Division and this report is published to provide comprehensive finding on biodiversity with a check list of flora and fauna collected through the baseline biodiversity surveys and the review of secondary data.

Many individuals, agencies and organisations contributed to the accomplishments of this Baseline Biodiversity Report. Mr. Karma from Non-wood Forest Products and Agro-Forestry Sub-Centre, Darla under Ugyen Wangchuk Institute for Environmental Conservation and Research (UWICER) led the survey team in botanization in all the Sampled Biodiversity Monitoring Grids. Sincere acknowledgement to Mr. Rinzin Dorji, Sr. Forestry Officer of Gedu Forest Division for his efforts, hard work and dedication in coordinating the field surveys, analysis and the report writing.

Nature Conservation Division, Department of Forests and Park services provided the technical guidance and the secondary data for incorporation into the Baseline biodiversity Report. International Centre for Integrated Mountain Development (ICIMOD) provided the fund under Kangchenjunga Landscape Conservation and Development Initiative (KLCDI) for conducting this baseline biodiversity survey and publication of this report.

Most heartfelt thanks to all the colleagues of Gedu Forest Division, particularly those who were involved in the baseline surveys for their unwavering support and contribution during the field work, data compilation and sharing their experience .

Lastly, we are highly indebted to the Director, Department of Forests and Park Services for his invaluable advice, constant inspiration and continued guidance to bring out this important publication.



Pema Wangda
Chief Forestry Officer
Gedu Forest Division

ABBREVIATIONS AND ACRONYMS

BMG	Biodiversity Monitoring Grids
CFMG	Community Forest Management Group
FMU	Forest Management Unit
FNCA	Forest and Nature Conservation Act
GHNC	Gross National Happiness Centre
GFD	Gedu Forest Division
ICIMOD	International Centre for Integrated Mountain Development
KLCDI	Kangchenjunga Landscape Conservation and Development Initiative
LFMP	Local Forest Management Plan
masl	Meters above sea level
NDVI	Normalized Difference Vegetation Index
NWFP	Non-Wood Forests Products
PES	Payment for Environmental Services
Sq.km	Square kilometre



Marbled Cat
(*Pardofelis marmorata*)

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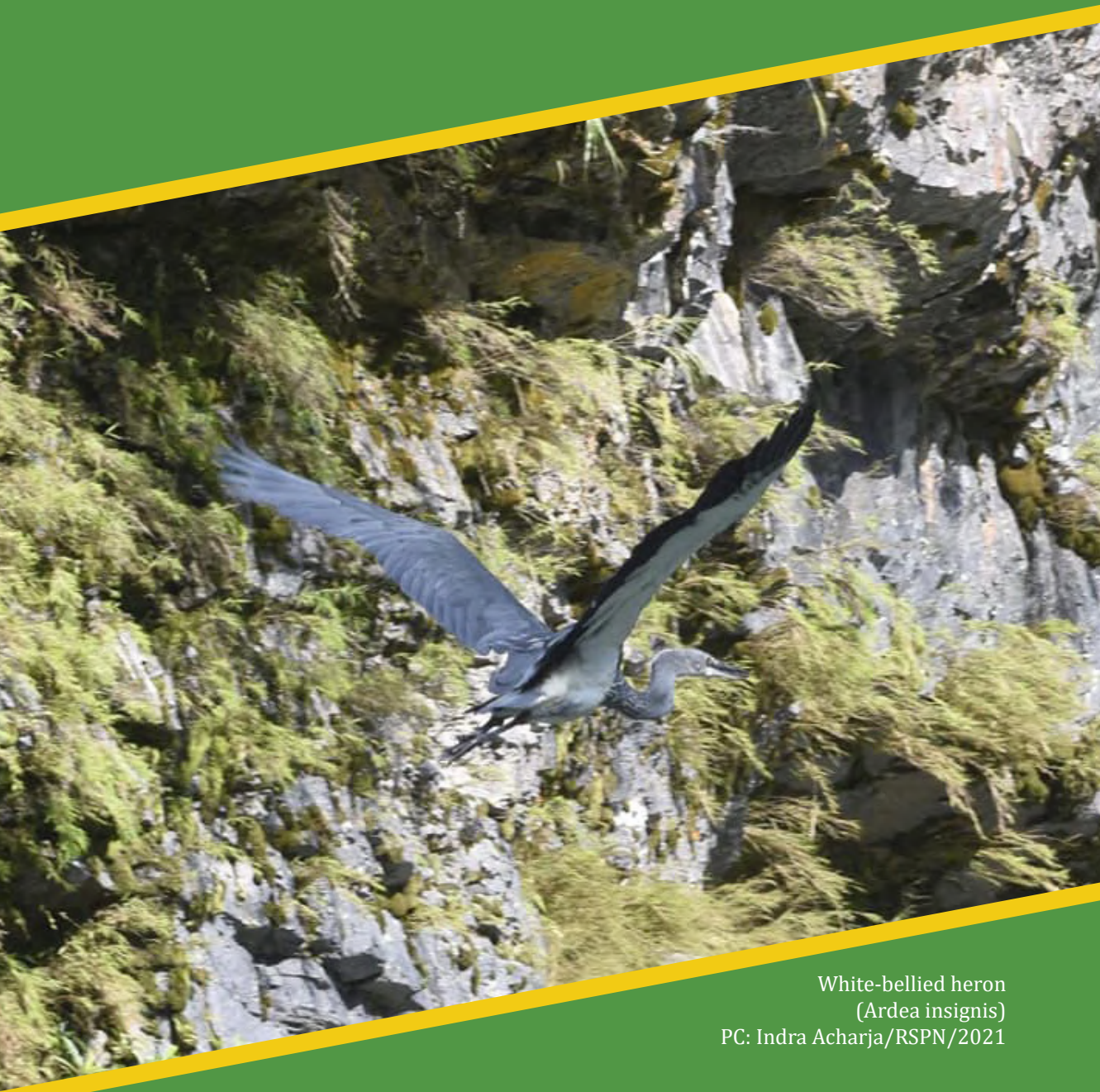
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White-bellied heron
(*Ardea insignis*)

PC: Indra Acharja/RSPN/2021

1. Introduction

1.1 Background

Bhutan is a biologically diverse country in the eastern Himalayas (Myers et al., 2000). It is situated at the ecotone of two biogeographic realms, the Palearctic Realm and Indo-Malayan Zoogeographic Realms, and thus forms a part of Eastern Himalayan Biodiversity Hotspot. Forest Ecosystem constitutes the dominant Ecosystem diversity and vascular plants account for the largest portion of species diversity in Bhutan (NBC, 2014). Gedu Forest Division (GFD) is situated in the south-western part of Bhutan which harbours diverse Ecosystem diversity (forest, aquatic and agricultural ecosystem diversity) and species diversity (wild and domestic species diversity) attributed to its high elevation range and diverse habitat types.

Forest Ecosystem is most dominant one with 81.42% of the total land area under forest cover as compared to aquatic and agricultural ecosystem with 1.64% and 11.39% respectively (Forest Resource Management Division, 2017). GFD can be divided into three eco-floristic zones viz. Alpine Zone (4000+ masl), Temperate Zone (2,000-4,000 masl) and Sub-tropical Zone (150-2,000 masl) with different forest types such as tropical lowland forest, chirpine forest, broadleaved forest, broadleaf mixed with conifer forest, bluepine forest, mixed conifer forest, fir forest and alpine meadows and scrubs (Oshawa, 1987).

There are two major river basins (Wang chhu and Amo chhu) of Bhutan that drains through the GFD. There are few prominent lakes such as Shawgayla Lake, Lumila Lake, Phaktshoding Lake and small water holes including marshlands that contribute to the aquatic ecosystem of GFD. All of these contribute to the aquatic ecosystem of GFD.

Agricultural ecosystem of the GFD can be broadly classified into six major agro-ecological zones in accordance with the altitudinal range and climatic conditions (NBC, 2014). The six agro-ecological zones are Alpine, Cool Temperate, Warm Temperate, Dry Sub-tropical, Humid sub-tropical and wet sub-tropical (Biodiversity Action Plan, 2009).

Bhutan is also characterized by strong species diversity and density, with about 5,603 flowering plant species, under 220 families and 1,415 genera, close to 200 species of mammals (CBD, 2011), about 760 species of butterfly (Wangchuk et al., 2021) and 50 freshwater fish species (with many more to species to be documented) and about 747 species of birds (Birdlife International, 2017). GFD also harbours diverse species along the altitudinal gradient of 150-4450 masl (Dhendup and Dorji, 2018a) with different forest types and across different landscapes.

1.2 Objectives of the Report:

- i. To establish baseline biodiversity data through checklist of flora and fauna recorded in GFD.
- ii. Assimilation from secondary biodiversity data.
- iii. To serve as foundation for all the research and conservation activities in GFD.

2. Gedu Forest Division

2.1 Location, Area, Background and Status

GFD is one of the 14 Territorial Forest Divisions in Bhutan under Department of Forests and Park Services. It was upgraded as the GFD in the year 1988 from the Sub-Divisional Forest Office which was first opened in the year 1985. The division oversees the sustainable forest management, forest resource utilization and public services delivery under Chukha District. It is strategically located being along the Phuntsholing-Thimphu National highways which is a gateway for import and export of forestry products among others.

2.1.1 Location of Gedu Forest Division

GFD is located in South-Western part of the country, between 26°43' - 27°18' N and 89°16' - 89°44' E. It is adjacent to Buxa Tiger Reserve in West Bengal, India in the south; Dagana Territorial Forest Division in the east; Thimphu Territorial Forest Division in the north; and Samtse and Paro Territorial Forest Division in the west.

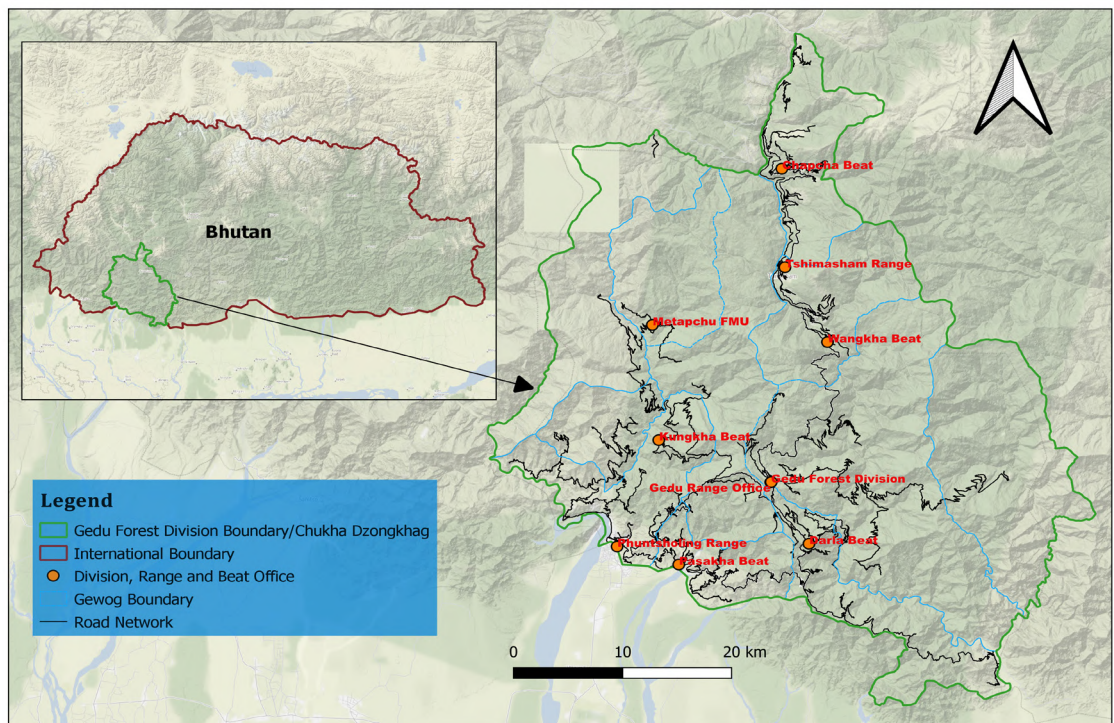


Figure 1: Map Showing location of Gedu Forest Division

2.1.2 Area Statement and Different forest management regimes

Gedu Forest Division's jurisdictional area covers 1879.77 sq.km (Forest Resource Management Division, 2017) in all the 11 Gewog of Chukha Dzongkhag. The Division Office has 3 Range Office, one each at Gedu, Tshimasham and Phuntsholing; five Beat Offices one each at Chapcha, Wangkha, Darla, Kungkha and Pasakha, and one Forest Management Unit (Metapchhu FMU).

GFD has different forest management regimes with 1 Forest Management Unit (FMU), 62 Community Forest Management Groups (CFMGs), 6 Non-wood Forest Product Groups, 1 Payment for Environmental Service group, 1 Important Bird area and 1 Local Forest Management Plan (LFMP). A significant portion of forest area is also under lease to Bhutan Board Products limited as production forest to produce raw materials for graded wood particle board.

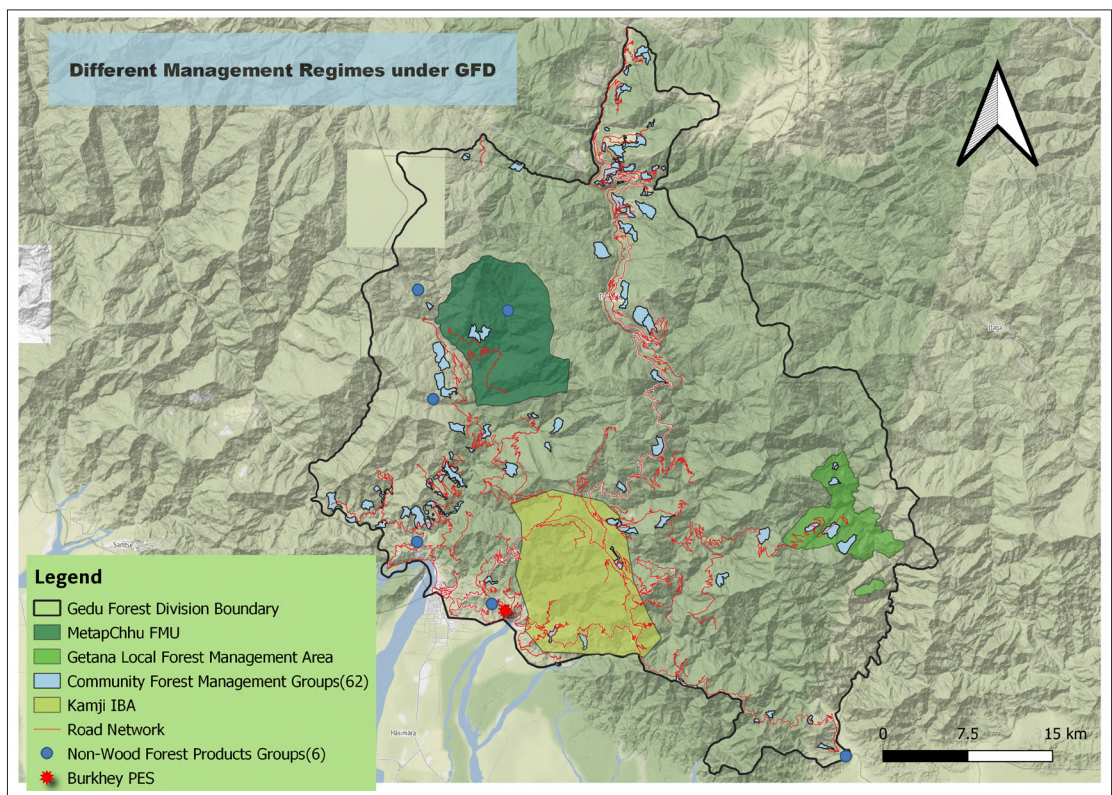


Figure 2: Different management regimes under GFD.

2.1.3 Forest Types

The forest covers about 89.26% (Forest Resource Management Division, 2017) of the total area of the GFD. Forest cover estimate is based on the forest defined in the National Forest Policy of Bhutan (NFP, 2011) which states that land with trees spanning more than 0.5 ha with trees higher than 5 meters and a canopy cover of more than 10%. Hence, the forest resources are still intact and a large number of hardwood species are grown. The number of trees per hectare is estimated to be 220 numbers, basal area of 8,930,964m² and growing stock volume of 82,958,251m³ in GFD (Department of Forests and Park Services, 2016).

The forest types of GFD ranges from low sub-tropical forest to high altitude rhododendron forest. Depending on the floristic characteristics, forest of GFD can be classified broadly into the following forest types;

Sl. No.	Forest Type	Altitude(masl)	Characteristic species
1	Rhododendron and Fir Forests	>3100	Rhododendron, Fir and Pedicularis.
2	Cool broadleaved Forest	2000-2900	<i>Acer spp.</i> , <i>Betula alnoides</i> , <i>Exbucklandia spp.</i> , <i>Lindera spp.</i> , <i>Symplocos spp.</i>
3	Warm broadleaved Forest	2000-3000	<i>Alnus nepalensis</i> , <i>Michelia excelsa</i> , <i>Castanopsis indica</i> , <i>Engelhardia spicata</i> , <i>Macaranga postulate</i> , <i>Schima wallichii</i> .
4	Sub-Tropical Forests	150-1000	<i>Gmelia arborea</i> , <i>Ailanthus grandis</i> , <i>Chukrasia tabularis</i> , <i>Daubanga grandiflora</i> .

Adapted from (Grierson & Long, 1983).

The major forest cover of GFD is Broadleaf forest (73.11%), followed by Mixed conifer forest (12.30%), Bluepine forest (2.67%) and Fir forest (1.18%). The land use land cover map of GFD is as shown below in Figure 3.

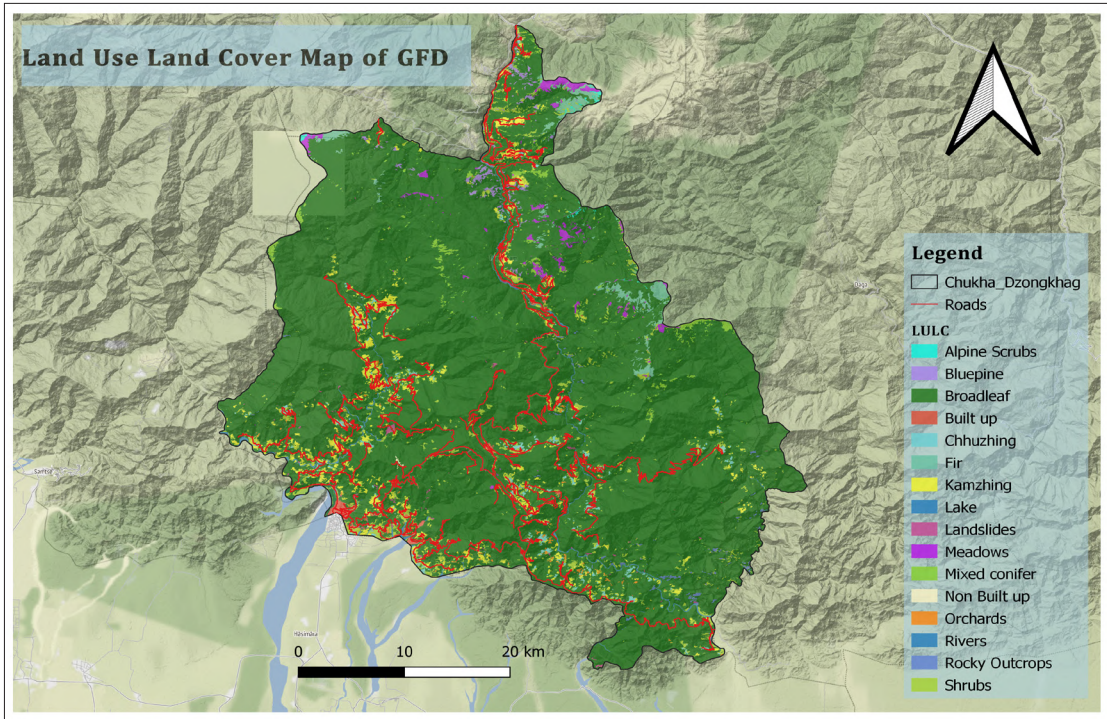


Figure 3: Land Use Land Cover Map of GFD.

2.1.4 Agro-ecological Zones of GFD

Gedu Forest Division has six major agro-ecological zones based on climatic conditions along the altitudinal gradients. The overview of the major agro-ecological zones based on the agricultural practices in dry land, wetland, orchards, Areca nut and Cardamom plantation among others that are followed in different altitude are depicted in Table 1 below.

Table 1: Agro-ecological Zones of GFD (Adapted from NBC, 2014)

Agro-ecological Zone	Altitude (masl)	Rainfall (mm)	Farming system, major crops and agriculture produce
Alpine	3600-4450	<650	Semi-nomadic people, yak herding, dairy products, barley, buckwheat, mustard and vegetables.
Cool Temperate	2600-3600	650-850	Yaks, cattle, sheep, horses, dairy products, barley, wheat and potatoes on dry land, buckwheat and mustard cultivation, temperate fruits and vegetables.

Warm Temperate	1800-2600	650-850	Rice on irrigated land, double cropping with wheat and mustard, barley and potatoes on dry land, temperate fruit trees, vegetables, cattle for draught and manure.
Dry Sub-Tropical	1200-1800	850-1200	Maize, rice, millet, pulses, fruit trees and vegetables, wild lemon grass, cattle, pigs and poultry.
Humid Sub-Tropical	600-1200	1200-2500	Irrigated rice rotated with mustard, wheat, pulses and vegetables, tropical fruit trees.
Wet Sub-Tropical	150-600	2500-5500	Irrigated rice rotated with mustard, wheat, pulses and vegetables, tropical fruit trees.

2.1.5 Legal status

Forest and Nature Conservation Act 1995, defines “forest” as “any land and water body whether or not under vegetative cover, in which no person has acquired a permanent and transferable right of use and occupancy, whether such land is located inside or outside the forest boundary pillar, and includes land registered in a person’s name as tsamdro (grazing land) or sokshing (wood lot for collection of leaf litter)”. Therefore, all such forest areas are declared as State reserved forest (SRF). Accordingly, the extent of SRF land is 177,456.61ha (95.33%) and 8692.66ha (4.67%) of human settlement and agricultural land which is of private(Forest Resource Management Division, 2017).

2.2 Permanent Site factors

2.2.1 Topography and slope

The Gedu Forest Division is in general moderate to steep sloping and mountainous with deeply incised valleys running mainly north-south. The elevation ranges from 150 m to 4450 m within an aerial distance of 77 km(Dhendup and Dorji, 2018a).

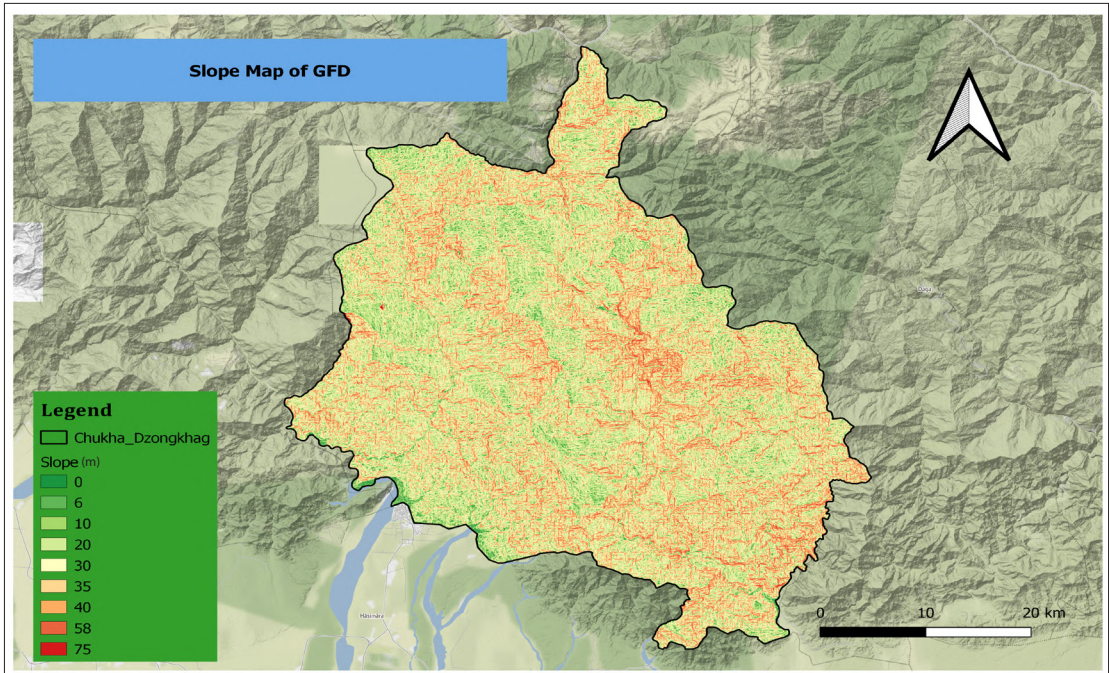


Figure 4: Map showings slope of GFD.

2.2.2 Climate

GFD has an altitudinal range between 150m to 4400masl and the summers in the south are very hot, whereas winters are cold in the north. The climate is mainly subtropical but parts of Chukha have tropical and temperate climate. Annual precipitation ranges from 750 mm in the north to 4000mm in the south (Forest Resource Management Division, 2017). The most common form of precipitation is in the form of rain but hailstorms during the late winter and snow in the higher elevations are received annually.

There is no meteorological station installed by the GFD and the weather data for the past 10 years (2011-2020) is obtained from the database of National Centre for Hydrology and Meteorology (NCHM), Thimphu. The maximum precipitation recorded during the month of May, June, July and August (Table 2).

Table 2: Monthly Average Rainfall (mm) of past 10 years.

Months	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Avg. Monthly Rainfall(mm)	14	24	44	81	140	179	366	192	154	48	4	3

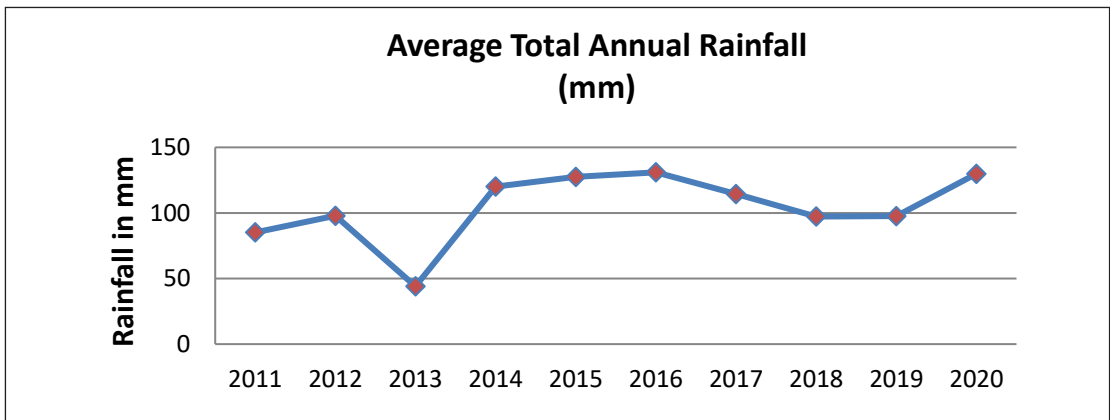


Figure 5: Graph showing Average Total Annual Rainfall (mm)

The average minimum temperature is 11.3 and the average maximum temperature is 19.3 degree celsius

Table 3: Average monthly minimum and maximum temperature.

Months	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Min.Temp	5	6	7	9	14	14	18	17	17	14	10	7
Max. Temp	13	14	15	17	20	21	24	24	24	23	20	17

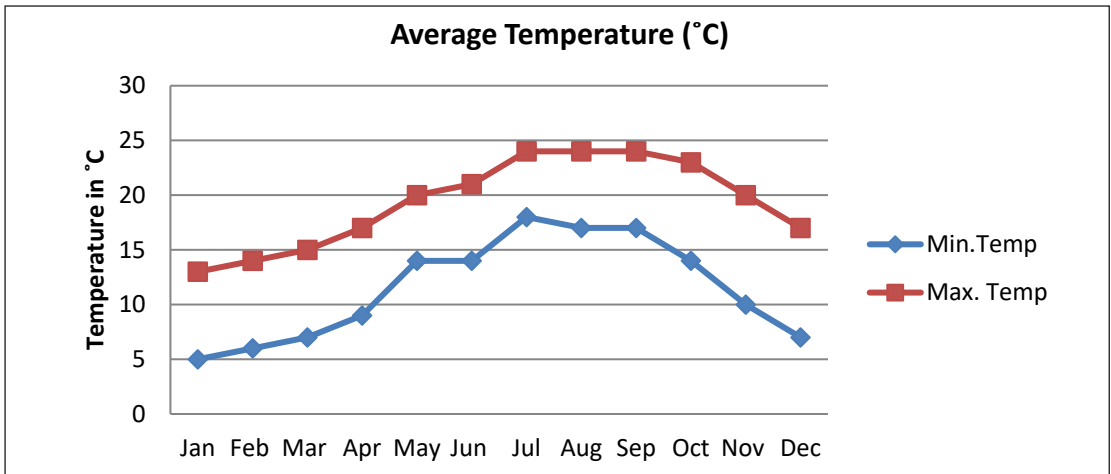


Figure 6: Graph showing average monthly temperature.

2.2.3 Geology and soil

GFD area falls under the tectonostratigraphic zone of upper lesser Himalayan under Phuntsholing formation which belongs to Baxa Group of Rocks (McQuarrie et al., 2013) as shown in the Figure 7 below. The area was formed during the paleozoic period and comprises mainly of folded successions of purple phyllites, quartzite and siliceous limestone. The soil is predominantly sandy loam (90.6%), 8.1% loamy soil and 1.3% sandy soil

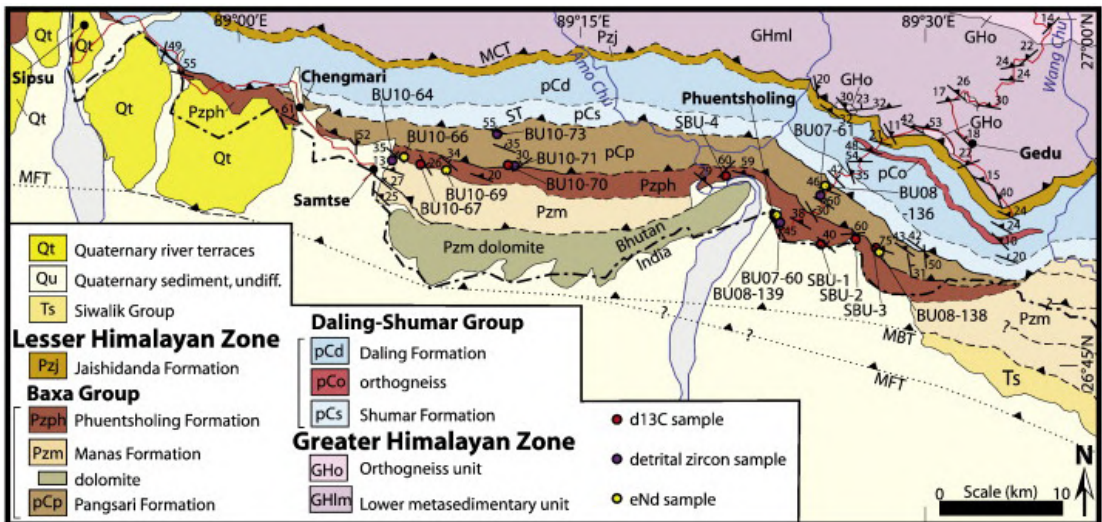


Figure 7: Geological map of South-west Bhutan(McQuarrie et al., 2013).

2.2.4 Hydrology

The entire GFD is the hydrological basin of the two major River Amochhu and Wangchhu which drains into the neighbouring Indian state. The Division area is dissected by many small streams that flows into the Amochhu and Wangchhu River. Most of the streams are seasonal which comes into life only during the rainy seasons. There are few prominent lakes like Shougayla Lake, Lumila Lake and Phaktshoding Lake among various other small water holes and marshes as shown in the Figure 8 below.

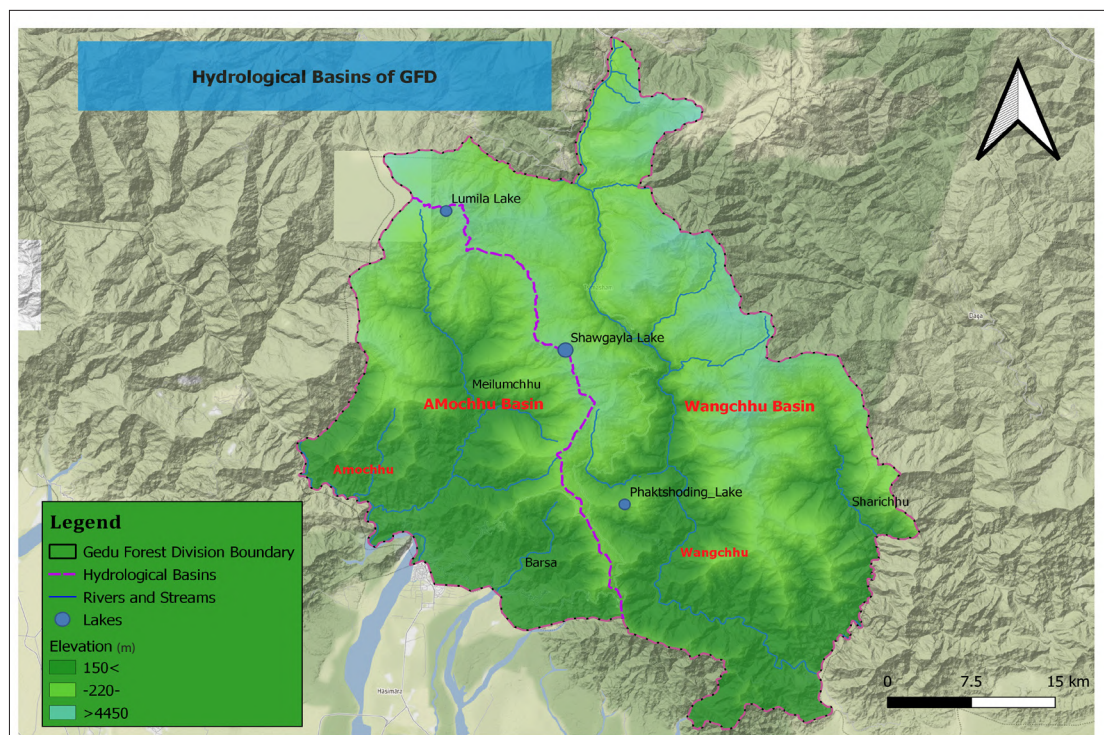
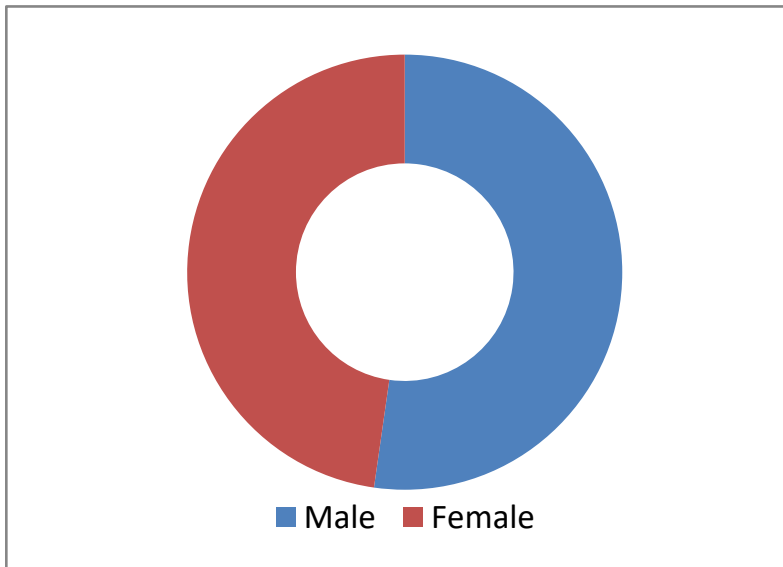


Figure 8: Hydrological basins of GFD.

2.3 Variable site factors

2.3.1 Population and demography

GFD consists of 11 Gewogs which falls under Chukha Dzongkhag and Phuntsholing Dungkhag. There are 36,041 males and 32925 females residing within the Division's jurisdiction (PHCB, 2017, n.d.).



2.3.2 Farming and agriculture

In terms of farmland, GFD is dominated by kamzhing (dryland) where potato, maize, wheat, barley, ginger, chilli and green vegetable are grown. However, chuzhing (wetland) is also found in its lower altitudes. The main sources of rural cash income are oranges and potatoes. However, cardamom and Areca nut also contribute to the cash income. The majority of the people living in the valley are subsistence farmers except in places like Phuntsholing and Pasakha where commercial activities are largely carried out. There are about 1882.87 hectares of wet land, 5653.05 hectares of dry land and 322.19 hectares of orchards under GFD (Forest Resource Management Division, 2017).

2.3.3 Traditional use of forests

The people depend on the forests for supply of forest resources such timber for house building, firewood, fencing poles, bamboo, cane shoots, edible ferns, flag poles and many other non-wood forests products. The major forest resource use in terms of traditional purpose is for house building timber and firewood.

2.3.4 Grazing

Grazing is evident in most of the area particularly in Metakha, Gelling, Bjabcho and Getana gewog. However, people prefer to raise few productive animals rather than herds of local cattle that will greatly reduce pressure on forests and enhanced income of the people. Livestock diversity of GFD is not different from those occurring commonly in most of other Districts of Bhutan. Livestock Population by Types (Chukha Dzongkhag, 2019) is shown in Figure 9.

The fodder species that are most commonly used as fodder for the domestic animals are *Acer lavigatum*, *Amoora wallichii*, *Brassiopsis hainla*, *Castanopsis tribuloides*, *Eurya acuminata*, *Ficus auriculata*, *Ficus nerifolia*, *Ficus semicordata*, *Morus lavigatum* and many other species.

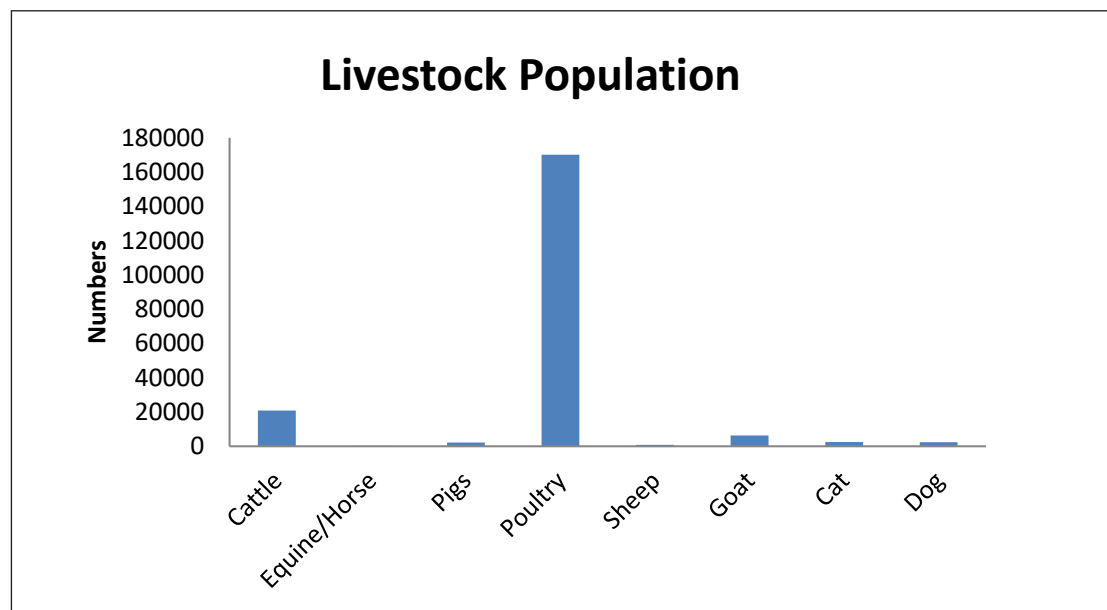


Figure 9: Types of livestock under GFD.

2.3.5 Forest fire

Forest fire is not a major problem in GFD as large extent of the area is covered by broadleaved forest and most of the areas remain moist under cloud forest. However, some incidences of forest fire are frequently occurring in the northern parts of GFD where there is conifer forest. The major area of concern in terms of fire although less compared to other dzongkhag is in Chapcha gewog where acres of conifer forests are damaged due to forest fire particularly in winter seasons.

2.3.6 Pest and diseases

There is no much history of report on pest and diseases apart from bark beetles infestation in conifer forest in Chapcha gewog area, affect of Champ defoliators in southern parts of GFD and teak shot bole in Samphelling and Darla gewog.

2.3.7 Non-Timber Forests Products

Non timber forest products (NTFP) are important resources to the people of GFD where people sell to make their living in addition to agriculture practices for cash income. The major species(Dorji et al., 2018) of NTFP found in GFD that are either used for domestic consumption or traded are as shown in Table 4.

Table 4: List of NTFP

Sl. No.	Species	Part used/Uses
NTFP used as Food		
1	<i>Cantharellus cibarius</i>	Entire plant
2	<i>Diplazium spp.</i>	Tender parts
3	<i>Elastotema lineolatum</i>	Entire part
4	<i>Girardinia diversifolia</i>	Bark
5	<i>Laportea terminalis</i>	Flower bud and young leaves
6	<i>Musa spp.</i>	Flower bud
7	<i>Plectocomia himalayana</i>	Young shoots and mature stem
8	<i>Dioscorea spp.</i>	Tuber
Medicinal Plants		
9	<i>Acorus calamus</i>	Root/Tuber
10	<i>Artemesia spp.</i>	Leaves and flower buds
11	<i>Astilbe rivularis</i>	Roots
12	<i>Cassia spp.</i>	Leaves
13	<i>Ficus semicordata</i>	Figs
14	<i>Rhus chinensis</i>	Fruit
15	<i>Rubia cordifolia</i>	All parts
16	<i>Rubus ellipticus</i>	Root
Cane and Bamboos		
17	<i>Calamus acanthopathus</i>	Young shoots and mature stems
18	<i>Plectocomia himalayana</i>	Young shoots and mature stems
19	<i>Cephalostychem spp.</i>	Young shoots and culms
20	<i>Chimnobambusa spp.</i>	Culms
21	<i>Bambusa nutans</i>	
Other plants used		
22	<i>Cinnamomum spp.</i>	Leaves
23	<i>Cupressus spp.</i>	Leaves and twigs
24	<i>Daphne spp.</i>	Bark

Sl. No.	Species	Part used/Uses
25	<i>Edgeworthia spp.</i>	Bark
26	<i>Piper spp.</i>	Fruits
27	<i>Thyasaenolaena latifolia</i>	Inflorescence
28	<i>Xanthoxylum spp.</i>	Fruits

2.4 Resource allocation

Forest resources are managed scientifically through establishment of various forest management regimes like Forest Management Unit, Local Forest Management Areas, Community Forest, Non-wood Forest Products Groups, Payment for Environmental Services, etc for allocation of forestry resources for commercial and rural use, and for providing ecosystem services

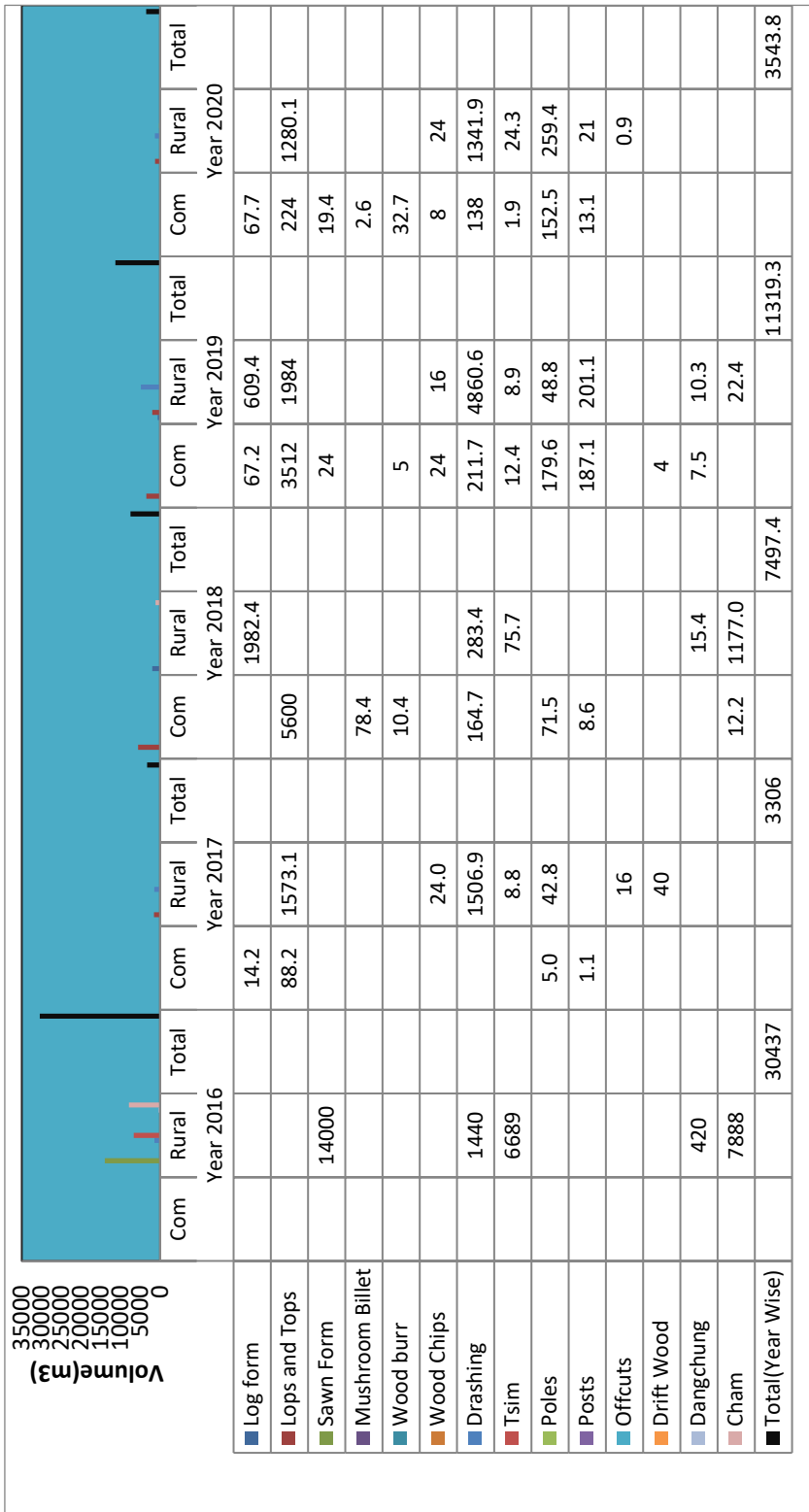
The resource allocation is done mostly through single tree selection system and patch cut system in Forest Management Units (Dorji et al., 2018).

2.4.1 Rural Timber and Commercial Timber allotment trends

Rural house building timber is allocated based on the eligibility as per Forest and Nature Conservation Rules and Regulations 2017 and amendments annually. Similarly, commercial timber is allotted to the people through Natural Resource Development Corporation Limited (NRDCL) and Association of Wood Based Industries(AWBI) as per the Timber distribution modality of the Department of Forest and Park Services.

The trend in the commercial and rural timber allocation within GFD for past five years is given in Table 5.

Table 5: Trend in commercial and rural timber allotment under GFD.



2.4.2 Non-Timber Forest Products (NTFP)

Non-timber forest product IS one important biological resource that is used by the people in different forms such as edible mushrooms, medicinal plants, wild vegetables, bamboos and canes among many others. NTFP's are allotted to the people by forming groups as well as to the individual where there is no groups formed based on the resource assessment. Table 6 shows the NTFP allotment over the past three years (2018 to 2020) by the GFD.

Table 6: NTFP allotted by GFD over past 3 years.

NTFP Product type	2018		2019		2020	
	Qty	Unit	Qty	Unit	Qty	Unit
<i>Calamus</i> sp.					4000	Number
Cane shoot (<i>Plectocomia himalayana</i>)	3650	Number	2960	Number	800	Truckload
Daphne bark	7105	Kg	4885	Kg	3480	Kg
<i>Juniperus</i> sp.	3	Truckload	10	Truckload	4	Truckload
Large Bamboo	3512	Number	3002	Numbers	1849	Number
Pine needle	4	Truckload	4	Truckload	1	Truckload
<i>Rubia cordifolia</i>	800	Kg	70	Kg	10	Kg
Small Bamboo (<i>Yushania</i> sp.)	50123	Bundle	7980	Number	20111	Numbers
<i>Thysanolaena latifolia</i> (Broom grass)	54	Bundle	40	Bundle		
Wildlings	255	Number				
Wood burrs			90	Number		
<i>Rhododendron lepidotum</i>					250	Numbers



Rufous necked hornbill
(*Aceros nipalensis*)

3. Methods of Biodiversity Assessment

The baseline biodiversity assessment was carried through both primary data (survey) and secondary data (literature review) assimilation. A detailed study plan was developed to guide the field activities (particularly for floristic study) and accomplish the Baseline Biodiversity Report in the span of over one year. The study was conducted for a period of 13 months (November 2020 to November 2021) in the sampled biodiversity monitoring grids with two grids within an interval of 500 masl along the elevation gradient of GFD.

3.1 Flora and Normalized Difference Vegetation Index

Flora Assessment Methods

The floral survey was conducted as per Biodiversity Monitoring and Social Survey Protocol of Bhutan, 2020 (DoFPS, 2020) in the sampled Biodiversity monitoring Grids under GFD. Biodiversity monitoring grids are the 4x4 km grid cell spread across the country and in GFD the survey was conducted in 17 sampled grids. The grids were systematically sampled along the elevation gradient with two grids selected over every 500 masl elevation range.

A total of 17 plots were laid along the altitudinal gradient as shown in Figure 10. A plot size of 20x20 m for trees, 2x2 m for Shrubs, and herbs were laid to document the flora in sample grids by entering about 200 m into the grid from its boundary. Orchids, bamboos and weed are recorded from the opportunistic surveys and from that of literature review.

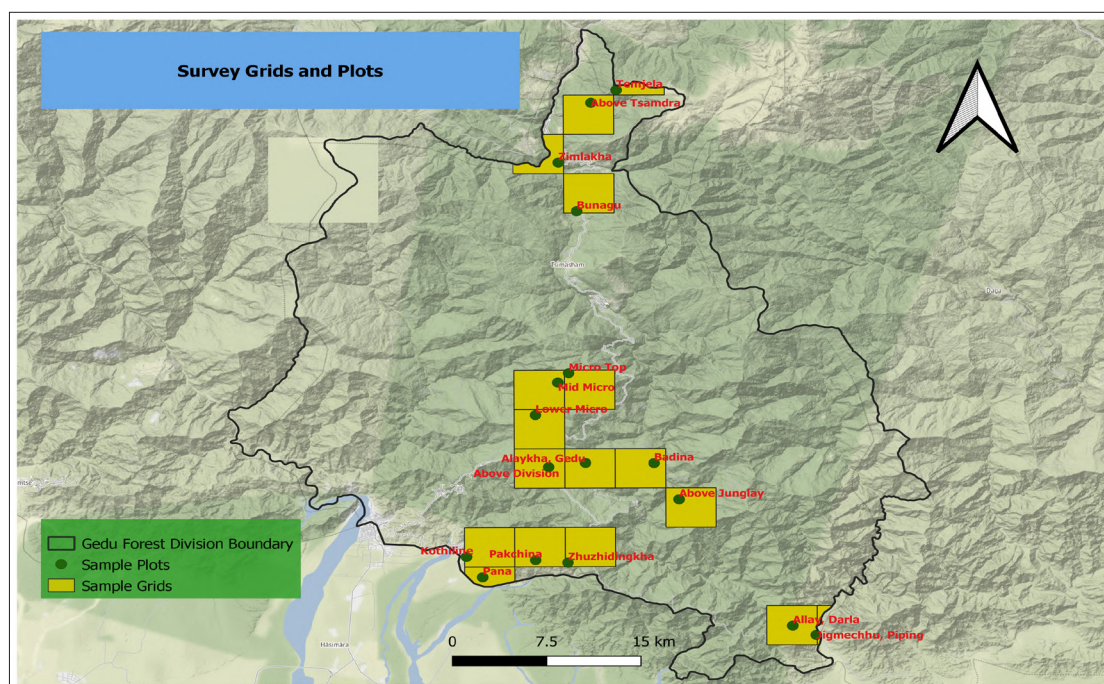


Figure 10: Map showing Vegetation Survey Sample Plots.

Normalized Difference Vegetation index

“Normalized Difference Vegetation Index (NDVI) quantifies vegetation by measuring the difference between Near-Infrared (which vegetation strongly reflects) and red light (Which vegetation absorbs)”. The NDVI ranges from -1 to +1 and it is a standard way to measure healthy vegetation. When there is higher NDVI value, there is healthier vegetation and when there is lower value, there is less or no vegetation cover. Average annual NDVI of two decades (2000 to 2020) as per the Landsat Image (30m) for Gedu Forest Division with trendline (Figure 11). Accordingly, the graph shows that there is increase in vegetation cover under GFD over the past years on an average.

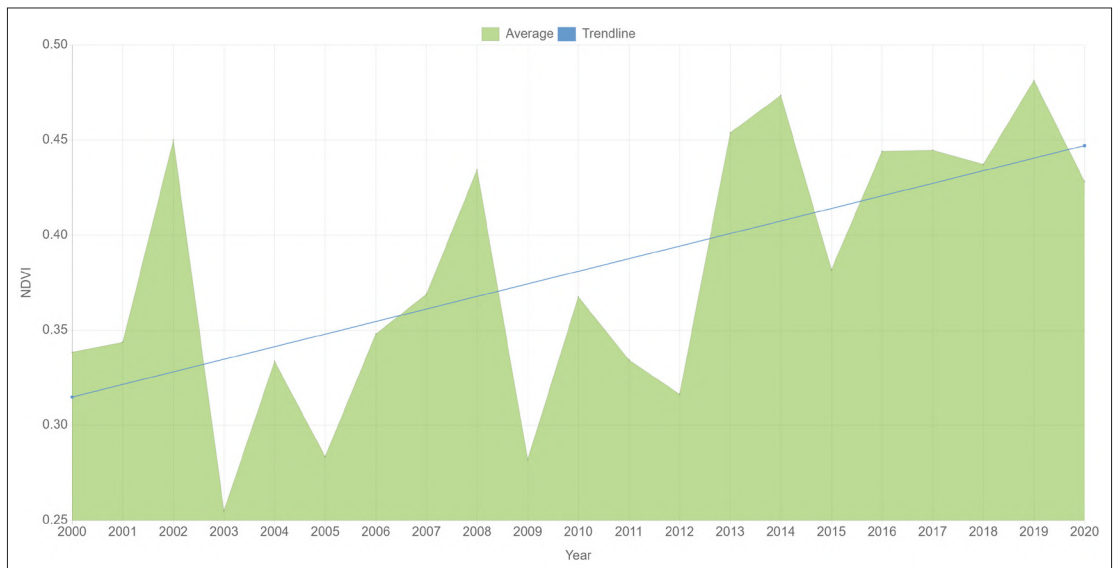


Figure 11: Graph showing NDVI of GFD(FAO, 2020).

3.2 Avifauna

Bhutan has a rich bird species with about 747 birds reported in the country which includes 18 endemic bird species of eastern Himalayas (Birdlife International, 2017). Avifauna diversity in Bhutan is attributed to its wide range of elevation from as low as 80 masl to 7700 masl (DoFPS, 2020).

The avifauna data assimilation is done mostly through call records, observation in field and pictorial evidences by the staff of GFD and birders of Bhutan birdlife society.

3.3 Mammals

The mammals list for this report are obtained from the past National Tiger survey, (2014-2015) National Elephant survey (2016) and Red Panda survey (2021), as Camera trapping was not conducted for this particular study. The images from earlier surveys were used to report the number of mammals species recorded under GFD. However, the record of bat species is based on the literature review as no separate survey was conducted to document bat species specifically.

3.4 Fishes

The baseline data for fish were compiled from the reports of Capture Fishery Management Plans of Drukdingsa and Sarphu Village (NRDCR&LF, 2016) and also from the aquatic survey report for Amocchu Township Project by Bhutan Ecolab Services (BES, 2020).

3.5 Butterflies

Butterflies and moths are widely distributed and found in diverse habitats such as grasslands, agricultural fields, conifer forests, broadleaved forests and scrubland. The survey was conducted with transects along the highways and farm roads. The survey plot is laid every 300m length of transect and pictures of the butterflies were taken for documentation and identification. The pictures were then identified through literature search and with help of expert knowledge. The survey was conducted jointly by Ugyen Wangchuk Institute for Conservation and Environmental Research and Gedu Forest Division staff.

3.6 Herpetofauna

The assessment on the herpetofauna under GFD was carried out through the literature review, documentation of species opportunistically during other field works and during the human-snake conflicts.

3.7 Human Wildlife Conflict

Humans have lived with nature and are intrinsically linked with nature. Human and wildlife lived together in conflict or coexistence and are bound to cause both negative and positive impacts. However it is a problem when there are negative impacts due to interaction of human and wild animals. The human-wildlife conflict occurs when human and wildlife compete for food and space whereby their behaviour affects negatively to both (Karanth and Kudalkar, 2017). The loss of life, property, livestock and agricultural crops to wildlife is of great loss to the communities and often lead to retaliatory killings thereby leading to loss of biodiversity (Sharma et al., 2020). Human-wildlife conflict is widespread across world and so is the case in Bhutan and its twenty dzogkhag. Similarly human-wildlife conflicts are reported annually within Gedu Forest Division as well.

To understand the Human-Wildlife conflicts under Gedu Forest Division, the past three years Human-Wildlife conflict area point data (2018-2020) were gathered and analyzed for Human-Wildlife Hotspot Mapping. The each point data of Crop depredation and Livestock depredation were assigned randomly with magnitude range of 1-10. The predictor variables such as topography (Digital Elevation Model), climate (precipitation and temperature, land use and anthropogenic factors were used. The raster data of predictor variables along with point data were analysed in MaxEnt software and predicted the Human-Wildlife hotspots under GFD.



Cattle herd
Bongo Gewog

4. Biological Diversity in GFD (Results from the assessment)

The baseline biodiversity assessment result is based on designed survey, Literature review and through opportunistic survey data during other field works. The Table below shows the summary of total species recorded under Gedu Forest Division.

Table 7: Number of species under different Taxa/Floral Live forms.

Sl. No.	Taxa/Floral Live Form	Number of Species
1	Trees	175
2	Shrubs	109
3	Herbs	46
4	Bamboos	8
5	Weeds	57
6	Mammals	28(excluding bats)
7	Avifauna	477
8	Orchids	116
9	Butterflies	162
10	Fish	43
11	Crabs (Crustaceans)	4
12	Bats	10
13	Herpetofauna (Reptiles and Amphibians)	11

4.1. Flora

The list of trees, shrubs, herbs and orchids are reported based on the survey conducted in the sampled grids and sampled plots under Gedu Forest Division. There are 176 species of trees, 109 species or shrubs, 46 species of herbs and 116 species of orchid. However the species of orchids are recorded opportunisticly and through literature review. The checklist of trees, shrubs, herbs , orchids, Bamboos and Weeds are as presented in Appendix I, Appendix II, Appendix III, Appendix IV, Appendix V and Appendix VI respectively.

4.2 Avifauna

Gedu Forest Division has 477 species of birds recorded, which is compiled from Birdlife society of Bhutan and through opportunistic surveys during various field work conducted by the Divisions staff. However, there is no photographic record for all these recorded species due to lack of database management system previously. The list of bird species observed and/or heard are listed in Appendix VII.

Threatened species birds as per International Union for Conservation of Nature (IUCN) that are found in GFD are *Apus acuticaudata* (Vulnerable) and *Ardea insignis* (Critically endangered).

4.3 Mammals

Mammals

The list of mammal species obtained from the camera trap images of various national survey like National Tiger Survey, National Elephant survey and Red panda survey for GFD is as shown in Appendix VIII. There are 28 species of mammals excluding bat species in GFD. Threatened species as per IUCN red list are *Ailurus fulgens*, *capricornis sumatraensis*, *Cuon alpinus*, *Elephas maximus*, *Neofelis nebulosa*, *Panthera pardus*, *Panthera tigris* and *Ursus thibetanus*.

Bats

Bats are mammal from the order Chiroptera and the true fliers among the mammals with its forelimb adapted as wings. There are almost 1411 species of bats in the world and are grouped under fruit bats and insectivorous bats. Among, 124 species of bats reported from south Asia, 65 species are expected within Bhutan, which accounts to almost 33% of the mammalian species in Bhutan(Srinivasulu et al., 2010).

The list compiled through literature review of bats under GFD suggest that there is 10 recorded species of bats and Gedu Forest Division (same jurisdiction with Chukha District) is the hotspot for bats species (Tshering et al., 2020). The list of bat species reported from the past studies is as shown in Appendix IX.

4.4 Fishes

There are 43 species of fishes recorded from Wangchu, Amochhu and Melumchhu (Dungna) based on (BES, 2020; NRDCR&LF, 2016). The list of fishes found in GFD is as shown in Appendix X.

4.5 Butterflies

Out of 760 species of Butterflies in Bhutan(Wangchuk et al., 2021), there are 162 species of Butterflies recorded under Gedu Forest Division through opportunistic survey with pictorial evidence by team from UWICER and Gedu Forest Division. The list of butterflies recorded is as show in Appendix XI.

4.6 Herpetofauna

The checklist of herpetofauna under GFD is very poor at the moment and needs further documentation. Currently, the checklist shows only about 28 species and 4 species of crustaceans as shown in Appendix XII.

4.7 Human-Wildlife Conflict

The results of the prediction of the Human-Wildlife conflict based on the point data of Human-wildlife conflict area and predictor variables are as shown in figures 11, 12 7 13. The hot spot for crop depredation in spread across the division but more concentrated in the southern gewog like samphelling. However, livestock depredation possibility is more in higher elevations which could be mainly due to free ranging cattle herding practices in Chapcha, Getana, Bjabcho, Gelling, Darla and Bongo.

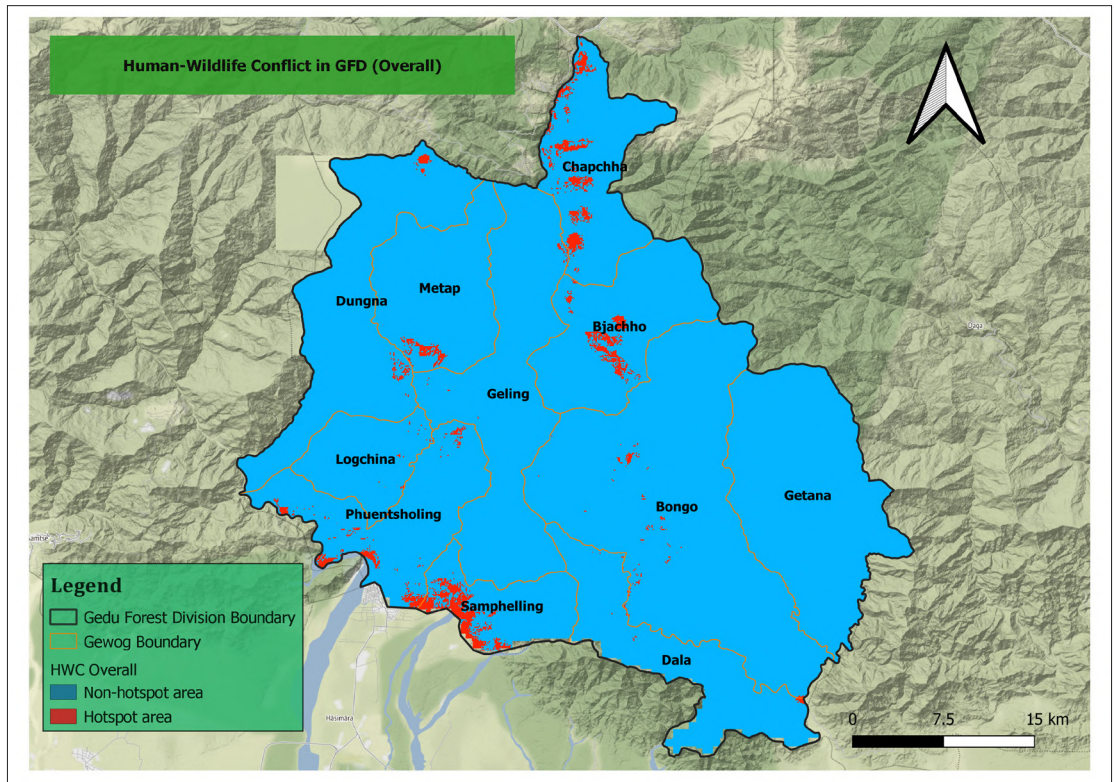


Figure 12: Predicted HWC hotspot areas.

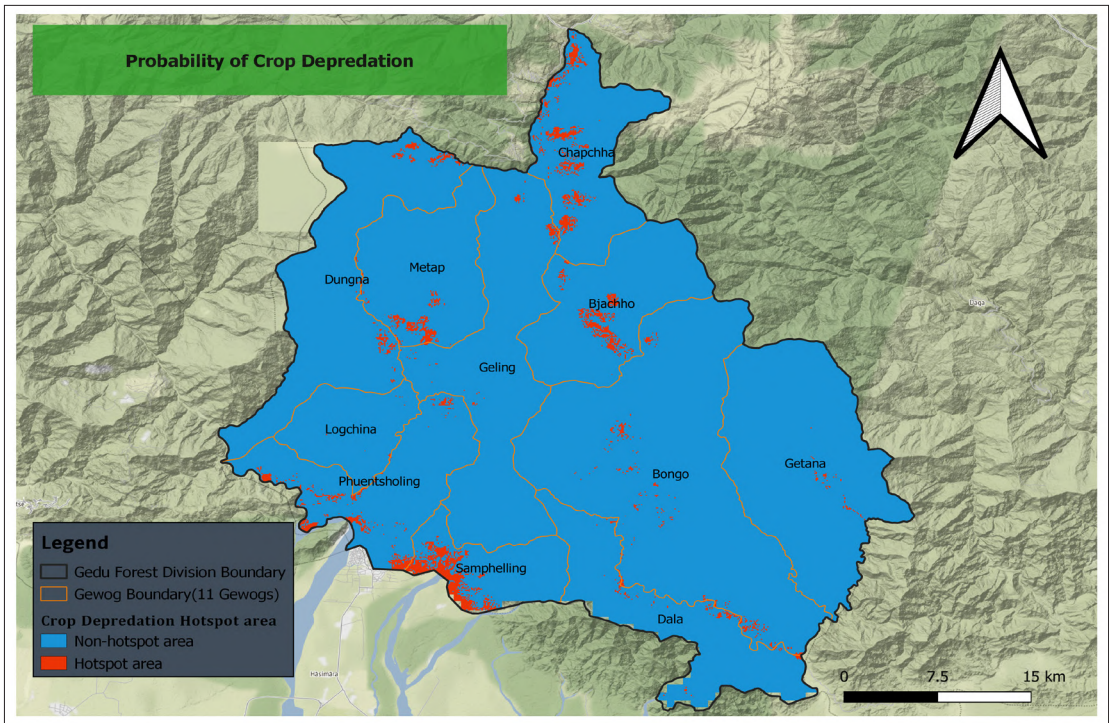


Figure 13: Probability of crop depredation.

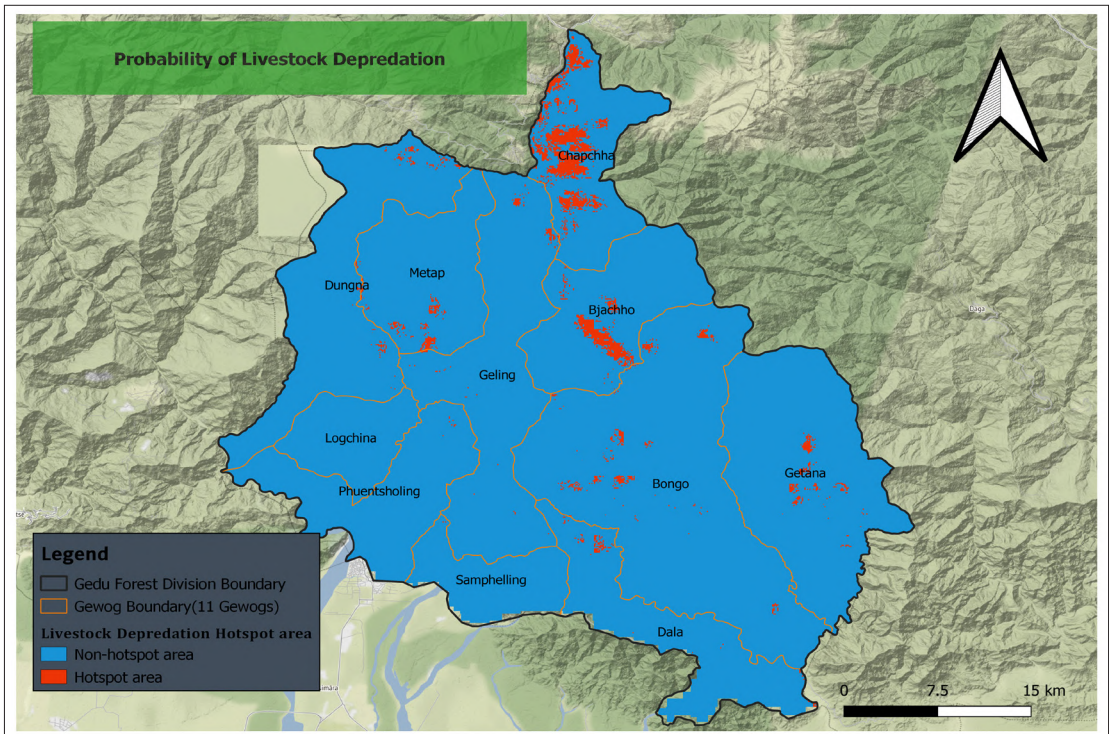


Figure 14: Probability of livestock depredation.

5. Threats to the Biodiversity

The list of possible major threats but not limited to under GFD to the biodiversity conservation are as follows:

- i. Land use Conversion
- ii. Forest Fire
- iii. Timber and NWFP harvesting, and poaching
- iv. Unsustainable agriculture practices
- v. Human Wildlife conflict
- vi. Invasive species
- vii. Pollution
- viii. Climate change
- ix. Population

7. List of Research activities conducted in GFD.

Sl. No.	Title	Author(s)	Year published
1	Grazing Management in Broadleaved Forest	(Norbu, 2002)	2002
2	Freshwater Brachyura Crab Diversity Assessment in Chukha Dzongkhag (Bsc. Thesis)	(Nagphel, 2015)	2015
3	Assessment of Amphibian Diversity in Three Gewogs of Chukha Dzongkhag(Bsc. Thesis)	(Tshering, 2016)	2016
4	First record of the Asiatic Brush-tailed Porcupine <i>Atherurus macrourus</i> Linnaeus, 1758 (Mammalia: Rodentia: Hystricidae) from western Bhutan	(Dhendup and Dorji, 2017)	2017
5	Assessment of Land Use/Cover Change and Urban Expansion Using Remote Sensing and GIS: A Case Study in Phuentsholing Municipality, Chukha, Bhutan	(Chimi et al., 2017)	2017
6	Camera-trap records of small carnivores from Gedu Territorial Forest Division, Bhutan	(Dhendup and Dorji, 2018a)	2018
7	Occurrence of six felid species outside protected areas in Bhutan	(Dhendup and Dorji, 2018b)	2018
8	Change in forest structure and diversity after the human disturbances in the cool montane evergreen broad-leaved forest	(Wangda et al., 2009)	2009

Sl. No.	Title	Author(s)	Year published
9	Bat (Mammalia: Chiroptera) diversity, dominance, and richness in the south western region of Bhutan with three new records for the country	(Tshering et al., 2020)	2020
10	The first record of Medog Gliding Frog <i>Rhacophorus translineatus</i> Wu, 1977 (Anura: Rhacophoridae) from Chhukha District, Bhutan	(Lhendup and Koirala, 2021)	2021

7. Conclusions

7.1 Conclusion

The baseline biodiversity report is prepared through survey in sampled biodiversity monitoring grids of GFD along the altitudinal gradient. Opportunistic survey and literature review have documented numerous species of flora and fauna under different taxa that are recorded within GFD. However, the species reported in the checklist are under reported especially the floral species due to survey in only 17 grids out of 113 biodiversity monitoring grids under GFD.

Human-wildlife conflicts, various site factors, both permanent and variable site factors that contribute to the biodiversity conservation and various threat that affects the biodiversity and are likely to affect in future were also looked into in this report. The probability of human-wildlife conflicts hotspot areas are also analyzed through the point data of the human-wildlife conflict occurrence data. Therefore, this report will be of great foundations for the listing of flora and fauna under Gedu Forest Division.

7.2 Management recommendations

- i. The species of flora and fauna, particularly flora needs further attention to document the diverse species found in GFD and with pictorial/specimen evidences for both flora and fauna.
- ii. The critical habitats for the endangered species needs to be identified, protected and conserved for the long term survival of the species.
- iii. The Human-Wildlife conflict areas as per the hotspot mapping needs to be intervened and provide mitigation measures for harmonious co-existence of the human and wild animals. However, prioritization should be based on more data collection of human-wildlife conflicts over the longer duration and more all the species, as mostly carnivore species records are only maintained or reported with the hope of compensation.
- iv. The threats to the biodiversity need to be addressed through strengthened SMART patrols.



Wedge-tailed green pigeon
(*Treron sphenurus*)
PC: Sangay Thinley (EDO)

Appendix I: Checklist of Trees of GFD

Sl. No.	Scientific Name	Common Name/ Local Name	Family
1	<i>Abies densa</i>	Dhungshing (Dz)	Pinaceae
2	<i>Acacia catechu (Senegalia catechu)</i>	Khair (lh)	Fabaceae
3	<i>Acer campbellii</i>	Chalam(Dz)	Sapindaceae
4	<i>Acer oblongum</i>		Sapindaceae
5	<i>Acrocarpus fraxinifolius</i>		Fabaceae
6	<i>Acronychia pedunculata</i>		Rutaceae
7	<i>Aglaia spectabilis</i>		Meliaceae
8	<i>Ailanthus integrifolia</i>	Gokul(lh)	Simaroubaceae
9	<i>Alangium chinense</i>	Luma shing(dz)	Cornaceae
10	<i>Albizia gamblei (Albizia lucidior)</i>		Fabaceae
11	<i>Albizia lebbeck (Albizia kalkora)</i>	Kalosiris(lh)	Fabaceae
12	<i>Albizia procera</i>		Fabaceae
13	<i>Alcimandra cathcartii (Magnolia cathcartii)</i>	Titichamp (lh)	Magnoliaceae
14	<i>Alnus nepalensis</i>	Utis(lh) Gamashing (Dz)	Betulaceae
15	<i>Aphanamixis polystachya</i>	Wagorey doroshing (ts)	Meliaceae
16	<i>Aporosa octandra</i>		Phyllanthaceae
17	<i>Bauhinia purpurea</i>	Wabilamshing(ts) Tankey (lh)	Fabaceae
18	<i>Beilschmiedia dalzellii</i>	Tarshing(dz)	Lauraceae
19	<i>Beilschmiedia gammieana (Beilschmiedia lucidula)</i>	Tarshing(Dz)	Lauraceae
20	<i>Benthamidia capitata (Cornus capitata)</i>	Phetshey(Dz)	Cornaceae
21	<i>Betula alnoides</i>	Tab(Dz)	Betulaceae
22	<i>Betula utilis</i>	Latap(Dz)	Betulaceae
23	<i>Bischofia javanica</i>	Kanjai	Phyllanthaceae
24	<i>Bombax ceiba</i>	Simal (lh)	Malvaceae
25	<i>Brassiopsis hainla</i>	Chuletro	Araliaceae
26	<i>Buddleja colvilei</i>		Scrophulariaceae
27	<i>Canthium glabrum (Psydrax glabra)</i>		Rubiaceae
28	<i>Carpinus viminea</i>	Rutoshing(dz)	Betulaceae

Sl. No.	Scientific Name	Common Name/ Local Name	Family
29	<i>Casearia graveolens</i>		Salicaceae
30	<i>Casearia sp.</i>		Salicaceae
31	<i>Castanopsis hystrix (Castanopsis purpurella)</i>	Katus(lh)	Fagaceae
32	<i>Castanopsis indica</i>	Aule Katus (lh)	Fagaceae
33	<i>Castanopsis tribuloides</i>	Musre Katus(lh)	Fagaceae
34	<i>Celtis australis (Celtis adolfriderici)</i>	Khari(lh)	Cannabaceae
35	<i>Celtis tetrandia (Oreocnide integrifolia)</i>		Urticaceae
36	<i>Cinnamomum bejolghota</i>	Shingkawla(lh)	Lauraceae
37	<i>Cinnamomum glaucescens</i>	Malagiri (lh)	Lauraceae
38	<i>Cinnamomum impressinervium</i>	Korsane(Lh)	Lauraceae
39	<i>Cinnamomum javanicum</i>	Dalchini(lh)	Lauraceae
40	<i>Cinnamomum tamala</i>	Tejpat (lh)	Lauraceae
41	<i>Clerodendrum bracteatum</i>		Lamiaceae
42	<i>Clerodendrum colebrookeanum</i>		Lamiaceae
43	<i>Cordia obliqua</i>	Yangshing (ts)	Cordiaceae
44	<i>Corylopsis himalayana</i>		Hamamelidaceae
45	<i>Crateva religiosa</i>		Capparaceae
46	<i>Croton caudatus</i>		Euphorbiaceae
47	<i>Croton himalaicus (Croton tiglium)</i>	Lapse bis (lh)	Euphorbiaceae
48	<i>Cryptocarya sp.</i>		Lauraceae
49	<i>Daphniphyllum himalense</i>	Chandan(lh)	Daphniphyllaceae
50	<i>Dendrocnide sinuata</i>		Urticaceae
51	<i>Dillenia indica</i>	Panchphale (lh)	Dilleniaceae
52	<i>Diploknema butyracea</i>	Yeeka shing (Dz) Penshing (ts)	Sapotaceae
53	<i>Drypetes indica</i>		Putranjivaceae
54	<i>Duabanga grandiflora</i>	Patangshing (Dz) Lampatey(lh)	Lythraceae
55	<i>Dysoxylum excelsum</i>		Meliaceae
56	<i>Elaeocarpus sikkimensis</i>	Bhadarase(lh)	Elaeocarpaceae
57	<i>Engelhardtia spicata</i>	Mauwa(Lh)	Juglandaceae

Sl. No.	Scientific Name	Common Name/ Local Name	Family
58	<i>Enkianthus deflexus</i>		Ericaceae
59	<i>Erythrina arborescens</i>	Chatsheyshing(dz) Kharshing (ts)	Fabaceae
60	<i>Eurya acuminata</i>	Gingani(lh)	Pentaphylacaceae
61	<i>Eurya cavinervis</i>	Gingani (lh)	Pentaphylacaceae
62	<i>Evodia fraxinifolia</i>	Khanakpa(lh)	Rutaceae
63	<i>Exbucklandia populnea</i>	Pipli(lh) Chenjushing (Dz) Lemshing(ts)	Hamamelidaceae
64	<i>Ficus auriculata</i>	Bar chongma (ts) Baku shing (Dz)	Moraceae
65	<i>Ficus cyrtophylla</i>		Moraceae
66	<i>Ficus glaberrima</i>	Chongmashing(ts)	Moraceae
67	<i>Ficus neriifolia</i>	Dudhila (lh)	Moraceae
68	<i>Ficus semicordata</i>	Barchongma(ts) K halhw(lh)	Moraceae
69	<i>Firmiana colorata</i>		Malvaceae
70	<i>Garuga pinnata</i>	Dabdabe(lh)	Burseraceae
71	<i>Glochidion sp.</i>	Dur Lampate	Burseraceae
72	<i>Gynocardia odorata</i>	Abidorshing (ts) Lentem (Dz)	Achariaceae
73	<i>Helicia nilagirica</i>	Photorshing (ts)	Proteaceae
74	<i>Heteropanax fragrans</i>		Araliaceae
75	<i>Hovenia dulcis</i>	Bangey(lh)	Rhamnaceae
76	<i>Ilex fragilis</i>		Aquifoliaceae
77	<i>Illicium griffithii</i>	Khaliatseenang (ts) Dhom leeshi (Dz)	Schisandraceae
78	<i>Jambosa formosa (Syzygium formosum)</i>	Ambqkey(lh)	Myrtaceae
79	<i>Juniperus recurva</i>	Shoop shing (Dz)	Cupressaceae
80	<i>Kydia glabrescens</i>		Malvaceae
81	<i>Lagerstroemia parviflora</i>	Dongka shing(Dz)	Lythraceae
82	<i>larix griffithiana</i>	Zashing (Dz)	Pinaceae
83	<i>Lithocarpus elegans</i>	Thokthola (ts) Askaula (lh)	Fagaceae
84	<i>Lithocarpus pachyphyllus</i>	Sokey(dz)	Fagaceae
85	<i>Litsea elongata</i>	Pialay (lh)	Lauraceae

Sl. No.	Scientific Name	Common Name/ Local Name	Family
86	<i>Litsea monopetala</i>	Kutmara (lh)	Lauraceae
87	<i>Lyonia ovalifolia</i>	Zentu shing (Dz) Angeri (Lh)	Ericaceae
88	<i>Macaranga denticulata</i>	Malata(Lh)	Euphorbiaceae
89	<i>Macaranga sp.</i>	Malata(lh)	Euphorbiaceae
90	<i>Macropanax dispermus</i>	Chinde (lh)	Araliaceae
91	<i>Maesa chisia</i>	Billowni(lh)	Primulaceae
92	<i>Magnolia campbellii</i>	Gogechamp (lh)	Magnoliaceae
93	<i>Michelia doltsopa (Magnolia doltsopa)</i>	Ranichamp (lh)	Magnoliaceae
94	<i>Micromelum integerrimum</i>		Rutaceae
95	<i>Microtropis discolor</i>		Celastraceae
96	<i>Morus laevigata (Synonym of Morus macroura)</i>	Kimbo(lh)	Moraceae
97	<i>Morus macroura</i>	Tshendey(dz)	Moraceae
98	<i>Murraya Koenigii</i>	Curry pata	Rutaceae
99	<i>Murraya paniculata</i>		Rutaceae
100	<i>Neolamarckia cadamba</i>		Rubiaceae
101	<i>Nyssa javanica</i>	Lekchillowni(lh)	Nyssaceae
102	<i>Osmanthus sp.</i>		Oleaceae
103	<i>Ostodes paniculata</i>	Bepari(lh)	Euphorbiaceae
104	<i>Pandanus nepalensis (Pandanus furcatus)</i>		Pandanaceae
105	<i>Pentapanax racemosus (Aralia gigantea)</i>	Chinde(lh)	Araliaceae
106	<i>Persea clarkeana (Machilus clarkeana)</i>	Kawla(lh)	Lauraceae
107	<i>Persea fructifera (Machilus edulis)</i>	Golee (ts)	Lauraceae
108	<i>Phoebe lanceolata</i>	Jahakrikath (lh)	Lauraceae
109	<i>Phyllanthus emblica</i>	Churoo shing (Dz) Amla(lh)	Phyllanthaceae
110	<i>Picea spinulosa</i>	Bashi(Dz)	Pinaceae
111	<i>Pinus wallichiana</i>	Tongphu (Dz)	Pinaceae
112	<i>Polyalthia simiarum</i>		Annonaceae
113	<i>Populus ciliata</i>	Kasing(Dz)	Salicaceae
114	<i>Populus rotundifolia</i>	Kashing(Dz)	Salicaceae

Sl. No.	Scientific Name	Common Name/ Local Name	Family
115	<i>Premna bracteata</i>		Lamiaceae
116	<i>Prunus sp.</i>		Rosaceae
117	<i>Pterospermum acerifolium</i>	Hatipaile(lh) Dha shom (Dz)	Malvaceae
118	<i>Pterygota alata</i>	Badam (Dz)	Malvaceae
119	<i>Pyralia edulis</i>	Badarey(lh)	Cervantesiaceae
120	<i>Pyrus pashia</i>	Naspati(lh) Letong (ts)	Rosaceae
121	<i>Quercus glauca</i>	Thongpashing(ts)	Fagaceae
122	<i>Quercus griffithii</i>	Sisi shing (Dz) Bainang shing (ts)	Fagaceae
123	<i>Quercus lamellosa</i>	Bangsher(lh)	Fagaceae
124	<i>Quercus lanata</i>	Ghumshing(Dz)	Fagaceae
125	<i>Quercus semecarpifolia</i>	Bjishing(Dz) Betshinang shing (ts)	Fagaceae
126	<i>Radermachera sinica</i>	Tsamshing(ts)	Bignoniaceae
127	<i>Rhododendron arboreum</i>	Eto meto(dz)	Ericaceae
128	<i>Rhododendron falconeri</i>		Ericaceae
129	<i>Rhododendron hodgsonii</i>	Eto(dz)	Ericaceae
130	<i>Rhododendron kendrickii</i>		Ericaceae
131	<i>Rhododendron kesangiae</i>	Eto(dz)	Ericaceae
132	<i>Rhododendron arboreum</i>		Ericaceae
133	<i>Rhododendron barbatum</i>		Ericaceae
134	<i>Rhododendron grande</i>		Ericaceae
135	<i>Rhododendron hodgsonii</i>		Ericaceae
136	<i>Rhus chinensis</i>	Chokashing(ts)	Anacardiaceae
137	<i>Rhus hookeri (Toxicodendron hookeri)</i>	Balayo(Lh)	Anacardiaceae
138	<i>Rhus succedanea</i>	Seyshing(dz)	Anacardiaceae
139	<i>Salix daltoniana</i>	Changma nab(Ts)	Salicaceae
140	<i>Sapindus rarak</i>	Nakupaney(dz)	Sapindaceae
141	<i>Sapium insigne (Falconeria insignis)</i>		Euphorbiaceae
142	<i>Saurauia napaulensis</i>	Mingdormashing(ts)	Actinidiaceae
143	<i>Schima wallichii</i>	Payam shing(Dz)	Theaceae

Sl. No.	Scientific Name	Common Name/ Local Name	Family
144	<i>Shorea robusta</i>		Dipterocarpaceae
145	<i>Sorbus hedlundii</i> (<i>Griffitharia hedlundii</i>)		Amygdaloideae
146	<i>Spondias pinnata</i>		Anacardiaceae
147	<i>Sterculia hamiltonii</i>	Zalaphrangshing (ts)	Malvaceae
148	<i>Stereospermum personatum</i> (<i>Stereospermum colais</i>)	Parari(lh)	Bignoniaceae
149	<i>Swida oblonga</i> (<i>Cornus oblonga</i>)	Zhumling shing(Ts)	Cornaceae
150	<i>Symplocos dryophila</i>		Symplocaceae
151	<i>Symplocos glomerata</i>	Domzim(dz)	Symplocaceae
152	<i>Symplocos lucida</i>		Symplocaceae
153	<i>Symplocos paniculata</i>		Symplocaceae
154	<i>Symplocos ramosissima</i>	Kharani(lh)	Symplocaceae
155	<i>Syzygium cumini</i>	Jamuna(Lh)	Myrtaceae
156	<i>Syzygium formosum</i>		Myrtaceae
157	<i>Syzygium ramosissimum</i>		Myrtaceae
158	<i>Taxus baccata</i>		Taxaceae
159	<i>Tectona grandis</i>		Lamiaceae
160	<i>Terminalia bellirica</i>		Combretaceae
161	<i>Terminalia chebula</i>		Combretaceae
162	<i>Terminalia myriocarpa</i>	Panisaj(lh)	Combretaceae
163	<i>Tetrameles nudiflora</i>	Maina(lh)	Tetramelaceae
164	<i>Toona ciliata</i>	Tooni(lh)	Meliaceae
165	<i>Trema politoria</i>		Cannabaceae
166	<i>Tsuga dumosa</i>	Seyshing (dz)	Pinaceae
167	<i>Turpinia pomifera</i> (<i>Staphylea pomifera</i>)	Thali(lh)	Staphyleaceae
168	<i>Vernonia volkameriifolia</i> (<i>Monosis volkameriifolia</i>)		Asteraceae
169	<i>Viburnum cylindricum</i>		Adoxaceae
170	<i>Viburnum erubescens</i>	Asare(lh)	Adoxaceae
171	<i>Viburnum nervosum</i>		Adoxaceae
172	<i>Walsura tubulata</i>		Meliaceae
173	<i>Wightia speciosissima</i>		Wightiaceae

Sl. No.	Scientific Name	Common Name/ Local Name	Family
174	<i>Wrightia arborea</i>		Apocynaceae
175	<i>Zanthoxylum myriacanthum</i>		Rutaceae

Appendix II: Checklist of Shrubs of GFD

Sl. No.	Scientific Name	Common Name	Family
1	<i>Aconogonon molle</i>	Chikom(ts)	Polygonaceae
2	<i>Ardisia crispa</i>		Primulaceae
3	<i>Ardisia macrcarpa</i>	Damai phal(lh)	Primulaceae
4	<i>Baliospermum sp.</i>		Euphorbiaceae
5	<i>Benthamidia capitata</i>	Phetsey (Dz)	Cornaceae
6	<i>Berberis asiatica</i>	Keepi tsang(Dz)	Berberidaceae
7	<i>Blumea balsamifera</i>		Asteraceae
8	<i>Boehmeria sp.</i>		Urticaceae
9	<i>Caesalpinia cucullata</i>		Fabaceae
10	<i>Caesalpinia decapetala</i>	Tstsetsang(dz)	Fabaceae
11	<i>Campylotropis speciosa</i>	Washing(Dz)	Fabaceae
12	<i>Canthium glabrum</i>		Rubiaceae
13	<i>Ceratostigma griffithii</i>		Plumbaginaceae
14	<i>Clerodendrum bracteatum</i>		Lamiaceae
15	<i>Clerodendrum colebrookeanum</i>		Lamiaceae
16	<i>Clerodendrum viscosum</i>		Lamiaceae
17	<i>Clethra delavayi</i>		Clethraceae
18	<i>Colquhounia coccinea</i>		Lamiaceae
19	<i>Cotoneaster acuminatus</i>		Rosaceae
20	<i>Cotoneaster microphyllus</i>		Rosaceae
21	<i>Croton bonplandianus</i>		Rosaceae
22	<i>Croton caudatus</i>		Rosaceae
23	<i>Croton roxburghii</i>		Rosaceae
24	<i>Daphne bholua</i>		Thymelaeaceae
25	<i>Daphne involucrata</i>		Thymelaeaceae
26	<i>Daphne sureil</i>		Thymelaeaceae

Sl. No.	Scientific Name	Common Name	Family
27	<i>Debregeasia longifolia</i>		Urticaceae
28	<i>Dendrocnide sinuata</i>		Urticaceae
29	<i>Desmodium gangeticum</i>		Fabaceae
30	<i>Desmodium trifolium</i>		Fabaceae
31	<i>Dichroa febrifuga</i>		Hydrangeaceae
32	<i>Edgeworthia gardneri</i>		Thymelaeaceae
33	<i>Elaeagnus parvifolia</i>	Ju(Dz)	Elaeagnaceae
34	<i>Elsholtzia fruticosa</i>		Elaeagnaceae
35	<i>Embelia vestita</i>		Primulaceae
36	<i>Eurya acuminata</i>	Gingani(lh)	Theaceae
37	<i>Flemengia macrophylla</i>	Batwasi(lh)	Fabaceae
38	<i>Gaultheria fragrantissima</i>		Ericaceae
39	<i>Glochidion khasicum</i>		Ericaceae
40	<i>Glycosmis pentaphylla</i>		Rutaceae
41	<i>Gomphostemma parviflorum</i>		Rutaceae
42	<i>Holmskioldia sanguinea</i>		Lamiaceae
43	<i>Hydrangea spp.</i>		Hydrangeaceae
44	<i>Ilex crenata</i>		Aquifoliaceae
45	<i>Illicium griffithii</i>	Dom leschi(Dz)	Schisandraceae
46	<i>Indigofera dosua</i>	Kumchingma(Ts)	Fabaceae
47	<i>Leea asiatica</i>		Vitaceae
48	<i>Leptodermis stapfiana</i>		Rubiaceae
49	<i>Leycesteria gracilis</i>		Caprifoliaceae
50	<i>Ligustrum compactum</i>		Oleaceae
51	<i>Lyonia ovalifolia</i>		Ericaceae
52	<i>Maesa chisia</i>	Khuberba shing(Ts)	Primulaceae
53	<i>Maesa indica</i>		Primulaceae
54	<i>Melastoma normale</i>		Melastomataceae
55	<i>Mimosa himalayan</i>		Fabaceae
56	<i>Murraya koenigii</i>		Rutaceae
57	<i>Murraya paniculata</i>		Rutaceae
58	<i>Mussaenda roxburghii</i>	Dhobi kat(lh)	Rubiaceae
59	<i>Myrsine semiserrata</i>		Primulaceae

Sl. No.	Scientific Name	Common Name	Family
60	<i>Oreocnide rubescens</i>		Urticaceae
61	<i>Osbeckia spp.</i>		Melastomataceae
62	<i>Oxyspora paniculata</i>		Melastomataceae
63	<i>Parthenocissus semicordata</i>		Vitaceae
64	<i>Phlogacanthus thyrsoformis</i>		Acanthaceae
65	<i>Pilea hookeriana</i>		Urticaceae
66	<i>Pilea pumila</i>		Urticaceae
67	<i>Piper longum</i>		Piperaceae
68	<i>Piper pedicellatum</i>	Pipla (lh)	Piperaceae
69	<i>Polygala arillata</i>		Polygalaceae
70	<i>Piptanthus nepalensis</i>		Fabaceae
71	<i>Pogostemon benghalensis</i>		Lamiaceae
72	<i>Rhododendron arboreum subsp. delavayi</i>	Eto(Dz)	Ericaceae
73	<i>Rhododendron arboreum var. arboreum</i>	Eto meto(Dz)	Ericaceae
74	<i>Rhododendron edgeworthii</i>		Ericaceae
75	<i>Rhododendron lepidotum</i>	Balu(Dz)	Ericaceae
76	<i>Rhododendron maddenii</i>		Ericaceae
77	<i>Rhododendron wallichii</i>		Ericaceae
78	<i>Rhododendron anthopogon</i>		Ericaceae
79	<i>Rhododendron keysii</i>		Ericaceae
80	<i>Rhododendron lepidotum</i>		Ericaceae
81	<i>Rhododendron setosum</i>		Ericaceae
82	<i>Ribes alpestre</i>		Grossulariaceae
83	<i>Rosa brunonii</i>	Taktse(Dz)	Rosaceae
84	<i>Rosa macrophylla</i>	Taktshel(Dz)	Rosaceae
85	<i>Rosa sericea</i>	Siw(Dz)	Rosaceae
86	<i>Rubus biflorus</i>		Rosaceae
87	<i>Rubus calycinoides</i>	Tsema tshelu(Dz)	Rosaceae
88	<i>Rubus ellipticus</i>	Tshema tsheloo(Dz)	Rosaceae
89	<i>Rubus lineatus</i>		Rosaceae
90	<i>Rubus sikkimensis</i>		Rosaceae
91	<i>Rubus treutleri</i>		Rosaceae

Sl. No.	Scientific Name	Common Name	Family
92	<i>Salix sp.</i>		Salicaceae
93	<i>Sauropus quadrangularis</i>		Phyllanthaceae
94	<i>Smilax myrtillus</i>		Smilacaceae
95	<i>Spermadictyon suaveolens</i>		Rubiaceae
96	<i>Strobilanthes accrescens</i>		Acanthaceae
97	<i>Strobilanthes capiata</i>		Acanthaceae
98	<i>Tabernamontana divaricata</i>		Apocynaceae
99	<i>Tetrastigma leucostaphylum</i>		Vitaceae
100	<i>Tetrastigma rumiciperium</i>		Vitaceae
101	<i>Thunbergia coccinea</i>		Acanthaceae
102	<i>Toddalia asiatica</i>		Rutaceae
103	<i>Vaccinium nummularia</i>		Ericaceae
104	<i>Vaccinium vacciniaceum</i>		Ericaceae
105	<i>Viburnum erubescens</i>	Asare(lh)	Ericaceae
106	<i>Viburnum mullaha</i>		Ericaceae
107	<i>Wallichia densiflora</i>		Arecaceae
108	<i>Woodfordia fruticosa</i>		Lythraceae
109	<i>Zanthoxylum armatum</i>	Thingi(Dz)	Rutaceae

Appendix III : Checklist of Herbs of GFD

Sl.No.	Scientific Name	Common Name	Family
1	<i>Achyranthes bidentata</i>		Amaranthaceae
2	<i>Achyrospermum sp.</i>		Lamiaceae
3	<i>Aconitum sp.</i>		Ranunculaceae
4	<i>Ageratina adenophora</i>		Asteraceae
5	<i>Ainsliaea aptera</i>		Asteraceae
6	<i>Anaphalis busua</i>		Asteraceae
7	<i>Artemisia myriantha</i>	Khempa(Dz)	Asteraceae
8	<i>Artemisia sp.</i>	Sangzey kachu(Dz)	Asteraceae
9	<i>Begonia annulata</i>		Begoniaceae
10	<i>Begonia griffithiana</i>		Begoniaceae
11	<i>Begonia josephi</i>		Begoniaceae
12	<i>Begonia xanthina</i>		Begoniaceae
13	<i>Cardamine sp.</i>		Brassicaceae
14	<i>Cirsium sp.</i>		Asteraceae
15	<i>Cyanotis spp.</i>		Commelinaceae
16	<i>Elatostema hookerianum</i>		Urticaceae
17	<i>Elatostema lineolatum</i>	Dambroo(dz)	Urticaceae
18	<i>Elatostema sessile</i>		Urticaceae
19	<i>Fragaria nubicola</i>	Pang tshelu(Dz)	Rosaceae
20	<i>Galium sp.</i>		Rubiaceae
21	<i>Henckelia urticilifolia</i>		Gesneriaceae
22	<i>Hydrocotyle nepalensis</i>		Apiaceae
23	<i>Impatiens discolor</i>		Balsaminaceae
24	<i>Impatiens puberula</i>		Balsaminaceae
25	<i>Oplismenus spp</i>		Poaceae
26	<i>Origanum sp.</i>		Lamiaceae
27	<i>Oxalis sp.</i>		Oxalidaceae
28	<i>Persicaria sp.</i>		Polygonaceae
29	<i>Pilea scripta</i>		Urticaceae
30	<i>Potentilla fragarioides</i>		Rosaceae
31	<i>Potentilla peduncularis</i>		Rosaceae

Sl.No.	Scientific Name	Common Name	Family
32	<i>Pouzolzia hirta</i>		Urticaceae
33	<i>Primula bracteosa</i>		Primulaceae
34	<i>Primula denticulata</i>	Doched metog	Primulaceae
35	<i>Primula gracilipes</i>		Primulaceae
36	<i>Primula malacoides</i>	Fairy primrose	Primulaceae
37	<i>Primula scapigera</i>		Primulaceae
38	<i>Primula tanneri</i>		Primulaceae
39	<i>Primula vulgaris</i>	Primrose	Primulaceae
40	<i>Prunella vulgaris</i>		Lamiaceae
41	<i>Rubia sp.</i>	Tse(Dz)	Rubiaceae
42	<i>Selinum wallichianum</i>		Apiaceae
43	<i>Stellaria vestita</i>		Caryophyllaceae
44	<i>Swertia bimaculata</i>		Gentianaceae
45	<i>Synotis alata</i>		Asteraceae
46	<i>Viola sp.</i>		Violaceae

Appendix IV : Checklist of Orchids of GFD

Sl.No	Scientific Name	Location sighted	Source
1	<i>Acampe ochracea</i>	Phuntsholing	(Dorji, 2008)
2	<i>Acampe papillosa</i>	Phuntsholing	(Dorji, 2008)
3	<i>Acrochaene punctata</i>	Phuntsholing	(Dorji, 2008)
4	<i>Aerides multiflorum</i>	Phuntsholing	(Dorji, 2008)
5	<i>Aerides odorata</i>	Phuntsholing	(Dorji, 2008)
6	<i>Agrostophyllum brevipes</i>	Chukha	(Dorji, 2008)
7	<i>Agrostophyllum callosum</i>	Chukha	(Dorji, 2008)
8	<i>Anoectochilus brevilabris</i>	Chukha	(Dorji, 2008)
9	<i>Anthogonium gracile</i>	Darla	Recorded Opportunistically
10	<i>Arundina graminifolia</i>	Tashilakha	Recorded Opportunistically
11	<i>Bulbophyllum affine</i>	Chukha	(Dorji, 2008)
12	<i>Bulbophyllum cornutum</i>	Chukha	(Dorji, 2008)
13	<i>Bulbophyllum cylindraceum</i>	Chukha	(Dorji, 2008)

Sl.No	Scientific Name	Location sighted	Source
14	<i>Bulbophyllum eublephrum</i>	Chukha	(Dorji, 2008)
15	<i>Bulbophyllum guttulatum</i>	Tshimakha and Metakha	Recorded Opportunistically
16	<i>Bulbophyllum leopardinum</i>	Chukha	(Dorji, 2008)
17	<i>Bulbophyllum odoratissimum</i>	Chukha	(Dorji, 2008)
18	<i>Bulbophyllum hymenanthum</i>	Chukha	(Dorji, 2008)
19	<i>Calanthe brevicornu</i>	Chukha	(Dorji, 2008)
20	<i>Calanthe chloroleuca</i>	Chukha	(Dorji, 2008)
21	<i>Calanthe griffithii</i>	Chukha	(Dorji, 2008)
22	<i>Calanthe plantaginea</i>	Above Gedu Village	Recorded Opportunistically
23	<i>Calanthe puberula</i>	Chukha	(Dorji, 2008)
24	<i>Calanthe reflexa</i>	Chukha	(Dorji, 2008)
25	<i>Calanthe sylvatica</i>	Phuntsholing	(Dorji, 2008)
26	<i>Calanthe triplicate</i>	Chukha	(Dorji, 2008)
27	<i>Ceratostylis himalaica</i>	Chukha	(Dorji, 2008)
28	<i>Cheirostylis griffithii</i>	Deorali	Recorded Opportunistically
29	<i>Chiloschista parishii</i>	Chukha	(Dorji, 2008)
30	<i>Cleisostoma racemiferum</i>	Chukha	(Dorji, 2008)
31	<i>Cleisostoma williamsonii</i>	Chukha	(Dorji, 2008)
32	<i>Coelogynae corymbosa</i>	Chukha	(Dorji, 2008)
33	<i>Coelogynae cristata</i>	Chukha	(Dorji, 2008)
34	<i>Coelogynae occulaa</i>	Jumja Road	Recorded Opportunistically
35	<i>Coelogynae ovalis</i>	Chukha	(Dorji, 2008)
36	<i>Coelogynae prolifera</i>	Chukha	(Dorji, 2008)
37	<i>Coelogynae stricta</i>	Chukha	(Dorji, 2008)
38	<i>Coelogyne barbata</i>	Ganglakha & Barsa area	Recorded Opportunistically
39	<i>Coelogyne nitida</i>	Division office area	Recorded Opportunistically
40	<i>Coelogyne prolifera</i>	Metakha	Recorded Opportunistically
41	<i>Crepidium acuminatum</i>	Jumja	Recorded Opportunistically
42	<i>Cybmidium elegans</i>	Barsa area	Recorded Opportunistically
43	<i>Cymbidium bicolor</i>	Chukha	(Dorji, 2008)
44	<i>Cymbidium devonianum</i>	Jumja	Recorded Opportunistically
45	<i>Cymbidium erythraeum</i>	Bongo	Recorded Opportunistically

Sl.No	Scientific Name	Location sighted	Source
46	<i>Cymbidium hookerianum</i>	Chukha	(Dorji, 2008)
47	<i>Cymbidium iridioides</i>	Chukha	(Dorji, 2008)
48	<i>Cymbidium lancifolium</i>	Above Gedu Village	Recorded Opportunistically
49	<i>Dendrobium aphyllum</i>	Phuntsholing	(Dorji, 2008)
50	<i>Dendrobium candidum</i>	Chukha	(Dorji, 2008)
51	<i>Dendrobium chrysanthum</i>	Deorali	Recorded Opportunistically
52	<i>Dendrobium densiflorum</i>	Chukha	(Dorji, 2008)
53	<i>Dendrobium devonianum</i>	Deorali and Wangkha	Recorded Opportunistically
54	<i>Dendrobium eriiflorum</i>	Sonam Ja area	Recorded Opportunistically
55	<i>Dendrobium fimbriatum</i>	Chukha	(Dorji, 2008)
56	<i>Dendrobium gibsonii</i>	Chukha	(Dorji, 2008)
57	<i>Dendrobium longicornu</i>	Above Darla School	Recorded Opportunistically
58	<i>Dendrobium moschatum</i>	Chukha	(Dorji, 2008)
59	<i>Dendrobium nobile</i>	Darla	Recorded Opportunistically
60	<i>Dendrobium rotundatum</i>	Phaktshoding area	Recorded Opportunistically
61	<i>Dendrobium trasnsparens</i>	Chukha	(Dorji, 2008)
62	<i>Epigenium amplum</i>	Chukha	(Dorji, 2008)
63	<i>Epigenium fuscescens</i>	Chukha	(Dorji, 2008)
64	<i>Epipactis helleborine</i>	Chukha	(Dorji, 2008)
65	<i>Eria alba</i>	Chukha	(Dorji, 2008)
66	<i>Eria coronaria</i>	Near Division office	Recorded Opportunistically
67	<i>Eria excavata</i>	Chukha	(Dorji, 2008)
68	<i>Eria graminifolia</i>	Chukha	(Dorji, 2008)
69	<i>Eria lasiopetala</i>	Chukha	(Dorji, 2008)
70	<i>Eria spicata</i>	Saurani CF area	Recorded Opportunistically
71	<i>Esmeralda clarkei</i>	Chukha	(Dorji, 2008)
72	<i>Gastrochilus acutifolius</i>	Above Gedu Village	Recorded Opportunistically
73	<i>Gastrochilus calceolaris</i>	Chukha	(Dorji, 2008)
74	<i>Gastrochilus distichus</i>	Chukha	(Dorji, 2008)
75	<i>Gastrochilus inconspicuss</i>	Chukha	(Dorji, 2008)
76	<i>Goodyera foliosa</i>	Chukha	(Dorji, 2008)
77	<i>Goodyera schlectendaliana</i>	Jumja	Recorded Opportunistically
78	<i>Goodyeria dongchenii</i>	Jumja	Recorded Opportunistically

Sl.No	Scientific Name	Location sighted	Source
79	<i>Herminium lanceum</i>	Near Lapsakha Lhaxhang	Recorded Opportunistically
80	<i>Ione bicolor</i>	Chukha	(Dorji, 2008)
81	<i>Liparis bootanensis</i>	Phaktshoding area	Recorded Opportunistically
82	<i>Liparis resupinata</i>	Manitar-Pasakha Road	Recorded Opportunistically
83	<i>Listera pinetorum</i>	Chukha	(Dorji, 2008)
84	<i>Malaxis acuminata</i>	Chukha	(Dorji, 2008)
85	<i>Neottianthe cucullata</i>	Jumja	Recorded Opportunistically
86	<i>Oberonia acaulis</i>	Dungna	Recorded Opportunistically
87	<i>Oberonia falcata</i>	Bara area	Recorded Opportunistically
88	<i>Oberonia maxima</i>	Manitar-Pasakha Road	Recorded Opportunistically
89	<i>Otochilus fuscus</i>	Chukha	(Dorji, 2008)
90	<i>Otochilus lancilabius</i>	Chukha	(Dorji, 2008)
91	<i>Panisea demissa</i>	Chukha	(Dorji, 2008)
92	<i>Panisea yunnanensis</i>	Chukha	(Dorji, 2008)
93	<i>Paphiopedilum farrieianum</i>	Piping and Amochu	Recorded Opportunistically & (Dorji, 2008)
94	<i>Papilionanthe uniflora</i>	Chukha	(Dorji, 2008)
95	<i>Peristylus aristatus</i>	Damdara area	Recorded Opportunistically
96	<i>Phalaenopsis taenialis</i>	Near Division Office	Recorded Opportunistically
97	<i>Pholidata imbricate</i>	Manitar Road	Recorded Opportunistically
98	<i>Pholidota articulata</i>	Chukha	(Dorji, 2008)
99	<i>Pholidota protracta</i>	Chukha	(Dorji, 2008)
100	<i>Phreatia elegans</i>	Chukha	(Dorji, 2008)
101	<i>Pinalia amica</i>	Upper Sauraney CF	Recorded Opportunistically
102	<i>Pleione hookeriana</i>	Above Mircro road	Recorded Opportunistically
103	<i>Pleione humilis</i>	Chukha	(Dorji, 2008)
104	<i>Pleione maculate</i>	Metapchhu FMU	Recorded Opportunistically
105	<i>Pleione praecox</i>	Above Darla School	Recorded Opportunistically
106	<i>Satyrium nepalense</i>	Chukha	(Dorji, 2008)
107	<i>Smitinandia micrantha</i>	Phuntsholing	(Dorji, 2008)
108	<i>Spathoglottis ixiioides</i>	Tshimakha	Recorded Opportunistically
109	<i>Spathoglottis jetsuniae</i>	Allay Village, Darla	Recorded Opportunistically
110	<i>Spiranthes sinensis</i>	Jumja Road	Recorded Opportunistically

Sl.No	Scientific Name	Location sighted	Source
111	<i>Thunia alba</i>	Chukha	(Dorji, 2008)
112	<i>Vanda cristata</i>	Chukha	(Dorji, 2008)
113	<i>Vanda griffithii</i>	Chukha	(Dorji, 2008)
114	<i>Vandopsis undulata</i>	Chukha	(Dorji, 2008)
115	<i>Zeuxine goodyeroides</i>	Chukha	(Dorji, 2008)
116	<i>Zeuxine pulchra</i>	Chukha	(Dorji, 2008)

Appendix V: Checklis of bamboos of GFD

Sl. No.	Scientific Name	Common Name
1	<i>Chimnobambusa callosa</i>	Kanti bans(lh)
2	<i>Cephalostachyum latifolium</i>	Pishima(Khengkha)
3	<i>Dendrocalamus sikkimensis</i>	Zang(Dzo)
4	<i>Drepanotachyum anallatum</i>	
5	<i>Dendrocalamus hamiltonii</i>	
6	<i>Himalayacalamus falconeri</i>	
7	<i>Pseudostachyum polymorphum</i>	
8	<i>Yushania maling</i>	Maling

Appendix VI: Checklis of weeds of GFD

Sl. No.	Scientific Name
1	<i>Acmella uliginosa</i>
2	<i>Ageratum conyzoides</i>
3	<i>Ainsliaea aptera</i>
4	<i>Alternanthera sessilis</i>
5	<i>Amaranthus hybridus</i>
6	<i>Anaphilis busua</i>
7	<i>Artemisia myriantha</i>
8	<i>Biden pilosa</i>
9	<i>Carex alopecuroides</i>
10	<i>Chromoleana odorata</i>
11	<i>Cirsium arvense</i>
12	<i>Cotoneaster nitidus</i>
13	<i>Crassocephalum crepidioides</i>

Sl. No.	Scientific Name
14	<i>Crotalaria aculeata</i>
15	<i>Cyanotis fasciculata</i>
16	<i>Cynodon dactylon</i>
17	<i>Cyperus cyperoides</i>
18	<i>Desmodium triflorum</i>
19	<i>Dymaria cordata</i>
20	<i>Euphorbia roxburghii</i>
21	<i>Fagopyrum esculentum</i>
22	<i>Fimbristylis falcata</i>
23	<i>Fragaria nubicola</i>
24	<i>Galinsoga parviflora</i>
25	<i>Gynura nepalensis</i>
26	<i>Hedera nepalensis</i>
27	<i>Hedychium spicatum</i>
28	<i>Impatiens arguta</i>
29	<i>Imperata cylindrica</i>
30	<i>Innula cappa</i>
31	<i>Lonicera japonica</i>
32	<i>Mikania micrantha</i>
33	<i>Nasturtium officinale</i>
34	<i>Oplismenus compositus</i>
35	<i>Oxalis corniculata</i>
36	<i>Parthenocissus semicordata</i>
37	<i>Pennisetum clandestinum</i>
38	<i>Persicaria nepalensis</i>
39	<i>Phyllanthus urina</i>
40	<i>Pilea scripta</i>
41	<i>Plantago erosa</i>
42	<i>Plantago major</i>
43	<i>Pogostemon benghalensis</i>
44	<i>Pouzolzia hirta</i>
45	<i>Primula denticulata</i>
46	<i>Prunella vulgaris</i>
47	<i>Pteridium aquilinum</i>
48	<i>Rumex nepalensis</i>
49	<i>Saccharum arundinaceum</i>

Sl. No.	Scientific Name
50	<i>Senecio laetus</i>
51	<i>Sida acuta</i>
52	<i>Sigesbeckia orientalis</i>
53	<i>Swertia bimaculata</i>
54	<i>Tagetes minuta</i>
55	<i>Taraxacum parvulum</i>
56	<i>Trifolium repens</i>
57	<i>Verbascum thapsus</i>

Appendix VII: Checklist of Avifauna of GFD

Sl. No.	Scientific Name	Common Name	Status (IUCN)
Accentor			
1	<i>Prunella collaris</i>	Alpine Accentor	Least Concern
2	<i>Prunella himalayana</i>	Altai Accentor	Least Concern
3	<i>Prunella strophciata</i>	Rufous-breasted Accentor	Least Concern
4	<i>Prunella immaculata</i>	Maroon-backed Accentor	Least Concern
Babblers			
5	<i>Pellorneum ruficeps</i>	Puff-throated Babbler	Least Concern
6	<i>Turdoides striata</i>	Jungle Babbler	Least Concern
7	<i>Macronous gularis</i>	Pin-striped Tit Babbler	Least Concern
8	<i>Xiphirhynchus superciliaris</i>	Slender-billed Scimitar Babbler	Least Concern
9	<i>Pomatorhinus erythrogenys</i>	Rusty-cheeked Scimitar Babbler	Least Concern
10	<i>Pomatorhinus ferruginosus</i>	Coral-billed Scimitar Babbler	Least Concern
11	<i>Pomatorhinus ruficollis</i>	Streaked-breasted Scimitar Babbler	Least Concern
12	<i>Pomatorhinus schisticeps</i>	White-browed Scimitar Babbler	Least Concern
13	<i>Stachyris nigriceps</i>	Grey-throated Babbler	Least Concern
14	<i>Stachyris ruficeps</i>	Rufous-capped Babbler	Least Concern
15	<i>Stachyris rufifrons</i>	Rufous-fronted Babbler	Least Concern
16	<i>Stachyris chrysaea</i>	Golden Babbler	Least Concern
17	<i>Gampsorhynchus rufulus</i>	White-hooded Babbler	Least Concern
Wren Babblers			
18	<i>Elachura formosa</i>	Spotted Elachura	Least Concern

Sl. No.	Scientific Name	Common Name	Status (IUCN)
19	<i>Pnoepyga pusilla</i>	Pygmy Wren Babbler	Least Concern
20	<i>Rimator malacoptilus</i>	Long-billed Wren Babbler	Least Concern
21	<i>Pnoepyga albiventer</i>	Scaly-breasted Wren Babblar	Least Concern
22	<i>Spelaeornis caudatus</i>	Rufous-throated Wren Babblar	Near Threatened
Shrike Babblers			
23	<i>Pteruthius flaviscapis</i>	White-browed Shrike Babblar	Least Concern
24	<i>Pteruthius melanotis</i>	Black-eared Shrike Babblar	Least Concern
25	<i>Pteruthius rufiventer</i>	Black-headed shrike Babblar	Least Concern
26	<i>Pteruthius xanthochlorus</i>	Green Shrike Babblar	Least Concern
Cutia/Leiothrix/Liocichla/Mesia			
27	<i>Cutia nipalensis</i>	Cutia	Least Concern
28	<i>Leiothrix lutea</i>	Red-billed Leiothrix	Least Concern
29	<i>Liocichla phoenicea</i>	Red-faced Liocichla	Least Concern
30	<i>Leiothrix argenteauris</i>	Silver-eared Mesia	Least Concern
Laughing Thrush			
31	<i>Garrulax affinis</i>	Black-faced Laughingthrush	Least Concern
32	<i>Garrulax leucoplophus</i>	White-crested Laughingthrush	Least Concern
33	<i>Garrulax striatus</i>	Striated Laughingthrush	Least Concern
34	<i>Garrulax monileger</i>	Lesser Necklaced Laughingthrush	Least Concern
35	<i>Garrulax pectoralis</i>	Greater Necklaced Laughingthrush	Least Concern
36	<i>Garrulax erythrocephalus</i>	Chestnut-crowned Laughingthrush	Least Concern
37	<i>Garrulax caerulatus</i>	Grey-sided Laughingthrush	Least Concern
38	<i>Garrulax ruficollis</i>	Rufous-necked Laughingthrush	Least Concern
39	<i>Garrulax squamatus</i>	Blue-winged Laughingthrush	Least Concern
40	<i>Garrulax imbricatus</i>	Bhutan Laughingthrush	Least Concern
41	<i>Garrulax gularis</i>	Rufous-vented Laughingthrush	Least Concern
42	<i>Garrulax rufogularis</i>	Rufous-chinned Laughingthrush	Least Concern
43	<i>Garrulax albogularis</i>	White-throated Laughingthrush	Least Concern
44	<i>Garrulax subunicolor</i>	Scaly Laughingthrush	Least Concern
Yuhinas/Sivas/Barwings			
45	<i>Yuhina bakeri</i>	White-naped Yuhina	Least Concern
46	<i>Yuhina flavicollis</i>	Whiskered Yuhina	Least Concern
47	<i>Yuhina nigrimenta</i>	Black-chinned Yuhina	Least Concern

Sl. No.	Scientific Name	Common Name	Status (IUCN)
48	<i>Yuhina occipitalis</i>	Rufous-vented Yuhina	Least Concern
49	<i>Yuhina castaniceps</i>	Striated Yuhina	Least Concern
50	<i>Yuhina gularis</i>	Stripe-throated Yuhina	Least Concern
51	<i>Siva cyanouroptera</i>	Blue-winged Siva	Least Concern
52	<i>Siva strigula</i>	Bar-throated Siva	Least Concern
53	<i>Actinodura egertoni</i>	Rusty-fronted Barwing	Least Concern
54	<i>Actinodura nipalensis</i>	Hoary-throated Barwing	Least Concern
Minla/Fulvettas			
55	<i>Minla ignotincta</i>	Red-tailed Minla	Least Concern
56	<i>Pseudominla castaneiceps</i>	Rufous-winged Fulvetta	Least Concern
57	<i>Pseudominla cinerea</i>	Yellow-throated Fulvetta	Least Concern
58	<i>Alcippe nipalensis</i>	Nepal Fulvetta	Least Concern
59	<i>Fulvetta vinipectus</i>	White-browed Fulvetta	Least Concern
60	<i>Lioparus chrysotis</i>	Golden-breasted Fulvetta	Least Concern
61	<i>Schoeniparus dubius</i>	Rusty-capped Fulvetta	Least Concern
Sibias/Epornis			
62	<i>Malacias capistratus</i>	Rufous Sibia	Least Concern
63	<i>Leioptila annectens</i>	Rufous-backed Sibia	Least Concern
64	<i>Heterophasia picaoides</i>	Long-tailed Sibia	Least Concern
65	<i>Yuhina zantholeuca</i>	White-bellied Erpornis	Least Concern
Parrotbills and Myzornis			
66	<i>Suthora nipalensis</i>	Black-throated Parrotbill	Least Concern
67	<i>Psittiparus ruficeps</i>	Greater Rufous-headed Parrotbill	Least Concern
68	<i>Psittiparus gularis</i>	Grey-headed Parrotbill	Least Concern
69	<i>Cholornis unicolor</i>	Brown Parrotbill	Least Concern
70	<i>Myzornis pyrrhoura</i>	Fire-tailed Myzornis	Least Concern
White-eye and Goldcrest			
71	<i>Zosterops palpebrosus</i>	Oriental White-eye	Least Concern
72	<i>Regulus regulus</i>	Goldcrest	Least Concern
Barbets and Woodpeckers			
73	<i>Megalaima virens</i>	Great Barbet	Least Concern
74	<i>Megalaima lineata</i>	Lineated Barbet	Least Concern
75	<i>Megalaima franklinii</i>	Golden-throated Barbet	Least Concern

Sl. No.	Scientific Name	Common Name	Status (IUCN)
76	<i>Megalaima asiatica</i>	Blue-throated Barbet	Least Concern
77	<i>Megalaima australis</i>	Blue-eared Barbet	Least Concern
78	<i>Megalaima haemacephala</i>	Coppersmith Barbet	Least Concern
Bee-eaters			
79	<i>Nyctyornis athertoni</i>	Blue-bearded Bee-eater	Least Concern
80	<i>Merops orientalis</i>	Green Bee-eater	Least Concern
81	<i>Merops leschenaulti</i>	Chestnut-headed Bee-eater	Least Concern
82	<i>Merops philippinus</i>	Blue-tailed Bee-eater	Least Concern
Broadbills & Bluebird			
83	<i>Psarisomus dalhousiae</i>	Long-tailed Broadbill	Least Concern
84	<i>Serilophus lunatus</i>	Silver-breasted Broadbill	Least Concern
85	<i>Irena puella</i>	Asian Fairy Bluebird	Least Concern
Bulbuls			
86	<i>Pycnonotus striatus</i>	Striated Bulbul	Least Concern
87	<i>Pycnonotus (melanicterus) flaviventris</i>	Black-crested Bulbul	Least Concern
88	<i>Pycnonotus jocosus</i>	Red-whiskered Bulbul	Least Concern
89	<i>Pycnonotus leucogenys</i>	Himalayan Bulbul	Least Concern
90	<i>Pycnonotus cafer</i>	Red-vented Bulbul	Least Concern
91	<i>Alophoixus flaveolus</i>	White-throated Bulbul	Least Concern
92	<i>Ixos mccllellandii</i>	Mountain Bulbul	Least Concern
93	<i>Hypsipetes leucocephalus</i>	Black Bulbul	Least Concern
Buntings			
94	<i>Melophus lathami</i>	Crested Bunting	Least Concern
Buttonquails			
95	<i>Turnix suscitator</i>	Barred Buttonquail	Least Concern
96	<i>Turnix tanki</i>	Yellow-legged Buttonquail	Least Concern
Cormorants			
97	<i>Phalacrocorax carbo</i>	Great Cormorant	Least Concern
98	<i>Phalacrocorax fuscicollis</i>	Indian Cormorant	Least Concern
99	<i>Phalacrocorax niger</i>	Little Cormorant	Least Concern
Crows, Magpies and Treepies			
100	<i>Corvus macrorhynchos</i>	Large-billed Crow	Least Concern

Sl. No.	Scientific Name	Common Name	Status (IUCN)
101	<i>Corvus levaillantii</i>	Eastern Jungle Crow	Least Concern
102	<i>Corvus splendens</i>	House Crow	Least Concern
103	<i>Urocissa flavirostris</i>	Yellow-billed Blue Magpie	Least Concern
104	<i>Cissa chinensis</i>	Common Green Magpie	Least Concern
105	<i>Dendrocitta formosae</i>	Grey Treepie	Least Concern
106	<i>Dendrocitta vagabunda</i>	Rufous Treepie	Least Concern
107	<i>Dendrocitta frontalis</i>	Collared Treepie	Least Concern
Jays and Nutcrackers			
108	<i>Garrulus glandarius</i>	Eurasian Jay	Least Concern
109	<i>Nucifraga caryocatactes</i>	Spotted Nutcracker	Least Concern
Cuckoos			
110	<i>Hierococcyx fugax</i>	Hodgson's Hawk Cuckoo	Least Concern
111	<i>Clamator coromandus</i>	Chestnut-winged Cuckoo	Least Concern
112	<i>Hierococcyx sparverioides</i>	Large Hawk Cuckoo	Least Concern
113	<i>Hierococcyx varius</i>	Common Hawk Cuckoo	Least Concern
114	<i>Cuculus micropterus</i>	Indian Cuckoo	Least Concern
115	<i>Cuculus canorus</i>	Eurasian Cuckoo	Least Concern
116	<i>Cuculus saturatus</i>	Oriental Cuckoo	Least Concern
117	<i>Cuculus poliocephalus</i>	Lesser Cuckoo	Least Concern
118	<i>Cacomantis sonneratti</i>	Banded bay Cuckoo	Least Concern
119	<i>Cacomantis Passerinus</i>	Grey-bellied Cuckoo	Least Concern
120	<i>Cacomantis merulinus</i>	Plaintive Cuckoo	Least Concern
121	<i>Chrysococcyx maculatus</i>	Asian Emerald Cuckoo	Least Concern
122	<i>Chrysococcyx xanthorhynchus</i>	Violet Cuckoo	Least Concern
123	<i>Surniculus lugubris</i>	Drongo Cuckoo	Least Concern
Malkohas & Coucals			
124	<i>Phaenicophaeus tristis</i>	Green-billed malkoha	Least Concern
125	<i>Centropus sinensis</i>	Greater Coucal	Least Concern
126	<i>Centropus bengalensis</i>	Lesser Coucal	Least Concern
Cuckooshrikes & Minivets			
127	<i>Coracina macei</i>	Large Cuckooshrike	Least Concern
128	<i>Coracina melaschistos</i>	Black-winged Cuckooshrike	Least Concern

Sl. No.	Scientific Name	Common Name	Status (IUCN)
129	<i>Tephrodornis virgatus</i>	Large Woodshrike	Least Concern
130	<i>Pericrocotus flammeus</i>	Scarlet Minivet	Least Concern
131	<i>Pericrocotus solaris</i>	Grey-chinned Minivet	Least Concern
132	<i>Pericrocotus brevirostris</i>	Short-billed Minivet	Least Concern
133	<i>Pericrocotus ethologus</i>	Long-tailed Minivet	Least Concern
Drongos			
134	<i>Dicrurus macrocercus</i>	Black Drongo	Least Concern
135	<i>Dicrurus leucophaeus</i>	Ashy Drongo	Least Concern
136	<i>Dicrurus annectans</i>	Crow-billed drongo	Least Concern
137	<i>Dicrurus aeneus</i>	Bronzed Drongo	Least Concern
138	<i>Dicrurus remifer</i>	Lesser Racket-tailed Drongo	Least Concern
139	<i>Dicrurus hottentottus</i>	Hair-crested Drongo	Least Concern
140	<i>Dicrurus paradiseus</i>	Greater Racket-tailed Drongo	Least Concern
Crakes			
141	<i>Amaurornis phoenicurus</i>	White-breasted Waterhen	Least Concern
142	<i>Porzana bicolor</i>	Black-tailed Crake	Least Concern
Dippers			
143	<i>Cinclus pallasii</i>	Brown Dipper	Least Concern
Ducks, Merganser & Grebe			
144	<i>Tadorna ferruginea</i>	Ruddy Shelduck	Least Concern
145	<i>Mergus merganser</i>	Goosander	Least Concern
146	<i>Anas crecca</i>	Common Teal	Least Concern
Falcons / Kestrel / Falconet			
147	<i>Falcon amurensis</i>	Amur Falcon	Least Concern
148	<i>Falco peregrinus</i>	Peregrine Falcon	Least Concern
149	<i>Falco subbuteo</i>	Eurasian Hobby	Least Concern
150	<i>Falco severus</i>	Oriental Hobby	Least Concern
151	<i>Falco tinnunculus</i>	Common Kestrel	Least Concern
152	<i>Microhierax caerulescens</i>	Collared Falconet	Least Concern
Finches & Grosbeak			
153	<i>Haematospiza sipahi</i>	Scarlet Finch	Least Concern
154	<i>Carpodacus erythrinus</i>	Common Rosefinch	Least Concern
155	<i>Carduelis spinoides</i>	Yellow-breasted Greenfinch	Least Concern

Sl. No.	Scientific Name	Common Name	Status (IUCN)
156	<i>Leucosticte nemoricola</i>	Plain Mountain Finch	Least Concern
157	<i>Carpodacus edwardsii</i>	Dark-rumped Rosefinch	Least Concern
158	<i>Propyrrhula subhimachala</i>	Crimson-browed Finch	Least Concern
159	<i>Carpodacus thura</i>	White-browed Rosefinch	Least Concern
160	<i>Carpodacus nipalensis</i>	Dark-breasted Rosefinch	Least Concern
161	<i>Pyrrhula nipalensis</i>	Brown Bullfinch	Least Concern
162	<i>Pyrrhula erythrocephala</i>	Red-headed Bullfinch	Least Concern
163	<i>Pyrrhoptes epauletta</i>	Golden-naped Finch	Least Concern
164	<i>Loxia curvirostra</i>	Red Crossbill	Least Concern
165	<i>Mycerobas affinis</i>	Collared Grosbeak	Least Concern
166	<i>Mycerobas melanozanthos</i>	Spot-winged Grosbeak	Least Concern
167	<i>Mycerobas carnipes</i>	White-winged Grosbeak	Least Concern
Flowerpeckers			
168	<i>Dicaeum ignipectus</i>	Fire-breasted Flowerpecker	Least Concern
169	<i>Dicaeum concolor</i>	Plain Flowerpecker	Least Concern
170	<i>Dicaeum erythrorhynchus</i>	Pale-billed Flowerpecker	Least Concern
171	<i>Dicaeum chrysorrheum</i>	Yellow-vented Flowerpecker	Least Concern
172	<i>Dicaeum cruentatum</i>	Scarlet-backed Flowerpecker	Least Concern
Flycatchers and Niltavas			
173	<i>Muscicapa sibirica</i>	Dark-sided Flycatcher	Least Concern
174	<i>Muscicapa dauurica</i>	Asian Brown Flycatcher	Least Concern
175	<i>Muscicapa ferruginea</i>	Ferruginous Flycatcher	Least Concern
176	<i>Cyornis poliogenys</i>	pale-chhined Flycatcher	Least Concern
177	<i>Ficedula strophitata</i>	Rufous-gorgrted Flycatcher	Least Concern
178	<i>Ficedula albicilla</i>	Taiga Flycatcher	Least Concern
179	<i>Ficedula sapphira</i>	Sapphire Flycatcher	Least Concern
180	<i>Ficedula hodgsonii</i>	Slaty-backed Flycatcher	Least Concern
181	<i>Ficedula monileger</i>	White-gorgeted Flycatcher	Least Concern
182	<i>Ficedula westermanni</i>	Little Pied flycatcher	Least Concern
183	<i>Ficedula superciliaris</i>	Ultramarine Flycatcher	Least Concern
184	<i>Ficedula tricolor</i>	Slaty-blue Flycatcher	Least Concern
185	<i>Eumyias thalassinus</i>	Verditer Flycatcher	Least Concern
186	<i>Cyornis unicolor</i>	Pale Blue Flycatcher	Least Concern

Sl. No.	Scientific Name	Common Name	Status (IUCN)
187	<i>Cyornis rubeculoides</i>	Blue-throated Blue Flycatcher	Least Concern
188	<i>Muscicapella hodgsoni</i>	Pygme Blue Flycatcher	Least Concern
189	<i>Culicicapa ceylonensis</i>	Grey-headed Canary Flycatcher	Least Concern
190	<i>Niltava macgrigoriae</i>	Small Niltava	Least Concern
191	<i>Niltava sundara</i>	Rufous-bellied Niltava	Least Concern
192	<i>Niltava grandis</i>	Large Niltava	Least Concern
Fantails			
193	<i>Rhipidura hypoxanthus</i>	Yellow-bellied Fantail	Least Concern
194	<i>Rhipidura albicollis</i>	White-throated Fantail	Least Concern
Osprey and Sea Eagle/Fish Eagles			
195	<i>Pandion haliaetus</i>	Osprey	Least Concern
196	<i>Haliaeetus leucoryphus</i>	Pallas's Fish Eagle	Endangered
197	<i>Ichthyophaga ichthyaetus</i>	Grey-headed Fish Eagle	Near Threatened
198	<i>Ichthyophaga humilis</i>	Lesser Fish Eagle	Near Threatened
Accipiter(Hawks), Bazas/Kites Vultures			
199	<i>Accipiter badius</i>	Shikra	Least Concern
200	<i>Accipiter virgatus</i>	Besra	Least Concern
201	<i>Accipiter nisus</i>	Eurasian Sparrowhawk	Least Concern
202	<i>Accipiter trivirgatus</i>	Crested Goshawk	Least Concern
203	<i>Accipiter virgatus</i>	Besra	Least Concern
204	<i>Accipiter badius</i>	Shikra	Least Concern
205	<i>Elanus caeruleus</i>	Black-winged Kite	Least Concern
206	<i>Haliastur indus</i>	Brahminy Kite	Least Concern
207	<i>Milvus migrans</i>	Black Kite	Least Concern
208	<i>Aviceda jerdoni</i>	Jerdon's Baza	Least Concern
209	<i>Pemis ptilorhynchus</i>	Oriental Honey-buzzard	Least Concern
210	<i>Buteo buteo</i>	Common Buzzard	Least Concern
211	<i>Gyps himalayensis</i>	Himalayan Griffon	Least Concern
Forktails			
212	<i>Enicurus schistaceus</i>	Slaty-backed Forktail	Least Concern
213	<i>Enicurus immaculatus</i>	Black-backed Forktail	Least Concern
214	<i>Enicurus maculatus</i>	Spotted Forktail	Least Concern
215	<i>Enicurus scouleri</i>	Little Forktail	Least Concern

Sl. No.	Scientific Name	Common Name	Status (IUCN)
Harriers, Hawk Eagles and Eagles			
216	<i>Circus melanocleucos</i>	Pied Harrier	Least Concern
217	<i>Circus cyaneus</i>	Hen Harrier	Least Concern
218	<i>Circus aeruginosus</i>	Eurasian Marsh Harrier	Least Concern
219	<i>Ictinaetus malayensis</i>	Black Eagle	Least Concern
220	<i>Spilornis cheela</i>	Crested Serpent Eagle	Least Concern
221	<i>Aquila clanga</i>	Greater Spotted Eagle	Vulnerable
222	<i>Aquila nipalensis</i>	Steppe Eagle	Endangered
223	<i>Hieraaetus pennatus</i>	Booted Eagle	Least Concern
224	<i>Lophotriorchis kienerii</i>	Rufous-bellied eagle	Near Threatened
225	<i>Nisaetus nipalensis</i>	Mountain Hawk Eagle	Least Concern
Bitterns Herons and Egrets			
226	<i>Ixobrychus cinnamomeus</i>	Cinnamom Bittern	Least Concern
227	<i>Ardeola grayii</i>	Indian Pond Heron	Least Concern
228	<i>Butorides striata</i>	Striated Heron	Least Concern
229	<i>Ardeola bacchus</i>	Chinese Pond Heron	Least Concern
230	<i>Ardea cinerea</i>	Grey Heron	Least Concern
231	<i>Ardea purpurea</i>	Purple Heron	Least Concern
232	<i>Gorsachius melanolophus</i>	Malayan Night Heron	Least Concern
233	<i>Egretta garzetta</i>	Little Egret	Least Concern
234	<i>Mesophoyx intermedia</i>	Intermediate Egret	Least Concern
235	<i>Bubulcus ibis</i>	Cattle Egret	Least Concern
Hoopoes			
239	<i>Upupa epops</i>	Common Hoopoe	Least Concern
Hornbills			
237	<i>Buceros bicornis</i>	Great Hornbill	Vulnerable
238	<i>Rhyticeros undulatus</i>	Wreathed Hornbill	Vulnerable
239	<i>Anthracoceros albirostris</i>	Oriental Pied Hornbill	Least Concern
240	<i>Aceros nipalensis</i>	Rufous-necked Hornbill	Vulnerable
Ibisbill, Stilt & Avocet			
241	<i>Ibidorhyncha struthersii</i>	Ibisbill	Least Concern
242	<i>Recurvirostra avocetta</i>	Pied Avocet	Least Concern

Sl. No.	Scientific Name	Common Name	Status (IUCN)
Ioras			
243	<i>Aegithina tiphia</i>	Common Iora	Least Concern
Kingfishers			
244	<i>Alcedo hercules</i>	Blyth's Kingfisher	Near Threatened
245	<i>Alcedo atthis</i>	Common Kingfisher	Least Concern
246	<i>Ceyx erithacus</i>	Oriental Dwarf-kingfisher	Least Concern
247	<i>Pelargopsis capensis</i>	Stork-billed Kingfisher	Least Concern
248	<i>Halcyon smyrnensis</i>	White-throated Kingfisher	Least Concern
249	<i>Megaceryle lugubris</i>	Crested Kingfisher	Least Concern
250	<i>Ceryle rudis</i>	Pied Kingfisher	Least Concern
Larks			
251	<i>Mirafra assamica</i>	Bengal Bushlark	Least Concern
252	<i>Alauda gulgula</i>	Oriental Skylark	Least Concern
253	<i>Calandrella raytal</i>	Sand Lark	Least Concern
Leafbirds			
254	<i>Chloropsis aurifrons</i>	Golden-fronted Leafbird	Least Concern
255	<i>Chloropsis hardwickii</i>	Orange-bellied Leafbird	Least Concern
Monarch Flycatcher			
256	<i>Hypothymis azurea</i>	Black-naped Monarch	Least Concern
Nightjars			
257	<i>Carpimulgus (indicus) jotaka</i>	Grey Nightjar	Least Concern
258	<i>Carpimulgus macrurus</i>	Long-tailed Nightjar	Least Concern
259	<i>Carpimulgus affinis</i>	Savanna Nightjar	Least Concern
Nuthatches, Wallcreeper and Wren			
260	<i>Sitta (castanea) cinnam- oventris</i>	Chestnut-bellied Nuthatch	Least Concern
261	<i>Sitta frontalis</i>	Velvet-fronted Nuthatch	Least Concern
262	<i>Sitta formosa</i>	Beautiful Nuthatch	Vulnerable
263	<i>Sitta himalayenses</i>	White-tailed Nuthatch	Least Concern
264	<i>Tichodroma muraria</i>	Wallcreeper	Least Concern
265	<i>Troglodytes troglodytes</i>	Eurasian Wren	Least Concern
Treecreepers			
266	<i>Certhia hodgsoni</i>	Hodgson's Treecreeper	Least Concern

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267	<i>Certhia nipalenses</i>	Rusty-flanked Treecreeper	Least Concern
268	<i>Certhia discolor</i>	Brown -throated Treecreeper	Least Concern
Orioles			
269	<i>Oriolus xanthornus</i>	Black-hooded Oriole	Least Concern
270	<i>Oriolus traillii</i>	Maroon Oriole	Least Concern
Owls			
271	<i>Ketupa flavipes</i>	Tawny Fish Owl	Least Concern
272	<i>Bubo nipalenses</i>	Spot-bellied Eagle Owl	Least Concern
273	<i>Strix aluco</i>	Tawny owl	Least Concern
274	<i>Otus spilocephalus</i>	Mountain Scops Owl	Least Concern
275	<i>Otus sunia</i>	Oriental Scops Owl	Least Concern
276	<i>Otus bakkaamoena</i>	Collared Scops Owl	Least Concern
277	<i>Glaucidium brodiei</i>	Collared Owlet	Least Concern
278	<i>Glaucidium cuculoides</i>	Asian Barred Owlet	Least Concern
279	<i>Glaucidium radiatum</i>	Jungle Owlet	Least Concern
280	<i>Athene brama</i>	Spotted Owlet	Least Concern
281	<i>Ninox scutulata</i>	Brown Hawk Owl	Least Concern
Parrots and Parakeets			
282	<i>Psittacula krameri</i>	Rose-ringed Parakeet	Least Concern
283	<i>Psittacula alexandri</i>	Red-breasted Parakeet	Least Concern
284	<i>Psittacula himalayana</i>	Slaty-headed Parakeet	Least Concern
285	<i>Psittacula eupatria</i>	Alexandrine Parakeet	Near Threatened
Pigeons, Doves and Green Pigeons			
286	<i>Columba livia</i>	Common Pегion	Least Concern
287	<i>Columba leuconota</i>	Snow Pigeon	Least Concern
288	<i>Columba hodgsonii</i>	Speckled Wood Pigeon	Least Concern
289	<i>Columba pulchricollis</i>	Ashy Wood Pigeon	Least Concern
290	<i>Ducula badia</i>	Mountain Imperial Pigeon	Least Concern
291	<i>Ducula aenea</i>	Green Imperial Pigeon	Least Concern
292	<i>Streptopelia orientalis</i>	Oriental Turtile Dove	Least Concern
293	<i>Spilopelia chinensis</i>	Spotted Dove	Least Concern
294	<i>Streptopelia tranquebarica</i>	Red Collared Dove	Least Concern
295	<i>Streptopelia decaocto</i>	Eurasian Collared Dove	Least Concern

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296	<i>Macropygia unchall</i>	Barred Cuckoo Dove	Least Concern
297	<i>Chalcophaps indica</i>	Emerald Dove	Least Concern
298	<i>Treron sphenurus</i>	Wedge-tailed Green Pigeon	Least Concern
299	<i>Treron bicinctus</i>	Orange-breasted Green Pigeon	Least Concern
300	<i>Treron (pompadora) phayrei</i>	Asy-headed Green Pigeon	Near Threatened
301	<i>Treron curvirostra</i>	Thick-billed Green Pigeon	Least Concern
302	<i>Treron apicauda</i>	Pin-tailed green Pigeon	Least Concern
303	<i>Treron phoenicopterus</i>	Yellow-footed Green Pigeon	Least Concern
Pheasants, Fowls, Partridges & Quails			
304	<i>Lophophorus impejanus</i>	Himalayan Monal	Least Concern
305	<i>Ithaginis cruentus</i>	Blood pheasant	Least Concern
306	<i>Lophura leucomelanos</i>	Kalij Pheasant	Least Concern
307	<i>Gallus gallus</i>	Red Junglefowl	Least Concern
308	<i>Pavo cristatus</i>	Indian Peafowl	Least Concern
309	<i>Arborophila torqueola</i>	Hill Partridge	Least Concern
310	<i>Arborophila rufogularis</i>	Rufous-throated Partridge	Least Concern
311	<i>Arborophila mandellii</i>	Chestnut-breasted Partridge	Vulnerable
312	<i>Tragopan satyra</i>	Satyr Tragopan	Near Threatened
Plovers & Lapwings			
313	<i>Vanellus indicus</i>	Red-wattled Lapwing	Least Concern
314	<i>Vanellus duvaucelii</i>	River Lapwing	Near Threatened
315	<i>Charadrius dubius</i>	Little Ringed Plover	Least Concern
316	<i>Charadrius alexandrius</i>	Kentish Plover	Least Concern
Pratincole			
317	<i>Glareola lactea</i>	Small Pratincole	Least Concern
Pittas			
318	<i>Pitta nepalenses</i>	Blue-naped Pitta	Least Concern
319	<i>Pitta sordida</i>	Hooded Pitta	Least Concern
Prinias/Tesias			
320	<i>Prinia atrogularis</i>	Black-throated Prinia	Least Concern
321	<i>Prinia crinigera</i>	Striated Prinia	Least Concern
322	<i>Prinia cinereocapilla</i>	Grey-crowned Prinia	Least Concern

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323	<i>Prinia sylvatica</i>	Jungle Prinia	Least Concern
324	<i>Prinia hodgsonii</i>	Grey-breasted Prinia	Least Concern
325	<i>Prinia socialis</i>	Ashy Prinia	Least Concern
326	<i>Tesia castaneocoronata</i>	Chestnut-headed Tesia	Least Concern
327	<i>Tesia cyaniventer</i>	Grey-bellied Tesia	Least Concern
328	<i>Tesia olivea</i>	Slaty-bellied Tesias	Least Concern
Redstarts			
329	<i>Phoenicurus ochruros</i>	Black Redstart	Least Concern
330	<i>Phoenicurus frontalis</i>	Blue-fronted Redstart	Least Concern
331	<i>Phoenicurus hodgsoni</i>	Hodgson's Redstart	Least Concern
332	<i>Chaimarrornis leucocephalus</i>	White-capped Water Redstart	Least Concern
333	<i>Rhyacornis fuliginosa</i>	Plumbeous water Redstart	Least Concern
Rollers			
334	<i>Coracias benghalensis</i>	Indian Roller	Least Concern
335	<i>Eurystomus orientalis</i>	Dollarbird	Least Concern
Warders: Sand pipers/Stint/Snipes			
336	<i>Tringa ochropus</i>	Green Sandpiper	Least Concern
337	<i>Actitis hypoleucos</i>	Common Sandpiper	Least Concern
338	<i>Calidris temminckii</i>	Temminck's Stint	Least Concern
339	<i>Tringa nebularia</i>	Common Greenshank	Least Concern
340	<i>Tringa totanus</i>	Common Redshank	Least Concern
341	<i>Gallinago gallinago</i>	Common Snipe	Least Concern
342	<i>Scolopax rusticola</i>	Eurasian Woodcock	Least Concern
Shrikes and Flycatcher Shrike			
343	<i>Lanius tephronotus</i>	Grey-backed Shrike	Least Concern
344	<i>Lanius cristatus</i>	Brown Shrike	Least Concern
345	<i>Lanius schach</i>	Long-tailed Shrike	Least Concern
346	<i>Hemipus picatus</i>	Bar-winged Flycatcher-Shrike	Least Concern
Sparrows, Weaver & Munias			
347	<i>Passer domesticus</i>	House parrow	Least Concern
348	<i>Passer montanus</i>	Eurasian Tree Sparrow	Least Concern
349	<i>Passer rutilans</i>	Russet Sparrow	Least Concern

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350	<i>Ploceus benghalensis</i>	Black-breasted weaver	Least Concern
351	<i>Ploceus philippinus</i>	Baya Weaver	Least Concern
352	<i>Lonchura striata</i>	White-rumped Munia	Least Concern
353	<i>Lonchura punctulata</i>	Scaly-breasted Munia	Least Concern
Stralings and Mynas			
354	<i>Sturnus contra</i>	Asian Pied Starling	Least Concern
355	<i>Sturnus malabarica</i>	Chestnut-tailed Starling	Least Concern
356	<i>Gracula religiosa</i>	Common Hill Myna	Least Concern
357	<i>Acridotheres tristis</i>	Common Myna	Least Concern
358	<i>Acridotheres ginginianus</i>	Bank Myna	Least Concern
359	<i>Acridotheres fuscus</i>	Jungle Myna	Least Concern
Storks/Ibises			
360	<i>Ciconia nigra</i>	Black Stork	Least Concern
361	<i>Ephippiorhynchus asiaticus</i>	Black-necked Stork	Near Threatened
362	<i>Ciconia episcopus</i>	Wooly-necked Stork	Near Threatened
363	<i>Pseudibis papillosa</i>	Red-naped Ibis	Least Concern
Sunbirds & Spiderhunters			
364	<i>Aethopyga siparaja</i>	Crimson Sunbird	Least Concern
365	<i>Aethopyga gouldiae</i>	Mrs Gould's Sunbird	Least Concern
366	<i>Aethopyga nipalenses</i>	Green-tailed Sunbird	Least Concern
367	<i>Aethopyga saturata</i>	Black-throated Sunbird	Least Concern
368	<i>Chalcoparia singalensis</i>	Ruby-cheeked Sunbird	Least Concern
369	<i>Cinnyris asiaticus</i>	Purple Sunbird	Least Concern
370	<i>Arachnothera magna</i>	Streaked spiderhunter	Least Concern
Swallows & Martins			
371	<i>Cecropis daurica</i>	Red-rumped Sallow	Least Concern
372	<i>Hirundo rustica</i>	Barn Sallow	Least Concern
373	<i>Delichon nipalense</i>	Nepal House martin	Least Concern
374	<i>Delichon dasypus</i>	Asian House martin	Least Concern
375	<i>Riparia riparia</i>	Sand Martin	Least Concern
376	<i>Riparia paludicola</i>	Plain Martin	Least Concern
377	<i>Ptyonoprogne rupestris</i>	Eurasian Crag Martin	Least Concern

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Swifts and Swiftlets			
378	<i>Apus acuticauda</i>	Dark-rumped Swift	Vulnerable
379	<i>Apus pacificus</i>	Fork-tailed swift	Least Concern
380	<i>Collocalia brevirostris</i>	Himalayan Swiftlet	Least Concern
381	<i>Tachymarptis melba</i>	Alpine swift	Least Concern
382	<i>Cypsiurus balasiensis</i>	Asian Palm Swift	Least Concern
383	<i>Hirundapus Caudacutus</i>	White-throated Needletail	Least Concern
384	<i>Apus affinis</i>	House Swift	Least Concern
Tailorbirds			
385	<i>Phyllergates cucullatus</i>	Mountain Tailorbird	Least Concern
386	<i>Orthotomus sutorius</i>	Common Tailorbird	Least Concern
Terns			
387	<i>Sterna aurantia</i>	River tern	Vulnerable
Tits or Titmice			
388	<i>Melanochlora sultanea</i>	Sultan Tit	Least Concern
389	<i>Parus major</i>	Great Tit	Least Concern
390	<i>Caphalopyrus flammiceps</i>	Fire-capped Tit	Least Concern
391	<i>Parus monticolus</i>	Green-backed Tit	Least Concern
392	<i>Aegithalos concinnus</i>	Black-throated Tit	Least Concern
393	<i>Aegithalos iouschistos</i>	Rufous-fronted Tit	Least Concern
394	<i>Sylviparus modestus</i>	Yellow-browed Tit	Least Concern
395	<i>Periparus ater</i>	Coal Tit	Least Concern
396	<i>Periparus rubidiventris</i>	Rufous-vented Tit	Least Concern
397	<i>Parus spilonotus</i>	Yellow-cheeked Tit	Least Concern
398	<i>Parus ater</i>	Coal Tit	Least Concern
Tragons			
399	<i>Harpactes erythrocephalus</i>	Red-headed Trogon	Least Concern
Thick-knee			
400	<i>Burhinus (oedictemus) indicus</i>	Indian Thick-knee	Least Concern
401	<i>Esacus recurvirostris</i>	Great Thick-knee	Least Concern
Thurshes, Rock Thurshes and Whistling Thrush			
402	<i>Zoothera dixonii</i>	Long-tailed Thrush	Least Concern

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403	<i>Zoothere mollissima</i>	Alpine Thrush	Least Concern
404	<i>Zoothera dauma</i>	Scaly Thrush	Least Concern
405	<i>Zoothera monticola</i>	Long-billed Thrush	Least Concern
406	<i>Turdus atrogularis</i>	Black-throated Thrush	Least Concern
407	<i>Zoothera citrina</i>	Orange-headed Thrush	Least Concern
408	<i>Turdus unicolor</i>	Tickell's Thrush	Least Concern
409	<i>Monticola solitarius</i>	Blue Rock Thrush	Least Concern
410	<i>Monticola cinclorhynchus</i>	Blue-capped Rock thrush	Least Concern
411	<i>Monticola rufiventris</i>	Chestnut-bellied Rock Thrush	Least Concern
412	<i>Turdus albocinctus</i>	White-collared Blackbird	Least Concern
413	<i>Turdus boulboul</i>	Grey-winged Blackbird	Least Concern
414	<i>Myophonus caeruleus</i>	Blue Whistling Thrush	Least Concern
Cochoas and Shortwings			
415	<i>Cochoa purpurea</i>	Purple Cochoa	Least Concern
416	<i>Brachypteryx hyperythra</i>	Rusty-bellied Shortwing	Near Threatened
417	<i>Brachypteryx leucophris</i>	Lesser Shortwing	Least Concern
Chats & Robins/Shama			
418	<i>Saxicola ferreus</i>	Grey Bushchat	Least Concern
419	<i>Saxicola torquatus</i>	Common Stonechat	Least Concern
420	<i>Saxicola caprata</i>	Pied Bushchat	Least Concern
421	<i>Tarsiger chrysaeus</i>	Golden Bush Robin	Least Concern
422	<i>Tarsiger (cyanurus) rufilatus</i>	Himalayan Bluetail	Least Concern
423	<i>Myiomela leucura</i>	White-tailed Robin	Least Concern
424	<i>Copsychus saularis</i>	Oriental Magpie Robin	Least Concern
425	<i>Copsychus malabaricus</i>	White-rumped shama	Least Concern
Wagtails & Pipits			
426	<i>Montacilla alba</i>	White Wagtail	Least Concern
427	<i>Montacilla maderaspatensis</i>	White-browed Wagtail	Least Concern
428	<i>Montacilla citreola</i>	Citrine wagtail	Least Concern
429	<i>Montacilla cinerea</i>	Grey Wagtail	Least Concern
430	<i>Anthus hodgsonii</i>	Olive-backed Pipit	Least Concern
431	<i>Anthus roseatus</i>	Rosy Pipit	Least Concern

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432	<i>Anthus rufulus</i>	Paddyfield Pipit	Least Concern
433	<i>Anthus richardi</i>	Richard's Pipit	Least Concern
Warblers			
434	<i>Seicercus burkii</i>	Green-crowned Warbler	Least Concern
435	<i>Abroscopus superciliaris</i>	Yellow-bellied Warbler	Least Concern
436	<i>Abroscopus albogularis</i>	Rufous-faced Warbler	Least Concern
437	<i>Cettia brunnifrons</i>	Grey-sided Bush Warbler	Least Concern
438	<i>Cettia fortipes</i>	Brown-flanked Bush Warbler	Least Concern
439	<i>Cettia flavolivacea</i>	Aberrant Bush Warbler	Least Concern
440	<i>Cettia castaniceps</i>	Chestnut-crowned Warbler	Least Concern
441	<i>Cettia pallidipes</i>	Pale-footed Bush Warbler	Least Concern
442	<i>Acrocephalus dumetorum</i>	Bylth's Reed Warbler	Least Concern
443	<i>Phylloscopus affinis</i>	Tickle's Leaf Warbler	Least Concern
444	<i>Phylloscopus cantator</i>	Yellow-vented Warbler	Least Concern
445	<i>Phylloscopus inornatus</i>	Yellow-browed Warbler	Least Concern
446	<i>Phylloscopus maculipennis</i>	Ashy-throated Warbler	Least Concern
447	<i>Phylloscopus magnirostris</i>	Large-bellied Leaf Warbler	Least Concern
448	<i>Phylloscopus pulcher</i>	Buff-barred Warbler	Least Concern
449	<i>Phylloscopus reguloides</i>	Blyth's Leaf Warbler	Least Concern
450	<i>Phylloscopus trochiloides</i>	Greenish Warbler	Least Concern
451	<i>Phylloscopus chloronotus</i>	Lemon-rumped Warbler	Least Concern
452	<i>Seicercus affinis</i>	White-spectacled Warbler	Least Concern
453	<i>Seicercus poliogenys</i>	Grey-cheeked Warbler	Least Concern
454	<i>Seicecus whistleri</i>	Whistler's Warbler	Least Concern
455	<i>Seicercus xanthoschistos</i>	Grey-hooded Warbler	Least Concern
456	<i>Abroscopus schisticeps</i>	Black-faced warbler	Least Concern
457	<i>Tickellia hodgsoni</i>	Broad-billed Warbler	Least Concern
458	<i>Bradypterus luteoventris</i>	Brown Bush Warbler	Least Concern
459	<i>Phylloscopus fuscatus</i>	Dusky Warbler	Least Concern
Woodpeckers			
460	<i>Blythipicus pyrrhotis</i>	Bay Woodpecker	Least Concern
461	<i>Celeus brachyurus</i>	Rufous Wood Pecker	Least Concern
462	<i>Dendrocopos canicapillus</i>	Grey-capped Pygmy Woodpecker	Least Concern

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463	<i>Dendrocopos macei</i>	Fulvous-breasted Woodpecker	Least Concern
464	<i>Dendrocopos cathpharius</i>	Crimson-breasted Woodpecker	Least Concern
465	<i>Dendrocopos darjellensis</i>	Darjeeling Woodpecker	Least Concern
466	<i>Picus canus</i>	Grey-headed Woodpecker	Least Concern
467	<i>Picus chlorolophus</i>	Lesser Yellownape	Least Concern
468	<i>Picus flavinucha</i>	Greater Yellownape	Least Concern
469	<i>Gecinulus grantia</i>	Pale-headed Woodpecker	Least Concern
470	<i>Picus xanthopygaeus</i>	Streak-throated Woodpecker	Least Concern
471	<i>Chrysocolaptes lucidus</i>	Greater Goldenback	Least Concern
472	<i>Dinopium shorii</i>	Himalayan Goldenback	Least Concern
473	<i>Dinopium benghalense</i>	Lesser Goldenback	Least Concern
474	<i>Picumnus innominatus</i>	Speckled Piculet	Least Concern
475	<i>Sasia ochracea</i>	White-browed Piculet	Least Concern
Woodswallow			
476	<i>Artamus fuscus</i>	Ashy Woodswallow	Least Concern
Heron			
477	<i>Ardea insignis</i>	White Bellied Heron	Critically endangered

Appendix VIII: Checklist of mammals of GFD(excluding bats)

Sl. No.	Scientific Name	Common Name	Family	IUCN Status	FNCA1995
1	<i>Muntiacus muntjak</i>	Barking Deer	Cervidae	Least Concern	
2	<i>Paguma larvata</i>	Masked Palm Civet	Viverridae	Least Concern	
3	<i>Capricornis sumatraensis</i>	Himalayan Serow	Bovidae	Vulnerable	Schedule I
4	<i>Sus scrofa</i>	Wild boar	Suidae	Least Concern	
5	<i>Bos Gaurus</i>	Gaur	Bovidae	Vulnerable	Schedule I
6	<i>Catopuma temmincki</i>	Golden Cat	Felidae	Near Threatened	
7	<i>Panthera pardus</i>	Leopard	Felidae	Vulnerable	Schedule I
8	<i>Prionailurus bengalensis</i>	Leopard cat	Felidae	Least Concern	Schedule I

Sl. No.	Scientific Name	Common Name	Family	IUCN Status	FNCA1995
9	<i>Macaca assaamensis</i>	Assamese Macaque	Cercopithecidae	Near Threatened	
10	<i>Callosciurus pygerythrus</i>	Hoary bellied squirrel	Sciuridae	Least Concern	
11	<i>Cuon alpinus primaevus</i>	Dhole	Canidae	Endangered	
12	<i>Martes flavigula</i>	Himalayan Yellow-Throated Marten	Mustelidae	Least Concern	
13	<i>Nemorhaedus goral</i>	Goral	Bovidae	Near Threatened	
14	<i>Atherurus macrourus</i>	Asiatic Bursh-Tailed Porcupine	Hystricidae	Least Concern	
15	<i>Ursus thibetanus</i>	Himalayan Black Bear	Ursidae	Vulnerable	Schedule I
16	<i>Pardofelis marmorata</i>	Marbled cat	Felidae	Near Threatened	
17	<i>Prionodon pardicolor</i>	Spotted Lin-sang	Prionodontidae	Least Concern	
18	<i>Rusa unicolor</i>	Sambar	Cervidae	Vulnerable	
19	<i>Semnopithecus entellus</i>	Gray Langur	Cercopithecidae	Least Concern	
20	<i>Ailurus fulgens</i>	Red Panda	Ailuridae	Endangered	Schedule I
21	<i>Elephas maximus</i>	Asian Elephant	Elephantidae	Endangered	Schedule I
22	<i>Panthera tigris</i>	Tiger	Felidae	Endangered	Schedule I
23	<i>Mustela siberica</i>	Siberian Weasel	Mustelidae	Least Concern	
24	<i>Nemorhaedus goral</i>	Goral	Bovidae	Near Threatened	
25	<i>Neofelis nebulosa</i>	Clouded Leopard	Felidae	Vulnerable	
26	<i>Manis pentadactyla</i>	Chinese Pangolian	Manidae	Critically endangered	
27	<i>Moschus chrysogaster</i>	Musk Deer	Moschidae	Endangered	Schedule I
28	<i>Lutra lutra</i>	Eurasian Otter	Mustelidae	Near Threatened	

Appendix IX: Checklist of bats of GFD

Sl.No	Species	Family
1	<i>Hipposideros armiger</i>	Hipposideridae
2	<i>Myotis siligorensis</i>	Vespertilionidae
3	<i>Myotis longipes</i>	Vespertilionidae
4	<i>Rhinolophus afnis</i>	Rhinolophidae
5	<i>Rhinolophus luctus</i>	Rhinolophidae
6	<i>Rhinolophus pusillus</i>	Rhinolophidae
7	<i>Rhinolophus lepidus</i>	Rhinolophidae
8	<i>Rhinolophus sinicus</i>	Rhinolophidae
9	<i>Rhinolophus macrots</i>	Rhinolophidae
10	<i>Miniopterus fuliginosus</i>	Miniopteridae

Appendix X : Checklist of Fishes of GFD

Sl. No.	Scientific Name	Common Name	Location	Source
1	<i>Aborichthys sp.</i>	Loach	Jigmechhu and Toorsa	(BES, 2020) & (NRDCR&LF, 2016)
2	<i>Amblyceps apangi</i>			(BES, 2020) & (NRDCR&LF, 2016)
3	<i>Amblyceps arunchalensis</i>			(BES, 2020) & (NRDCR&LF, 2016)
4	<i>Amblyceps cerinum</i>			(BES, 2020) & (NRDCR&LF, 2016)
5	<i>Anguilla bengalensis</i>		Jigmechhu and Toorsa	(BES, 2020) & (NRDCR&LF, 2016)
6	<i>Aspidoparia morar</i>			(BES, 2020) & (NRDCR&LF, 2016)
7	<i>Badis badis</i>	Dwarf chameleonfish	Raidak	(BES, 2020) & (NRDCR&LF, 2016)
8	<i>Barilius barna</i>	Barna baril	Jigmechhu and Toorsa	(BES, 2020) & (NRDCR&LF, 2016)
9	<i>Barilius bendelesis</i>	Baril	Jigmechhu and Toorsa	(BES, 2020) & (NRDCR&LF, 2016)
10	<i>Barilius vagra</i>	Vagra baril	Jigmechhu and Toorsa	(BES, 2020) & (NRDCR&LF, 2016)

Sl. No.	Scientific Name	Common Name	Location	Source
11	<i>Chagunius chagunio</i>	Chaguni	Jigmechhu and Toorsa	(BES, 2020) & (NRDCR&LF, 2016)
12	<i>Channa gachua</i>			(BES, 2020) & (NRDCR&LF, 2016)
13	<i>Channa melanostigma</i>			(BES, 2020) & (NRDCR&LF, 2016)
14	<i>Channa punctatus</i>			(BES, 2020) & (NRDCR&LF, 2016)
15	<i>Crossocheilus latius</i>		Jigmechhu and Toorsa	(BES, 2020) & (NRDCR&LF, 2016)
16	<i>Danio dangila</i>		Raidak	(BES, 2020) & (NRDCR&LF, 2016)
17	<i>Danio rerio</i>	Zebra danio	Jigmechhu and Toorsa	(BES, 2020) & (NRDCR&LF, 2016)
18	<i>Devario aequipinnatus</i>		Jigmechhu and Toorsa	(BES, 2020) & (NRDCR&LF, 2016)
19	<i>Garra annandelei</i>	Stone roller	Jigmechhu and Toorsa	(BES, 2020) & (NRDCR&LF, 2016)
20	<i>Garra gotyla</i>	Stone roller	Jigmechhu and Toorsa	(BES, 2020) & (NRDCR&LF, 2016)
21	<i>Glyptothorax panda</i>			(BES, 2020) & (NRDCR&LF, 2016)
22	<i>Labeo dyocheilus</i>			(BES, 2020) & (NRDCR&LF, 2016)
23	<i>Labeo pungusia</i>		Jigmechhu	(BES, 2020) & (NRDCR&LF, 2016)
24	<i>Lepidocephalichthys guntea</i>			(BES, 2020) & (NRDCR&LF, 2016)
25	<i>Mastacembelus armatus</i>	Spiny eel	Jigmechhu and Toorsa	(BES, 2020) & (NRDCR&LF, 2016)
26	<i>Neolissochilus dukai</i>			(BES, 2020) & (NRDCR&LF, 2016)
27	<i>Neolissochilus hexagonolepis</i>	Chocolate Mahseer	Jigmechhu, Amochhu and Melum Chhu	(BES, 2020) & (NRDCR&LF, 2016)
28	<i>Olyra longicaudata</i>			(BES, 2020) & (NRDCR&LF, 2016)
29	<i>Oreichtys crenucliodes</i>			(BES, 2020) & (NRDCR&LF, 2016)

Sl. No.	Scientific Name	Common Name	Location	Source
30	<i>Paracanthocobitis abutwebi</i>			(BES, 2020) & (NRDCR&LF, 2016)
31	<i>Pethia ticto</i>	Rosy barb	Jigmechhu and Toorsa	(BES, 2020) & (NRDCR&LF, 2016)
32	<i>Pseudochenesis sulcatus</i>			(BES, 2020) & (NRDCR&LF, 2016)
33	<i>Pseudolaguvia shawi</i>			(BES, 2020) & (NRDCR&LF, 2016)
34	<i>Psilorhynchus balitora</i>			(BES, 2020) & (NRDCR&LF, 2016)
35	<i>Pterocryptis barakensis</i>		Jigmechhu	(BES, 2020) & (NRDCR&LF, 2016)
36	<i>Puntius sophore</i>			(BES, 2020) & (NRDCR&LF, 2016)
37	<i>Schistura beavani</i>			(BES, 2020) & (NRDCR&LF, 2016)
38	<i>Schistura reticulofasciata</i>			(BES, 2020) & (NRDCR&LF, 2016)
39	<i>Schizothorax progastas</i>	Snow trout	Jigmechhu and Amochhu	(BES, 2020) & (NRDCR&LF, 2016)
40	<i>Schizothorax richardsonii</i>	Snow trout	Jigmechhu, Melum Chhu and Toorsa	(BES, 2020) & (NRDCR&LF, 2016)
41	<i>Semiplotus semiplotus</i>	Assamese King Fish	Jigmechhu and Amochhu	(BES, 2020) & (NRDCR&LF, 2016)
42	<i>Tor putitora</i>	Golden Mahseer	Jigmechhu and Toorsa	(BES, 2020) & (NRDCR&LF, 2016)
43	<i>Xenontodon Cancilla</i>	Needle fish	Jigmechhu	(BES, 2020) & (NRDCR&LF, 2016)

Appendix XI: Checklist of Butterflies of GFD

Sl. No.	Scientific Name	Common Name	Family
1	<i>Spalgis epeus</i>	Apefly	Lycaenidae
2	<i>Doleschallia bisaltidae</i>	Autumn Leaf	Nymphalidae
3	<i>Prosotas aluta</i>	Banded Lineblue	Lycaenidae
4	<i>Lethe confusa</i>	Banded Treebrown	Nymphalidae
5	<i>Borbo bevani</i>	Bevan's Swift	Hesperiidae
6	<i>Rohana paristis</i>	Black Prince	Nymphalidae
7	<i>Athyma ranga</i>	Blackvein Sergeant	Nymphalidae
8	<i>Junonia orithya</i>	Blue Pansy	Nymphalidae
9	<i>Tirumala limniace</i>	Blue Tiger	Nymphalidae
10	<i>Symbrenthia niphanda</i>	Blue-tail Jester	Nymphalidae
11	<i>Burura oedipodea</i>	Branded Orange Awlet	Hesperiidae
12	<i>Curetis bulis</i>	Bright Sunbeam	Lycaenidae
13	<i>Basamia exclamationis</i>	Brown Awl	Hesperiidae
14	<i>Arhopala centaurus</i>	Centaur Oakblue	Lycaenidae
15	<i>Odontoptilum angulata</i>	Chestnut Angle	Hesperiidae
16	<i>Lambrix salsala</i>	Chestnut Bob	Hesperiidae
17	<i>Parantica sita</i>	Chestnut Tiger	Nymphalidae
18	<i>Appias lycida</i>	Chocolate Albatross	Pieridae
19	<i>Ancistroides nigrita</i>	Chocolate Demon	Hesperiidae
20	<i>Ramelana janggala</i>	Chocolate Royal	Lycaenidae
21	<i>Parantica melaneus</i>	Chocolate Tiger	Nymphalidae
22	<i>Hestina nama</i>	Circe	Nymphalidae
23	<i>Libythea myrrha</i>	Club Beak	Nymphalidae
24	<i>Cigaritis syama</i>	Club Silverline	Lycaenidae
25	<i>Athyma nefte</i>	Colour Sergeant	Nymphalidae
26	<i>Stiboges nymphidia</i>	Columbine	Riodinidae
27	<i>Moduza procris</i>	Commander	Nymphalidae
28	<i>Surendra quercetorum</i>	Common Acacia Blue	Lycaenidae
29	<i>Libythea lepita</i>	Common Beak	Nymphalidae
30	<i>Graphium sarpedon</i>	Common Bluebottle	Papilionidae
31	<i>Mycalesis perseus</i>	Common Bushbrown	Nymphalidae

Sl. No.	Scientific Name	Common Name	Family
32	<i>Ariadne merione</i>	Common Castor	Nymphalidae
33	<i>Jamides celeno</i>	Common Cerulean	Lycaenidae
34	<i>Anthene emolus</i>	Common Ciliate Blue	Lycaenidae
35	<i>Euploea core</i>	Common Crow	Nymphalidae
36	<i>Oriens goloides</i>	Common Dartlet	Hesperiidae
37	<i>Tanaecia julii</i>	Common Earl	Nymphalidae
38	<i>Ypthima baldus</i>	Common Fivering	Nymphalidae
39	<i>Rapala nissa</i>	Common Flash	Lycaenidae
40	<i>Lethe insana</i>	Common Forester	Nymphalidae
41	<i>Ypthima huebneri</i>	Common Four-ring	Nymphalidae
42	<i>Poritia hewitsoni</i>	Common Gem	Lycaenidae
43	<i>Neptis sappho</i>	Common Glider (Pallas's Sailer)	Nymphalidae
44	<i>Eurema hecabe</i>	Common Grass yellow	Lycaenidae
45	<i>Cepora nerissa</i>	Common Gull	Pieridae
46	<i>Acytolepis puspa</i>	Common Hedge Blue	Lycaenidae
47	<i>Cheritra freja</i>	Common Imperial	Lycaenidae
48	<i>Symbrenthia lilaea</i>	Common Jester	Nymphalidae
49	<i>Pantoporia hordonia</i>	Common Lascar	Nymphalidae
50	<i>Phalanta phalantha</i>	Common Leopard	Nymphalidae
51	<i>Chersonesia risa</i>	Common Maplet	Nymphalidae
52	<i>Cyrestis thyodamas</i>	Common Mapwing	Nymphalidae
53	<i>Papilio polytes</i>	Common Mormon	Papilionidae
54	<i>Polyura athamas</i>	Common Nawab	Nymphalidae
55	<i>Horaga onyx</i>	Common Onyx	Lycaenidae
56	<i>Elymnias hypermnestra</i>	Common Palmfly	Nymphalidae
57	<i>Papilio polyctor</i>	Common Peacock	Papilionidae
58	<i>Castalius rosimon</i>	Common Pierrot	Lycaenidae
59	<i>Neopithecops zalmora</i>	Common Quaker	Lycaenidae
60	<i>Neptis hylas</i>	Common Sailer	Nymphalidae
61	<i>Sarangesa dasahara</i>	Common Small Flat	Hesperiidae
62	<i>Tagiades japetus</i>	Common Snow Flat	Hesperiidae
63	<i>Celaenorrhinus leucocera</i>	Common Spotted Flat	Hesperiidae

Sl. No.	Scientific Name	Common Name	Family
64	<i>Hypolycaena erylus</i>	Common Tit	Lycaenidae
65	<i>Lethe rohria</i>	Common Treebrown	Nymphalidae
66	<i>Lethe sidonis</i>	Common Woodbrown	Nymphalidae
67	<i>Pelopidas conjuncta</i>	Conjoined Swift	Hesperiidae
68	<i>Rapala pheretima</i>	Copper Flash	Lycaenidae
69	<i>Vandula erota</i>	Cruiser	Nymphalidae
70	<i>Jamides bochus</i>	Dark Cerulean	Lycaenidae
71	<i>Menlantis leda</i>	Dark Evening Brown	Nymphalidae
72	<i>Abisara fylla</i>	Dark Judy	Riodinidae
73	<i>Heliophorus indicus</i>	Dark Sapphire	Lycaenidae
74	<i>Neptis omeroda</i>	Dingy Sailer	Nymphalidae
75	<i>Arhopala paraganesa</i>	Dusky Bushblue	Lycaenidae
76	<i>Gerosis phisara</i>	Dusky Yellow-breasted Flat	Hesperiidae
77	<i>Zeltus amasa</i>	Fluffy Tit	Lycaenidae
78	<i>Pithecopus corvus</i>	Forest Quaker	Lycaenidae
79	<i>Pseudocoladenia dan</i>	Fulvous Pied Flat	Hesperiidae
80	<i>Euthalia lubemtina</i>	Gaudy Baron	Nymphalidae
81	<i>Parantica aglea</i>	Glassy Tiger	Nymphalidae
82	<i>Heliophorus brahma</i>	Golden Sapphire	Lycaenidae
83	<i>Papilio memnon</i>	Great Mormon	Papilionidae
84	<i>Hebomoia glaucippe</i>	Great Orange Tip	Pieridae
85	<i>Pelopidas assamensis</i>	Great Swift	Hesperiidae
86	<i>Sumalia daraxa</i>	Green Commodore	Nymphalidae
87	<i>Heliophorus androcles</i>	Green Sapphire	Lycaenidae
88	<i>Ticherra acte</i>	Himalayan Blue Imperial	Lycaenidae
89	<i>Potanthus dara</i>	Himalayan Dart	Hesperiidae
90	<i>Ypthima sakra</i>	Himalayan Fiver-ring	Nymphalidae
91	<i>Athyma opalina</i>	Himalayan Sergeant	Nymphalidae
92	<i>Pieris canidia</i>	Indian Cabbage White	Pieridae
93	<i>Argynnis hyperbius</i>	Indian Fritillary	Nymphalidae
94	<i>Arhopala atrax</i>	Indian Oakblue	Lycaenidae
95	<i>Vanessa indica</i>	Indian Red Admiral	Nymphalidae
96	<i>Spialia galba</i>	Indian Skipper	Hesperiidae

Sl. No.	Scientific Name	Common Name	Family
97	<i>Aglais cashmirensis</i>	Indian Tortoiseshell	Nymphalidae
98	<i>Rapala varuna</i>	Indigo Flash	Lycaenidae
99	<i>Elymnias vasudeva</i>	Jezebel Palmfly	Nymphalidae
100	<i>Scobura isota</i>	Khasi Forest Bob	Hesperiidae
101	<i>Lebadea martha</i>	Knight	Nymphalidae
102	<i>Pieris brassicae</i>	Large Cabbage White	Pieridae
103	<i>Cirrochroa aoris</i>	Large Yeoman	Nymphalidae
104	<i>Cethosia cyane</i>	Leopard Lacewing	Nymphalidae
105	<i>Zizina ots</i>	Lesser Grass Blue	Lycaenidae
106	<i>Cepora nadina</i>	Lesser Gull	Pieridae
107	<i>Graphium macareus</i>	Lesser Zebra	Papilionidae
108	<i>Lethe sura</i>	Lilacfork	Nymphalidae
109	<i>Cigaritis lohita</i>	Long-banded Silverline	Lycaenidae
110	<i>Euploea algae</i>	Long-branded Blue Crow	Nymphalidae
111	<i>Megisba malaya</i>	Malayan	Lycaenidae
112	<i>Cyrestis cocles</i>	Marbled Map	Nymphalidae
113	<i>Orsotriana medus</i>	Medus Brown	Nymphalidae
114	<i>Dodona ouida</i>	Mixed Punch	Riodinidae
115	<i>Catopsilia pyranthe</i>	Mottled Emigrant	Pieridae
116	<i>Eurema andersonii</i>	One-spot Grass Yellow	Pieridae
117	<i>Athyma cama</i>	Orange Staff Sergeant	Nymphalidae
118	<i>Bibasis sena</i>	Orange-tail Awl	Hesperiidae
119	<i>Colias erate</i>	Pale Clouded Yellow	Pieridae
120	<i>Neocheritra fabronia</i>	Pale Grand Imperial	Lycaenidae
121	<i>Pseudozizeeria maha</i>	Pale Grass Blue	Lycaenidae
122	<i>Papilio paris</i>	Paris Peacock	Papilionidae
123	<i>Junonia almana</i>	Peacock Pansy	Nymphalidae
124	<i>Neptis cartica</i>	Plain Sailer	Nymphalidae
125	<i>Danaus chrysippus</i>	Plain Tiger	Nymphalidae
126	<i>Anthene lycaenina</i>	Pointed Ciliate Blue	Lycaenidae
127	<i>Niphanda cymbia</i>	Pointed Pierrot	Lycaenidae
128	<i>Stibochiona nicea</i>	Popinjay	Nymphalidae
129	<i>Euthalia monina</i>	Powdered Baron	Nymphalidae

Sl. No.	Scientific Name	Common Name	Family
130	<i>Leptosia nina</i>	Psyche	Pieridae
131	<i>Abisara flegyas</i>	Punchinello	Riodinidae
132	<i>Heliophorus epicles</i>	Purple Sapphire	Lycaenidae
133	<i>Delias pasithoe</i>	Red -base Jezebel	Pieridae
134	<i>Cethosia biblis</i>	Red Lacewing	Nymphalidae
135	<i>Delias descombesi</i>	Red-spot Jezebel	Pieridae
136	<i>Lethe bhairava</i>	Rusty Forester	Nymphalidae
137	<i>Phaedyma columella</i>	Short-banded Sailer	Nymphalidae
138	<i>Rapala manea</i>	Slate Flash	Lycaenidae
139	<i>Pelopidas mathias</i>	Small Banded Swift	Hesperiidae
140	<i>Neptis miah</i>	Small Yellow Sailer	Nymphalidae
141	<i>Elymnias malelas</i>	Spotted Palmfly	Nymphalidae
142	<i>Tagiades menaka</i>	Spotted Snow Flat	Hesperiidae
143	<i>Athyma selenophora</i>	Staff Sergeant	Nymphalidae
144	<i>Parnara guttatus</i>	Straight Swift	Hesperiidae
145	<i>Lethe verma</i>	Straight-banded Treebrown	Nymphalidae
146	<i>Tagiades gana</i>	Suffused Snow Flat	Hesperiidae
147	<i>Neptis soma</i>	Sullied Sailer	Nymphalidae
148	<i>Graphium agamemnon</i>	Tailed Jay	Papilionidae
149	<i>Dodona eugenes</i>	Tailed Punch	Riodinidae
150	<i>Charaxes bernardus</i>	Tawny Rajah	Nymphalidae
151	<i>Eurema blanda</i>	Three-spot Grass Yellow	Pieridae
152	<i>Gandaca harina</i>	Tree Yellow	Pieridae
153	<i>Flos adriana</i>	Variegated Plushblue	Lycaenidae
154	<i>Jamides pura</i>	White Cerulean	Lycaenidae
155	<i>Parasarpa dudu</i>	White Commodore	Nymphalidae
156	<i>Gerosis sinica</i>	White Yellow-breasted Flat	Hesperiidae
157	<i>Euthalia telchinia</i>	White-bordered Blue Baron	Nymphalidae
158	<i>Loxura atymnus</i>	Yamfly	Lycaenidae
159	<i>Delias agostina</i>	Yellow Jezebel	Pieridae
160	<i>Ixias pyrene</i>	Yellow Orange Tip	Pieridae
161	<i>Charaxes marmax</i>	Yellow Rajah	Nymphalidae
162	<i>Polytremis eltola</i>	Yellow-spot Swift	Hesperiidae

Appendix XII: Checklist of Herpetofauna of GFD

SL. No.	Scientific Name	Common Name
Reptiles		
1	<i>Elaphe cantoris</i>	Eastern Trinket snake
2	<i>Trachischium tenuiceps</i>	Yellow belly worm eating snake
3	<i>Bungarus bungaroides</i>	Himalayan krait
4	<i>Trimeresurus albolabris</i>	Green pit viper
5	<i>Trachischium monticola</i>	Mountain worm eating snake
6	<i>Herpetoreas platyceps</i>	Himalayan keelback
7	<i>Daboia russelli</i>	Russells Viper
8	<i>Ovophis monticola</i>	Mountain pit viper
9	<i>Oligodon taeniolatus</i>	Russell's kukri
10	<i>Gloydius himalayanus</i>	Himalayan lance-headed pit viper
11	<i>Indotyphlops braminus</i>	Brahminy blind snake
12	<i>Python molurus</i>	Rock Python
13	<i>Blythia reticulata</i>	Blyths reticulate snake
14	<i>Gekko gekko</i>	Tokay Gecko
Amphibians		
1	<i>Amolops mantzorum</i>	Mouping sucker frog
2	<i>Amolops cf. himalayanus</i>	Himalaya cascade frog
3	<i>Rhachophorus maxima</i>	
4	<i>Rhacophorus translineatus</i>	
5	<i>Xenophrys parva</i>	
6	<i>Hylarana cf. aurantica</i>	
7	<i>Xenophrys cf. major</i>	
8	<i>Nanoran liebighi</i>	
9	<i>Hoplobatrachus tigerinus</i>	Indian Bullfrog
10	<i>Amolops cf. ricketti</i>	
11	<i>Rachophorus maximus</i>	
12	<i>Duttaphrynus melanostictus</i>	Asian Common Toad
13	<i>Duttaphrynus cf. stomaticus</i>	
14	<i>Bufo cf. stuartii</i>	

SL. No.	Scientific Name	Common Name
Crustaceans		
1	<i>Himalayapotamon atkinsonianum</i>	
2	<i>Himalayapotamon emphysetum</i>	
3	<i>Potamiscus aikkimensis</i>	
4	<i>Meydelliathelphsa edentula</i>	

Appendix XIII: Selected images of floral species under GFD



Oberonia acaulis



Dendrobium eriiflorum



Henckelia urticifolia



Rhododendron kesangiae



Leucoseptum cannum



Viburnum nervosum



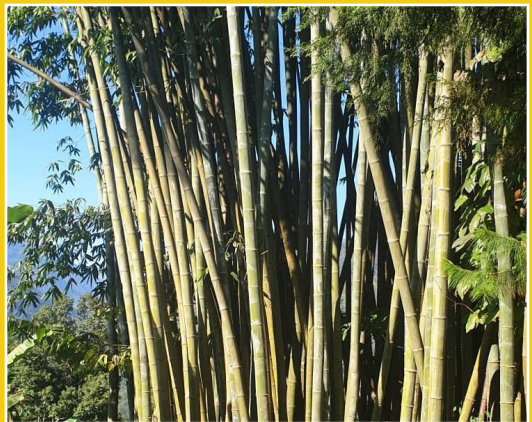
Aphanamixis polystachya



Primula bracteosa



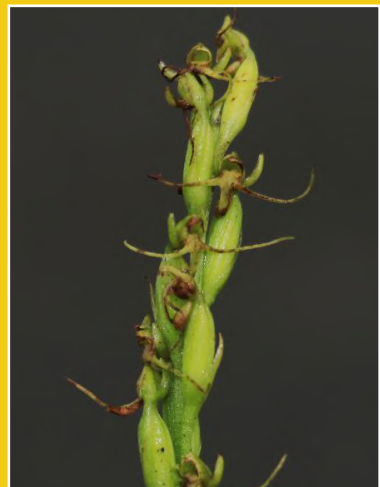
Primula scapigera



Dendrocalamus sikkimense



Wightia speciosissima



Peristylus aristatus

Appendix XIV: Selected images of faunal species under GFD



Panthera tigris



Elephan maximus



Capricornis sumatraensis



Ailurus fulgens



Ursus thibetanus



Bubulcus ibis



Myiophonus caeruleus



Blyth's Reticulate snake



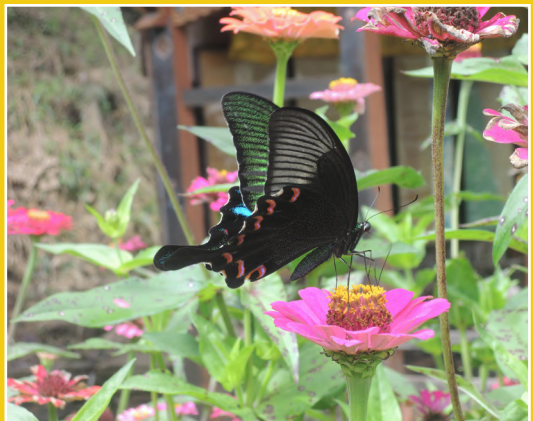
Pantoporia hordonia



Black Panther



Cuon alpinus



Papilio polyctor

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