

Environmental and Social Impact Assessment

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Bhutan: Bunakha Green Power Development Project

Annexes 5 and 6

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First Season
Terrestrial
Biodiversity
Assessment Field
Report

Bunakha Hydropower Project

Druk Green Power Corporation Ltd.

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List of Abbreviations

ADB	Asian Development Bank
D/S	Downstream
E	East
El.	Elevation
EPT	Ephemeroptera Plecoptera and Trichoptera
ESIA	Environmental and Social Impact Assessment
FD	Forest division/Forest Department
RGoB	Royal Government of Bhutan
GWh	Gigawatt-hours
HEP	Hydroelectric Project
IUCN	International Union for Conservation of Nature
kV	Kilo volt
L	Litre
LULC	Land Use land Classification
m	Metre
m ³	metre cube
MW	Megawatt
N	North
NTFPs	Non-Timber Forest Products
PA	Protected Area
RCC	Roller Compacted Concrete
S	Second
S	South
ST	Station
TDS	Total Dissolved Solids
U/S	Upstream

W West

LOA Letter of Award

1 Introduction

1.1 Project Background

The Royal Government of Bhutan has applied for financial assistance under a Project Readiness Financing (PRF) facility from the Asian Development Bank (ADB). The application, titled “BHU: Green Power Project Readiness Enhancement,” seeks funding to support the review and update of the Detailed Project Report (DPR) and the Environmental and Social Impact Assessment (ESIA) for the Bunakha Hydropower Project. The services provided under the project will enhance the readiness and preparedness of the project proponent for securing funding and implementing the Bunakha Hydropower Project.

The Bunakha HEP is a proposed 180 MW project located near the villages of Bunagu and Chanachan. This project is planned to be the most upstream component of a series of at least four projects along the Wangchhu River (Figure 1-2). These include the existing 336 MW Chukha HEP, situated 3.5 km downstream from the proposed Bunakha dam site, the existing 1020 MW Tala HEP, located 15 km downstream, and the proposed 570 MW Wangchhu HEP, with an uncertain distance downstream of Bunakha.

All four plants would function together, with Bunakha HEP acting as a large water storage reservoir. It would operate for peak power generation but also ensure dependable dry season water flow, boosting the downstream plants' total annual electricity production by 932 Gigawatt-hours (GWh).

The project is easily accessible from the Phuntsholing-Thimphu highway. Construction would involve a 197-meter-high dam, a 700-hectare reservoir, and a powerhouse built where the dam meets the riverbed.



Figure 1-1 Project Location

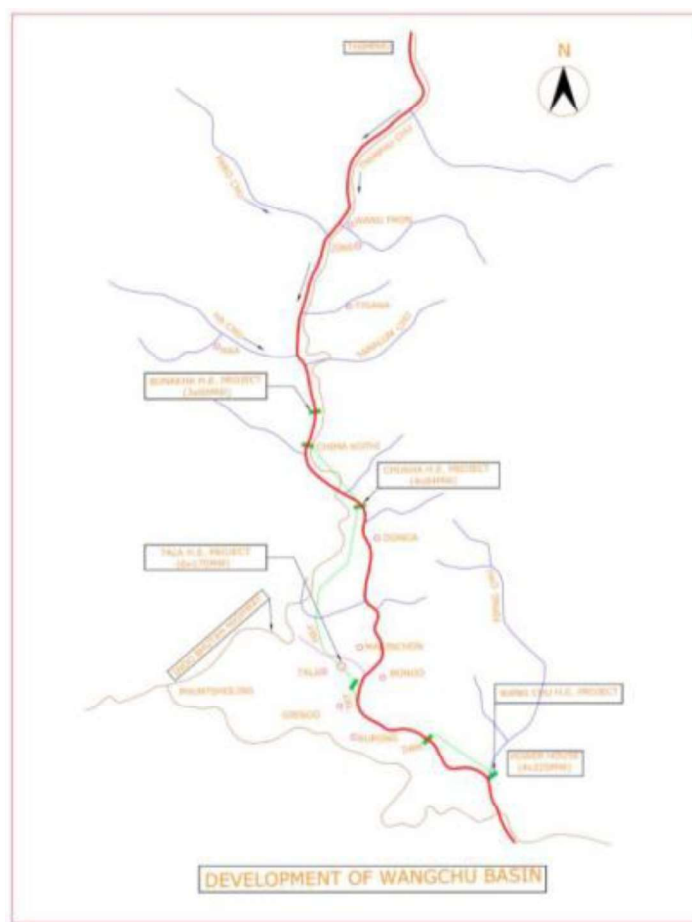


Figure 1-2 Plan View of Hydropower Projects along the Wangchhu River

Additionally, Bunakha HEP will require support facilities like worker housing, material quarries, processing plants, waste disposal sites, new access roads (both permanent and temporary), and transmission lines looping into the nearby 220 kV line.

Table 1 Salient Features of Bunakha HEP as indicated in the DPR (2013)

Project Features	Description
Average annual flow	83.29 m ³ /s
Dam type	Roller Compacted Concrete (RCC)
Height of Dam above deepest Foundation Level	197 m
Gross Storage	329.16 Mcum
Live Storage	250.62 Mcum
Area under Submergence at FRL	6.82 Sq. km
Length of the Reservoir	17.25 km at FRL of EL 2006 m
Total installed capacity	180 MW
Rated head	143.00 m (net)
Turbines	3 Vertical Francis x 60 MW = 180 MW
Design discharge	46.0 m ³ /s
New access road length	7.3 km of new permanent roads / 8.0 km of new temporary roads

Project Features	Description
New transmission line	2 km @ 220 kV to Chukha HEP / 20 km @ 220 kV to Tala HEP
Operating mode	Storage/ Peaking

1.2 Objectives of Survey

The main objective of this survey is to document the terrestrial species of the project area and prepare its base line seasonally.

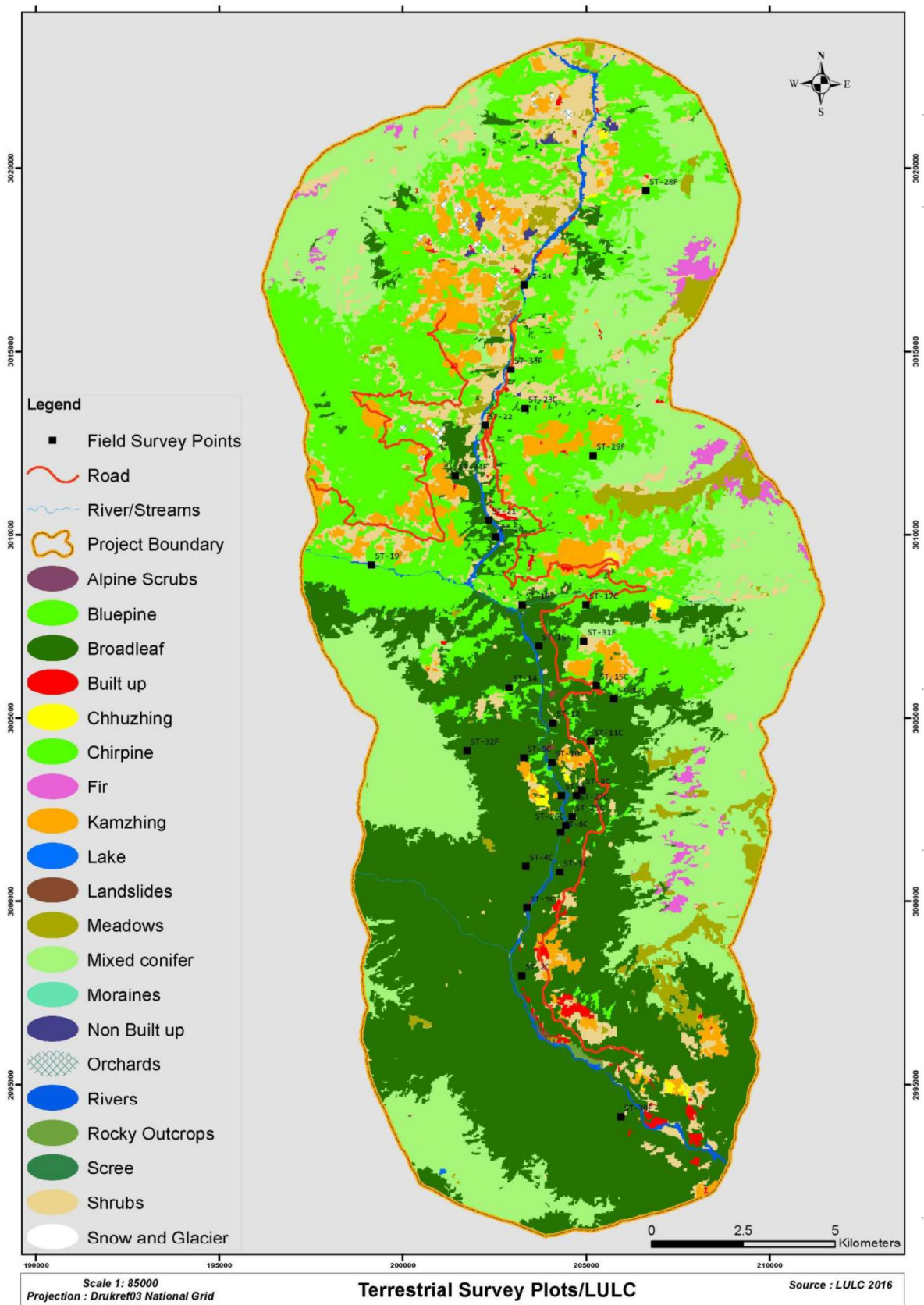


Figure 1-3 Study area showing the sample sites

The terrestrial survey includes a total of 34 sampling points across different forest types. Broadleaf forests have the highest representation with 19 plots, followed by Blue Pine (7 plots), Mixed Conifer (3 plots), Shrubs (4 plots), and Meadows (1 plot) (Table 2). Sampling is distributed across all directions - North, South, East, and West - to ensure comprehensive coverage of the study area.

Table 2 Details of Forest Type Representation

Forest Type	Directions				Total
	N	S	W	E	
Broadleaf	3	14	1	1	19
Blue pine	4	0	1	2	7
Mixed conifer	1	1	1	0	3
Shrubs	1	1	1	1	4
Meadows		1			1
Total terrestrial sampling points					34

Table 3 Details of Sample Plots with Coordinates

Stations	Latitude	Longitude
ST-1	27.04865	89.58015
ST-2	27.09271	89.52858117
ST-3	27.10934833	89.52983167
ST-4	27.119645	89.52952667
ST-5	27.118275	89.53893333
ST-6	27.12977333	89.54044
St-7	27.13701	89.53924333
ST-8	27.13835667	89.54493667
ST-9	27.14623	89.52884
ST-10	27.14516667	89.53651
ST-11	27.15041	89.54724
ST-12	27.15491333	89.536795
ST-13	27.16077833	89.553545
ST-14	27.16363666	89.524805
ST-15	27.16418	89.54866333
ST-16	27.17382667	89.53283667
ST-17	27.183995	89.54582
ST-18	27.183955	89.528225
ST-19	27.19366	89.48675
ST-20	27.20047167	89.52081333
ST-21	27.20481667	89.51885333
ST-22	27.22800833	89.51778333
ST-23	27.23238667	89.52878667
ST-24	27.26261833	89.528415
ST-25	27.13187667	89.542165
ST-26	27.12977333	89.54044
ST-27	27.13694833	89.54331833
ST-28	27.28597167	89.56185833

Stations	Latitude	Longitude
ST-29	27.22088667	89.54762
ST-30	27.05789333	89.55581333
ST-31	27.175095	89.54527
ST-32	27.14795833	89.5132
ST-33	27.2418	89.52477667
ST-34	27.21568167	89.50967167

2 Objectives and Scope of Work

The main objective and scope of this survey is to develop and implement a terrestrial biodiversity baseline study plan and protocol, overseeing proper execution of the baseline study, evaluating the collected data, and ensuring results accurately reflected in reports.

Collect all biological environmental inputs to the ESIA to ensure that the report meets all the TOR requirements (including the ESIA requirements in Appendices A and B) in terms of content, time, and quality as well as documenting project conformance with ADB's Safeguard Policy Statement (2009) and government requirements.

To include biodiversity baseline studies, alternatives analysis, and impact assessment and the development of appropriate biodiversity management plans, covering both upstream and downstream areas, and a Biodiversity Action Plan. Special attention to terrestrial biodiversity, and the Project's conformance with ADB natural and critical habitat requirements.

Provide biodiversity inputs to the environmental flow assessment and cumulative impact assessment.

Document how the project conforms with ADB's safeguard requirements relating to natural and critical habitat.

Provide relevant inputs related to biodiversity aspects to the tender documents. Support the implementing agency to evaluate the bids if applicable

3 Study Survey Area (geophysical location, area, vegetation) and Methods

3.1 Survey design

3.1.1 Vegetation Sampling

Approaches for vegetation sampling were as follows.

The existing aerial photographs have been utilized to delineate different forest and vegetation types, as well as their status, and transfer this information onto topographic maps for field surveys. Vegetation sampling plots have been identified on the topographic maps for all forest types and statuses within direct impact zones, along with representative sites for indirect impact zones. The quadrant method has been applied for field studies in direct impact zones to record biodiversity, forest status, wood volume, and other non-timber forest products (NTFPs).

The equipment and materials used for the survey were SW map to locate survey plots location and transect routes, suunto compass to read aspect of sample location, suunto clinometer to read the slope percentage, diameter tape to measure tree diameter at breast height, measuring tape to lay out sample plot, knife to blaze tree bark, red paint and brush to mark sample plot number, binocular to assist floral and faunal identification, digital camera/ mobile to capture pictures of flora, fauna, birds, butterflies and herpetofauna, polythene bag to collect plant specimens, old newspaper to press plant specimens, mounting frame to press plant specimens and hand gloves to catch herpetofauna for identification. Related books and manuals were referred to assist the field identification.

Prepare baseline of the terrestrial flora with maps for direct impact zones to show forest types and distribution, plant categories, status of endangered, rare, threatened, vulnerable and protected plant species, plant biodiversity, lichen flora, biomass volume and survey of forest quality sufficient to inform net loss calculations, etc.

The grids (1kmX1km) have been laid over the Project Area of Influence (AoI) that is 5 km from the project components. 27 sample plots have been selected on alternate grids with focus on the inundation area (one each on right and left banks). The points falling on agricultural/developed areas and inaccessible areas have been adjusted in different grids. The AoI representative samples for different forest types has been selected as per LULC 2016. Seven sample plots beyond project area have been selected randomly to cover AoI, conditional on accessibility.

A sample plot size of 20mx20m has been laid in every identified location with a minor plot of 2mx2m in the center of the main plot. All vegetation with more than 1.3m in height were recorded in tree data form including shrubs. Regeneration of tree species were recorded within the minor plot of 2mx2m including the ground cover (herbs and shrubs) and saplings of tree species. Individual tree species of 10 cm DBH (diameter at breast height) were recorded in the plot. Within the laid out 20 x 20m plots, general detail such as GPS coordinates, altitude, slope, soil and forest types, canopy density, any direct or indirect signs (tracks, scat, hair, rooting and scratch marks) of faunal diversity, degree of biotic disturbances, etc were recorded.

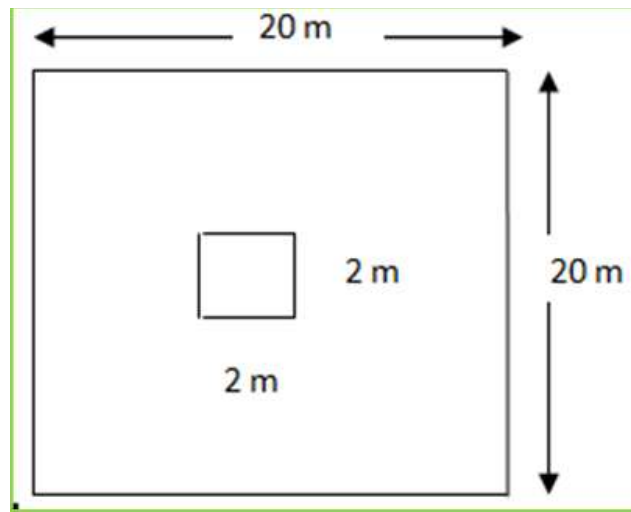


Figure 3-1 Field survey on vegetation in Bunakha HEP project area

3.1.2 Mammal Survey

The study methodology and approaches are as follow:

The assessment began with the collection and review of available secondary literature and terrestrial fauna maps to identify typical and critical wildlife habitats. The mammal survey was carried in the vegetation survey plot described in 3.1.1 and transect of 500m in both directions of the plot. Field surveys in the direct impact zones were focussed on mammals through direct habitat observation, analysis of pug marks and fecal droppings, and gathering information from local communities. A baseline of terrestrial fauna was prepared with mapped data for both direct and indirect impact zones to support subsequent assessment studies. Sign surveys were conducted along trails and riverbanks, with impression pad recordings and call-hearing surveys from vantage points. The presence of crop-raiding animals was documented, along with records from the Division Forest Office (DFO) on human-wildlife conflicts and road kill incidents. Direct observation surveys were employed where distance sampling is challenging, particularly along trails and difficult terrains. The survey time started from morning and continued till evening. There was no fixed time for any species in any plot as it depends on the time reached on the plot from camp and then proceeded to the next plot for mammal, bird species and vegetation survey.

Mammal transect survey were carried in the sampled biodiversity monitoring grids of 4x4 km in the protected area (PAs) and Forest divisions (FDs). Within each 4x4 km grid, trail transects of 3-5 km depending on the accessibility of the area were walked covering major habitat types within the grid. Mammal sightings and signs including tracks, scats, dung/droppings, scratch marks, etc., encountered on the trail transect were recorded. If the area found inaccessible, 3-5 shorter trail transects of each at least 1 km were searched for mammal and their signs. GPS location at every 500m distance covered were recorded in the datasheet even if there were no animal or sign observed. In case if direct sighting, species, GPS location details, number of animals seen and sex and age of the animal were recorded. For encounter of animal signs, recorded species, sign type, GPS location details and habitat type of the areas as per the datasheet were recorded. In case of animal trails, each trail set was considered as one sign (not each pugmark as one sign). If an animal continues to walk along a trail for a long distance in the same direction, then this was considered as one sign. If no sign seen on the track for over 50m then encountering a fresh

track set was considered as a new sign. Photographic records with proper scale reference and GPS location were taken if there is difficulty in sign identification.

3.1.3 Bird Survey

The assessment began with the collection and review of secondary literature and avifauna maps to identify typical and critical bird habitats. Field surveys in the direct impact zones were focussed on birds through direct observation. The bird survey used MacKinnon bird listing as advised by DGPC environment team, survey in the vegetation plot and 500m in both directions of the plot. One transect was taken for each plot which starts from road head to the survey plot. 34 transects were recorded for 34 survey plots and arranged based on survey plot location. In transect, species sign, call or observation were recorded. The list of species for each transect were prepared and compared. A baseline of avifauna was prepared with mapped data for subsequent assessment studies. Call recordings were taken, particularly for pheasants and any migratory birds arrived for breeding.

Different methods were used for different bird species. For common species, trail transect or any survey method adequately gathers data on common species. MacKinnon Listings were followed for this purpose. For rare species, trail transect combined with special search effort (combing or flushing) in their habitat enabled to gather enough data on rare species. For instance, Wood Snipe which is rare as well as cryptic species were given special search or acoustic survey methods. Colonial species: Counting huge colonial species is difficult; therefore, colonies were counted. For example, Nepal House Martin colonies between Chendebji and Mangde Zam. For nocturnal species, species which are active during the dusk were adequately surveyed using night vision binoculars, and listening to the bird calls.

Observations were made using binoculars along trails, ridges, riverbanks, and rock faces, with particular attention to nesting birds. Surveys were extended up to El. 2100 m in elevation (above the Full Reservoir Level of El. 2008 m) and were also covered access roads, muck disposal sites, and quarry locations.

3.1.4 Butterfly and Moths

The butterfly survey was carried out along the trasects and in and around the sample plots. The insects were captured by net, taken photographs and released the insects or taken photographs while landing on the branches of undergrowths and flowers. The butterfly was counted and recorded, identified at sites or by referring books. The habitat of the butterfly in the project areas was also recorded.

3.2 Data Management (field data collection, data storage/database, data analysis against survey components)

Field data has been collected by the trained field technician in direct supervision of the technical national expert. The data has been collected in the designated format provided in printed form. The data has been entered into a spreadsheet. Once the data entry was done, the list of species, frequency, and density has been estimated as per the information collected. Density of bird was estimated by using the length surveyed with the average width to estimate area and then dividing with number in hectare. Diversity as nuber of species per unit area and important value index was calculated based on the dominance.

4 Results

4.1 Vegetation with conservation significance

The survey was carried out from 4-14 April 2025 during pre-monsoon. The forest cover of Chukha District is 88.52% of the total land area of the district (National land Commission, 2020). The elevation varies from 200m to 3500 m above sea level. The forest types in Chukha district ranges from low sub-tropical forest to high altitude Rhododendron Forest. Depending on the floristic characteristics, the forest types classified are Rhododendron and Fir forests (>3100 masl), Cool broadleaved forest (2000-2900 masl), Warm broadleaved forest (2000-3000 masl) and subtropical broadleaved forest (150-1000 masl) (Gedu Forest Division, 2021). The major forest cover is Broadleaf forest (73.11%), followed by Mixed conifer forest (12.30%), Bluepine forest (2.67%) and Fir Forest (1.18%) (Gedu Forest Division, 2021). The habitat types in the study area are broadleaved forest (cool broadleaved forest, warm broadleaved forest and shrub land), Blue Pine Forest, Mixed Conifer Forest and meadow. The habitat types in the project areas are broadleaved forest (cool broadleaved forest, warm broadleaved forest and riparian forest), Blue Pine Forest and Mixed Conifer Forest. This is similar to the national forest types which is broadleaved forest (cool-28% & warm 25%) followed by fir forests (16%) and sub-tropical forest (13%) (NBSAP 2025).

A total of 10 invasive plant species with six plant species native to Bhutan and four plant species alien to Bhutan have been identified in the project area. The list of invasive plant species is provided in table 4.

Table 4 List of invasive plant species in the project area

Sl. No.	Family	Scientific name	Remarks
1	Asteraceae	<i>Bidens pilosa</i>	Alien to Bhutan
2	Asteraceae	<i>Senecio diversifolia</i>	Alien to Bhutan
3	Equisetaceae	<i>Equisetum diffusum</i>	Native to Bhutan
4	Lamiaceae	<i>Perilla frutescens</i>	Native to Bhutan
5	Poaceae	<i>Oplismenus hirtellus</i>	Alien to Bhutan
6	Polygonaceae	<i>Rumex nepalensis</i>	Native to Bhutan
7	Polygonaceae	<i>Persicaria capitata</i>	Native to Bhutan
8	Solanaceae	<i>Solanum viarum</i>	Alien to Bhutan
9	Urticaceae	<i>Urtica dioica</i>	Native to Bhutan
10	Urticaceae	<i>Pilea spp</i>	Native to Bhutan

		
Broadleaf forest	Riparian forest	Blue Pine Forest @April 2025

		
Mixed Conifer Forest	Shrub land	Meadow @ April 2025

Total forty-six species of trees, forty-two species of shrubs and forty-two species of herbs were recorded in the plots surveyed (Annex 5.2). There are reported 5390 species of seed plants in Bhutan and more than 200 plant species are used in Bhutanese traditional medicine (NBSAP 2025). Of these *Acer campbellii* (Himalayan maple), *Betula alnoides* (Himalayan birch), *Carpinus viminea* (Himalayan hornbeam), *Pinus wallichiana* (Blue pine) and *Acer oblongum* (Evergreen maple) are listed in schedule II of Forest and Nature Conservation Act, 2023 (FNCA). The Department of Forest and Park Services shall allow cultivation, collection or trade of this species listed in the schedule II of FNCA as per the procedure prescribed in the Rules.

Alnus nepalensis (Himalayan Alder), *Rhododendron arboreum* (Rhodo), *Lyonia ovalifolia* (Fetterbush), *Rhododendron griffithianum*, *Macaranga pustulata* (Blistery Macaranga), *Quercus oxyodon* (Sharp-toothed oak), *Quercus glauca* (Japanese blue oak), *Quercus lanata* (Ban oak), *Lithocarpus fenestratus* (Stone oak), *Persea spp* (Wild avocado), *Picea spinulosa* (Spruce), *Quercus semicarpifolia* (Brown oak), *Quercus griffithii* (Oak), *Edgeworthia gardneri* (Indian paper tree), *Daphne bholua* (Paper daphne), *Rhododendron triflorum* are listed in schedule II of Forest and Nature Conservation Act, 2023 (FNCA). The Department of Forest and Park Services shall allow cultivation, collection or trade of this species listed in the schedule II of FNCA as per the procedure prescribed in the Rules.

Paris polyphylla commonly known as Himalayan Paris) is a valuable medicinal plant and listed under schedule III of Forest and Nature Conservation Act, 2023(FNCA). The Department of Forest and Park Services shall allow cultivation, collection or trade of this species listed in the schedule III of FNCA as per the procedure prescribed in the Rules. The IUCN status of *Paris polyphylla* is vulnerable. Bhutan has legalized *Paris polyphylla* in 2015 to ensure sustainable and restricted harvesting (Bhutan Trust Fund 2017). *Paris polyphylla* has been found in the sample plot of forest representation but not in the project area area. So, it was not disturbed from its natural habitat.

Piper pedicellatum is commonly known as long pipla in Bhutan and categorized as vulnerable under IUCN status. It is collected for medicinal purpose. *Piper pedicellatum* has been found within the project area. Its rescue from the project area is not required since it is found in the country's broadleaved forests.

Tetracentron sinense (Qing pi tree) commonly known as leaf spur is listed in Appendix III of CITES. The international trade in this plant is regulated.

A total of 34 vegetation species has been listed in IBAT of which six species are critically endangered, eleven species are endangered and remaining 16 species are vulnerable (Table 5).

Table 5 Vegetation IBAT species and CH-triggering species

SN	Scientific_name	Common_name	IUCN Category	IUCN Population trend	Absence/ Presence (based on IBAT & literature review)	Alt.range (m) (from-to)	Distribution (Locations or in district)	CH-triggering
1	<i>Trillium tschonoskii</i>	Keun-yeon-yeong-cho	EN	De	P	1800-2100	Eastern slope of Dochula, Punakha	
2	<i>Bulbophyllum leopardinum</i> var. <i>tuberculatum</i>		CR	un	P	1400-2000	Haa	✓
3	<i>Cheirostylis sherriffii</i>		CR	un	P	Above 2000	Central & southern regions of Bhutan	
4	<i>Oreorchis sanguinea</i>		CR	un	P	1200-2200	Samdrup Jongkhar & central regions of Bhutan	
5	<i>Bambusa clavata</i>		VU	De	P	400-600	Samdrup Jongkhar & Phuentsholing	
6	<i>Drepanostachyum annulatum</i>		VU	un	P	up to 3400	Chukha	✓
7	<i>Carex nigra</i> subsp. <i>drakyulensis</i>		EN	un	P	2450-2900	Bumtnag	
8	<i>Oryza malampuzhaensis</i>		VU	De	A			
9	<i>Paris polyphylla</i>	Love Apple	VU	De	P	1800-3300	Samdrup Jongkhar, Trashigang, Pema Gatsel & Chukha	✓
10	<i>Trillium govanianum</i>	Himalayan Trillium	EN	De	P	2500-4000	Border himalayan range of Bhutan	
11	<i>Dactylorhiza hatagirea</i>	Salampanja	EN	De	P	2800-4200	Himalayan regions of Bhutan	
12	<i>Fritillaria cirrhosa</i>	Yellow Himalayan Fritillary	VU	De	P	3200-5000	Himalayan regions of Bhutan	

SN	Scientific_name	Common_name	IUCN Category	IUCN Populat ion trend	Absence/ Presence (based on IBAT & literature review)	Alt.range (m) (from-to)	Distribution (Locations or in district)	CH-triggering
13	<i>Nardostachys jatamansi</i>	Indian Nard	CR	De	P	3000-5000	Himalayan regions of Bhutan	
14	<i>Podophyllum hexandrum</i>	Himalayan Mayapple	EN	De	P	2000-4500	Himalayan alpine zone of Bhutan	
15	<i>Mesua ferrea</i>	Churuli	VU	De	P	300-1500	Trpical & subtropical regions of Bhutan	√
16	<i>Ceropegia bhutanica</i>		EN	un	P	>2000	Eastern himalayas within Bhutan	
17	<i>Corallodiscus cooperi</i>		VU	De	P	1900-2200	Dodena, Thimphu	√
18	<i>Isodon atroruber</i>		EN	un	P	2117-2550	Thimphu & Lhuentse	
19	<i>Buddleja bhutanica</i>		VU	un	P	1700	Bhutan	
20	<i>Meconopsis superba</i>		EN	St	P	3500-4494	JDNP & JKSNR, Bumthang, Gasa, Haa & Punakha	√
21	<i>Hoya bhutanica</i>		EN	un	P	150-1800	Gelephu, Mongar & Lhuentse	
22	<i>Pedicularis griniformis</i>		VU	un	P	3000-3900	Eastern Himalayan regions of Bhutan to Bhutan	
23	<i>Saxifraga vacillans</i>		VU	un	P	upto 1500	Thimphu, Punakha, Wangdue Phodrang, Trashigang, Lhuentse & Mongar	√
24	<i>Meconopsis bhutanica</i>		CR	De	P	4351-4494	JDNP	
25	<i>Astragalus paroensis</i>		CR	un	P	2000-6000	Bhutan	
26	<i>Strobilanthes accrescens subsp. accrescens</i>		EN	un	P	1800-3000	Haa, Paro, Thimphu, Bumthang	√
27	<i>Beilschmiedia clarkei</i>		VU	un	P		Bhutan	

SN	Scientific_name	Common_name	IUCN Category	IUCN Populat ion trend	Absence/ Presence (based on IBAT & literature review)	Alt.range (m) (from-to)	Distribution (Locations or in district)	CH-triggering
28	<i>Cinnamomum impressinervium</i>	Sung soar koong	VU	un	P	600-1800	Warm broadleaved forest regins of Bhutan	✓
29	<i>Litsea albescens</i>		VU	un	P	200-1700	Subtropical forests of Bhutan	✓
30	<i>Litsea nitida</i>		VU	un	P	100-2400	Southern part of Bhutan	✓
31	<i>Litsea panamanja</i>		VU	un	P		Bhutan	
32	<i>Litsea assamica</i>		EN	un	P	600-2500	Subtropical & temperate regions of Bhutan	✓
33	<i>Impatiens infundibularis</i>	The Kurseong Balsam	VU	De	A		No record	
34	<i>Ophiocordyceps sinensis</i>	Chinese Caterpillar Fungus	VU	De	P	3400-4800	Northern remote parts of Bhutan	
De = Decreasing, st= Stable, Un= Unknown; A= Absent, P Present, blue font to show potential distribution in project area.								

4.2 Mammals with conservation significance

Seven species of mammals are recorded in the survey (fig 4-2 and table 5) of which *Rusa unicolor* (Sambar Deer) is listed in schedule II of Forest and Nature Conservation Act, 2023 (FNCA) is protected and may not be killed, injured, destroyed, captured, collected, possessed, bred, raised, or traded except for scientific research, population management, defense against attack or imminent threat on human life or livestock and damage to crop or other private property. The Sambar Deer is classified as **Vulnerable** on the IUCN Red List and faces high risk of extinction in the wild. The Sambar Deer is listed on **CITES Appendix II** and not currently threatened with extinction. There are 129 species of mammal as per NBC 2019 (cited in NBSAP 2025).

Nemorhaedus goral (Himalayan Goral) is listed in schedule II of Forest and Nature Conservation Act, 2023 (FNCA) is protected and may not be killed, injured, destroyed, captured, collected, possessed, bred, raised, or traded except for scientific research, population management, defense against attack or imminent threat on human life or livestock and damage to crop or other private property. The Himalayan goral is currently listed as **Near Threatened** on the IUCN Red List and reflects significant population decline due to habitat loss and hunting for meat. The Himalayan goral is listed on CITES Appendix I and threatened with extinction and trade in their specimens is permitted in exceptional circumstances.

Macaca assamensis (Assamese macaque) is listed in **schedule III** of Forest and Nature Conservation Act, 2023 (FNCA) is protected and may not be killed, injured, destroyed, captured, collected, possessed, bred, raised, or traded except for scientific research, population management, defense against attack or imminent threat on human life or livestock and damage to crop or other private property. The Assamese macaque is listed as **Near Threatened** on the IUCN Red List and the primary threats to the species are habitat loss, degradation, and hunting. The Assamese macaque is listed on **CITES Appendix II** and it is not currently threatened with extinction but it may become so if the trade is not regulated.

Semnopithecus schistaceus (Gray Langur) is listed in schedule II of Forest and Nature Conservation Act, 2023 (FNCA) is protected and may not be killed, injured, destroyed, captured, collected, possessed, bred, raised, or traded except for scientific research, population management, defense against attack or imminent threat on human life or livestock and damage to crop or other private property. The Gray Langur is classified as **Least Concern** on IUCN Red List and the species is not currently considered threatened with extinction. The Gray Langur is listed on **CITES Appendix I** and the species are threatened with extinction and international trade in specimens of these species is prohibited except for exceptional cases.

Muntiacus muntjak (Barking Deer), *Sus scrofa* (Wild pig) and *Martes flavigula* (Himalayan Yellow Throated Marten) are listed in schedule III of Forest and Nature Conservation Act, 2023 (FNCA) is protected and may not be killed, injured, destroyed, captured, collected, possessed, bred, raised, or traded except for scientific research, population management, defense against attack or imminent threat on human life or livestock and damage to crop or other private property. The Barking Deer known as Indian muntjac is classified as **Least Concern** on IUCN Red List and the species is not currently considered threatened with extinction. The barking deer is listed on **CITES Appendix II** and it is not currently threatened with extinction but it may become so if the trade is not regulated. The Wild pig known as wild boar is classified as **Least Concern** on IUCN Red List due to its wide range, high numbers, and its adaptability to various habitats. The Wild pig

is listed on **CITES Appendix II** in Bhutan and species are not threatened with extinction but trade must be controlled to avoid utilization incompatible with their survival. The Himalayan yellow- throated Marten is classified as **Least Concern** on IUCN Red List due to its wide distribution across Asia, relatively stable population and presence in numerous protected areas. The Himalayan yellow- throated Marten is listed on **CITES Appendix III** and India has requested other CITES member countries to assist in regulating or monitoring trade of this species (Fig 4-2).

Wild animal Observed and signs Documented During Terrestrial Surveys



Figure 4-2 Observation and signs of wildlife recorded in first survey in Bunakha HEP

Only 7 mammal species have been recorded in the first season survey (Table 6) and species from IBAT record (Table 7)

Table 6 The summary of the mammals recorded in first season survey

S N	Scientific name	Common name	National legislation F NCA	CITES listing	IUCN Red list	IBAT status	Remarks
1	<i>Muntiacus muntjak</i>	Barking Deer	III	II	LC	Not in IBAT	not currently threatened with extinction
2	<i>Rusa unicolor</i>	Sambar	II	II	VU	Vu	Population declines due to habitat loss and hunting for meat.
3	<i>Sus scrofa</i>	Wild Pig	III	II	LC	Not in IBAT	May become threatened if the trade is not regulated.
4	<i>Semnopithecus schistaceus</i>	Grey Langur	II	I	LC	Not in IBAT	Threatened with extinction and international trade prohibited
5	<i>Martes flavigula</i>	Himalayan Yellow Throated Marten	III	III	LC	Not in IBAT	May become threatened if the trade is not regulated.
6	<i>Macaca assamensis</i>	Assamese macaque	III	II	NT	Not in IBAT	Not threatened with extinction but trade must be controlled to avoid utilization incompatible with their survival.
7	<i>Nemorhaedus goral</i>	Himalayan Goral	FNCA II	I	NT	Not in IBAT	Threatened with extinction and trade in their specimens is permitted in exceptional circumstances.

Fourteen species of mammals are recommended for critical habitat assessment based on the survey, IBAT listing, altitude range, and movement pattern (table 5). Of them five species are endangered and rest 9 are vulnerable as per IUCN red listing criteria.

Table 7 IBAT species mammal recommended for CHA assessment based on altitude and found in 20 Km radius from the dam.

S N	scientific_name	common_name	category	Movement pattern	Alt.range (m) (From-to)	Distribution (location points or in district)	Presence in 20 km radius	Remarks
1	<i>Ailurus fulgens</i>	Red Panda	EN	Alti. Migrant	2400-3700 (Red Panda population survey (2022-2023, DoFPS)	19 of 20 districts	y	
2	<i>Platanista gangetica</i>	Ganges River Dolphin	EN	Migrant	Below 250	Ganges-Brahmaputra-Meghna River systems extending to Bhutan	y	
3	<i>Aonyx cinereus</i>	Asian Small-clawed Otter	VU	Not a Migrant	160-1000	Manas, Punatsangchhu, Mangdechhu, Wangchhu, Trashigang and Phrumsengla National Park,	y	
4	<i>Arctictis binturong</i>	Binturong	VU	Not a Migrant	up to 1500	Bhutan bordering Buxa Tiger reserve, India	y	
5	<i>Canis lupus ssp. chanco</i>	Himalayan Wolf	VU	Not a Migrant	3400-5200	WCP, JDNP, JKSNR	y	
6	<i>Neofelis nebulosa</i>	Clouded Leopard	VU	Not a Migrant	243-3893	Southern regions, Gedu, RMNP, JSWNP, WCP, PWS, JDNP, PNP, BWS	y	
7	<i>Panthera tigris</i>	Tiger	EN	Not a Migrant	100-4400; Paro FD-1 (Common to Thimpu, 1F), Thimpu FD-3 (2F, 1M), Gedu FD (Chhukha district)-2 (1 M, 1 UN)	RMNP, JSWNP, PWS, Bumthang and Zhemgang forest Divisions; DoFPS 2023 BN (tiger survey 2021-22)	n	but Y sec.lit.
8	<i>Capricornis sumatraensis</i>	Mainland Serow	VU		200-3000	RMNP, PWS, Jhomosangkha wildlife sanctuary and Bumthang	y	
9	<i>Cuon alpinus</i>	Dhole	EN		1468-4980	widely distributed throughout Bhutan & JDNP, all 20 districts and in all PAs and BCs	y	

S N	scientific_name	common_ name	category	Movement pattern	Alt.range (m) (From-to)	Distribution (location points or in district)	Presence in 20 km radius	Remarks
10	<i>Moschus leucogaster</i>	Himalayan Muskdeer	EN		2500-4500	JDNP	y	
11	<i>Myotis sicarius</i>	Mandelli's Mouse-eared Myotis	VU			Tropical & subtropical moist montane forests in Bhutan	y	
12	<i>Panthera pardus</i>	Leopard	VU		97-3000	wide regions in Bhutan, RMNP, Gedu	y	
13	<i>Rusa unicolor</i>	Sambar	VU		2356-3655	Himalayan foot hills of Bhutan	n	y in plot
14	<i>Ursus thibetanus</i>	Asiatic Black Bear	VU		1200-3750	Widely distributed throughout Bhutan	n	y in social survey
Total Mammal species shown in IBAT is 30. 1 spp absent in Bhutan, CHA 29 spp to assess is proposed (CR 1, EN species 12, Vu 16) 15 species reduced as not found in 20 Km Radius in Bhutan CHA 14 spp to assess finally for Bunakha HEP.								

4.3 Birds status and conservation significance

In total, 76 species of birds have been recorded in the survey area. In Bhutan, so far 736 species of bird have been reported (NBSAP 2025). The survey of birds was along with the vegetation and other biodiversity elements in April 2025. The quantitative survey on birds were recorded in plots and Reece transects. In each plot approx.1 km length in and around the plots observing about 25m on either side in addition to 20mx20m plots surveyed for vegetation. The number of adult females, male and others were recorded based on which density was estimated. In 34 plots, the highest density of birds/ha was found to be 8.3 and lowest 1. This was categorized in to following four types: High density (7-9) one plot of cool broadleaved forest in Bunakha, medium density of 5-7 with three plots of cool broadleaved forest in Galing anTanadung, low density (3-5) of 19 plots in five habitat types including cool broadleaved forest and lowest density 1-3 in 11 plots in six habitat types including cool broadleaved forest (Annex 5.5.1). Similarly, bird species density was also categorized into four with very high (2.1-2.6 ind./ha) represented by three species of which Nepal Fulvetta was found in the plot above Bunakha only whereas as other two species Rufous sibia and Whiskered yuhina were found in other plots in lower densities as well. Nine species of bird were recorded in medium density (1.41-2.0 ind/ha), 16 species of birds in low density (0.8-1.4) and 65 species of birds were found in very low density (0.2-0.8). Most of these birds were found in other density categories as well (Annexure 5.5.2).

Diversity in terms of number of species in each plot (5.004 ha) has been found to range from 3 to 10 species of birds. It is seen that higher numbers of plots have medium diversity of 4-6 species in and few in either the lower diversity or higher diversity (table 8 below).

Table 8 showing the diversity of birds in survey plots

SN	No of species of birds	Number of plots in the diversity class
1	3	3
2	4	9
3	5	8
4	6	14
5	7	5
6	8	4
7	10	1

Details of these can be seen in annexure 5.5.3

Bird species of national conservation significance are Oriental Cuckoo (*Cuculus saturates*), Blyth's Leaf Warbler (*Phylloscopus reguloides*), Kalij Pheasant (*Lophura leucomelanos*), Large Hawk Cuckoo (*Hierococcyx sparveroides*), Indian Cuckoo (*Cuculus Micropterus*), Red-billed Chough (*Pyrrhocorax pyrrhocorax*), Large-billed

Crow(*Corvus macrorhynchos*), *Cuculus canorus* Hill Partridge (Eurasian Cuckoo), Hill Partridge (*Arborophila torqueola*), Asian Barred Owlet (*Glaucidium cuculoides*) are listed in schedule III of Forest and Nature Conservation Act, 2023 (FNCA) and protected and may not be killed, injured, destroyed, captured, collected, possessed, bred, raised, or traded except for scientific research, population management, defense against attack or imminent threat on human life or livestock and damage to crop or other private property and are currently listed as Least Concern on the IUCN Red List, not currently considered to be threatened with extinction and the population is considered stable and wide spread.

IBAT has provided 32 species of birds for Bunakha HEP. In a radius of 50 km from Bunakha dam, 25 species were found (Fig 4-2, table 9). Of the 32 species extracted from IBAT, 21 species are considered for CHA (present in Bhutan, font not highlighted ones). There is a possibility of an increase in this list after full CHA is completed, including all other species of which are not threatened but are nationally important even if they are near threatened or least concern.

Table 9 List of birds with IBAT and preliminary screening for CHA

SN	Scientific_name	Common_name	Category	Movement pattern	is_restricted_range	Absence/ Presence (based on literature & surveys)	Alt.range (m) (from-to)	Distribution (location points or in district)
1	<i>Sitta formosa</i>	Beautiful Nuthatch	VU	Altit. Migrant	FALSE	P	950-2300(>300m in winter)	Phuentsholing in Chukha, Trongsa, Lingmethang in Mongar, Dewathang in Samdrup Jongkhar & Tsirang
2	<i>Aquila heliaca</i>	Eastern Imperial Eagle	VU	Full Migrant	FALSE	P	0-1600	Lower elevations in Bhutan
3	<i>Aquila nipalensis</i>	Steppe Eagle	EN	Full Migrant	FALSE	P	300-2200	Phobjikha in wangdue, RMNP, Trongsa
4	<i>Aythya baeri</i>	Baer's Pochard	CR	Full Migrant	FALSE	P	150-2817	Narphung - Samdrup Jongkhar, Shechamthang-Wakleytar & Rimchu-Gasa
5	<i>Aythya ferina</i>	Common Pochard	VU	Full Migrant	FALSE	P	150-2817	Punatsangchhu river
6	<i>Calidris falcinellus</i>	Broad-billed Sandpiper	VU	Full Migrant	FALSE	P	1600-3600	Bhutan wintering grounds in plains
7	<i>Calidris ferruginea</i>	Curlew Sandpiper	VU	Full Migrant	FALSE	P	0-4500	Whole Bhutan
8	<i>Clanga clanga</i>	Greater Spotted Eagle	VU	Full Migrant	FALSE	P	0-1700	Lowland and foothills in Bhutan
9	<i>Emberiza aureola</i>	Yellow-breasted Bunting	CR	Full Migrant	FALSE	P	1600-3600	Central & southern foothills, Zhemgang

SN	Scientific_name	Common_name	Category	Movement pattern	is_restricted_range	Absence/ Presence (based on literature & surveys)	Alt.range (m) (from-to)	Distribution (location points or in district)
10	<i>Gallinago nemoricola</i>	Wood Snipe	VU	Full Migrant	FALSE	P	1800-4200	Phobjikha, Thimphu
11	<i>Grus antigone</i>	Sarus Crane	VU	Full Migrant	FALSE	A		
12	<i>Haliaeetus leucoryphus</i>	Pallas's Fish-eagle	EN	Full Migrant	FALSE	P	0-1400	Punatsangchhu, Mangdechhu, Kurichhu & Drangmechhu rivers
13	<i>Houbaropsis bengalensis</i>	Bengal Florican	CR	Full Migrant	FALSE	P	1000-1500	No record of distribution in Bhutan
14	<i>Pluvialis squatarola</i>	Grey Plover	VU	Full Migrant	FALSE	P	700-3600	Haa, Paro, Thimphu, Bumthang
15	<i>Saxicola insignis</i>	White-throated Bushchat	VU	Full Migrant	FALSE	P	400-1400	Punatsangchhu & Mangdechhu river basins
16	<i>Schoenicola striatus</i>	Bristled Grassbird	VU	Full Migrant	FALSE	P	400-1400	Central, eastern & southern foothills of Bhutan
17	<i>Turdus feae</i>	Grey-sided Thrush	VU	Full Migrant	FALSE	P	600-3050	Thimphu valley, Chelela pass, Punakha-wangdue valley & Phobjikha valley
18	<i>Gyps bengalensis</i>	White-rumped Vulture	CR	Nomadic	FALSE	P	560-1530	No detail of location in Bhutan
19	<i>Aceros nipalensis</i>	Rufous-necked Hornbill	VU	Not a Migrant	FALSE	P	150-2200	Trongsa, Zhemgang (JSWNP, RMNP)
20	<i>Ardea insignis</i>	White-bellied Heron	CR	Not a Migrant	FALSE	P	100-1500	Punatsangchhu & Mangdechhu river basins
21	<i>Buceros bicornis</i>	Great Hornbill	VU	Not a Migrant	FALSE	P	400-1400	RMNP, JSWNP, PNP, BWS, Jomotshangkha wildlife sanctuary
22	<i>Chrysomma altirostre</i>	Jerdon's Babbler	VU	Not a Migrant	TRUE	A		

SN	Scientific_name	Common_name	Category	Movement pattern	is_restricted_range	Absence/ Presence (based on literature & surveys)	Alt.range (m) (from-to)	Distribution (location points or in district)
23	<i>Clanga hastata</i>	Indian Spotted Eagle	VU	Not a Migrant	FALSE	P	0-1000	Lowlands & foothills of Bhutan
24	<i>Gyps tenuirostris</i>	Slender-billed Vulture	CR	Not a Migrant	FALSE	A		
25	<i>Laticilla cinerascens</i>	Swamp Grass-babbler	EN	Not a Migrant	FALSE	A		
26	<i>Mulleripicus pulverulentus</i>	Great Slaty Woodpecker	VU	Not a Migrant	FALSE	P	0-2000	PWS, Sarpang
27	<i>Paradoxornis flavirostris</i>	Black-breasted Parrotbill	VU	Not a Migrant	TRUE	A		
28	<i>Perdicula manipurensis</i>	Manipur Bush-quail	CR	Not a Migrant	FALSE	A		
29	<i>Ploceus megarhynchus</i>	Finn's Weaver	EN	Not a Migrant	FALSE	A		
30	<i>Sarcogyps calvus</i>	Red-headed Vulture	CR	Not a Migrant	FALSE	P	0-3000	Bhutan-uncommon & sparsely distributed
31	<i>Sterna acuticauda</i>	Black-bellied Tern	EN	Not a Migrant	FALSE	P	0-700	Lower river valleys of Bhutan
32	<i>Sterna aurantia</i>	River Tern	VU	Not a Migrant	FALSE	P	0-600	Punatsangchhu & Mangdechhu basin

Of the 34 plots surveyed, 8 plots are lying outside the project impact area. Thus, of the 26 plots, no wildlife recorded from 11 plots and only 15 plots had the wildlife recorded. Among the 15 plots, the vulnerable sambar is recorded in 9 plots (table 10)

Table 10 Plots where wildlife (mammal) recorded in Bunakha HEP project impact area

Plots IDs	Location of the plot	Altitude (m)	Wildlife /sign recorded
1	Tala dam upper end reservoir	1338.1	-
2	Below Tsimasham (camp area-3)	1881.2	Sambar
3	Chukha dam (below dam)	1791.1	-
4	Chanachan (INRQ-2)	2151.5	Sambar
5	Above Chanachan junction (MD-3,6,7 & access road)	1969.6	-
6	Chanachen (above bridge) downstream of Bunakha dam	1821.8	-
7	Below Chanachan (upstream right bank)	1923.8	Sambar, Barking Deer, Wild Pig
8	Bunagu (camp area-5 & MD-1)	2076.7	Sambar
9	Chanachan (near village INRQ-3)	2261.6	Barking Deer
10	Below Bunagu (upstream left bank)	1970.9	Sambar, Himalayan Goral, Barking Deer
11	Above Bunakha (camp area-6)	2336.2	Sambar
12	Tanalum new bridge	1974	Sambar
13	Near old Tanalum bridge (INRQ-4)	2198.1	-
15	Near old Tanalum highway (INRQ-6)	2128.9	-
16	Near Bunakha	1974.1	Sambar, Barking Deer
17	Near Tanalum old highway (INRQ-7)	2169.9	Wild Pig Sambar
18	New Tanalum Bridge (along tributary left bank)	2063.2	Himalayan Goral
20	Near Haa bridge (Wangchhu right bank)	1964.9	Sambar, Barking Deer, Wild Pig
21	Near Haa bridge (Wangchhu upstream right bank)	1920.4	-
22	Damchu below highway	2038.1	-
23	Damchu (INRQ-10)	2238.8	Barking Deer, Sambar, Grey Langur
24	Damchu (riverine)	2005.9	-
25	Bunagu below highway (near 1st bore hole)	2011.7	Assamese macaque
26	Near Bridge (Chanachan)	1821.8	-
27	Below Bunagu highway	2007.1	Sambar
33	Damchu above highway	2011.5	Barking Deer
	Total 26 plots are placed here	Range 1338-2336	

Eight plots 14,19,28, 32 & 34 are not included in this report but will /may be used to compare later while comparing seasonality in later reporting.

*Note: 32 species in IBAT, 7 spp absent in Bhutan (red font above in table 9), 25 to be assessed, 2 terns, below 700m may be reduced, 2 species (Bengal Florican, White-rumped Vulture)-no details in Bhutan=21 SPP CHA considered (To be confirmed after final screening and CHA analysis); P=presence, A=Absence

No detail of location / No record of distribution in Bhutan

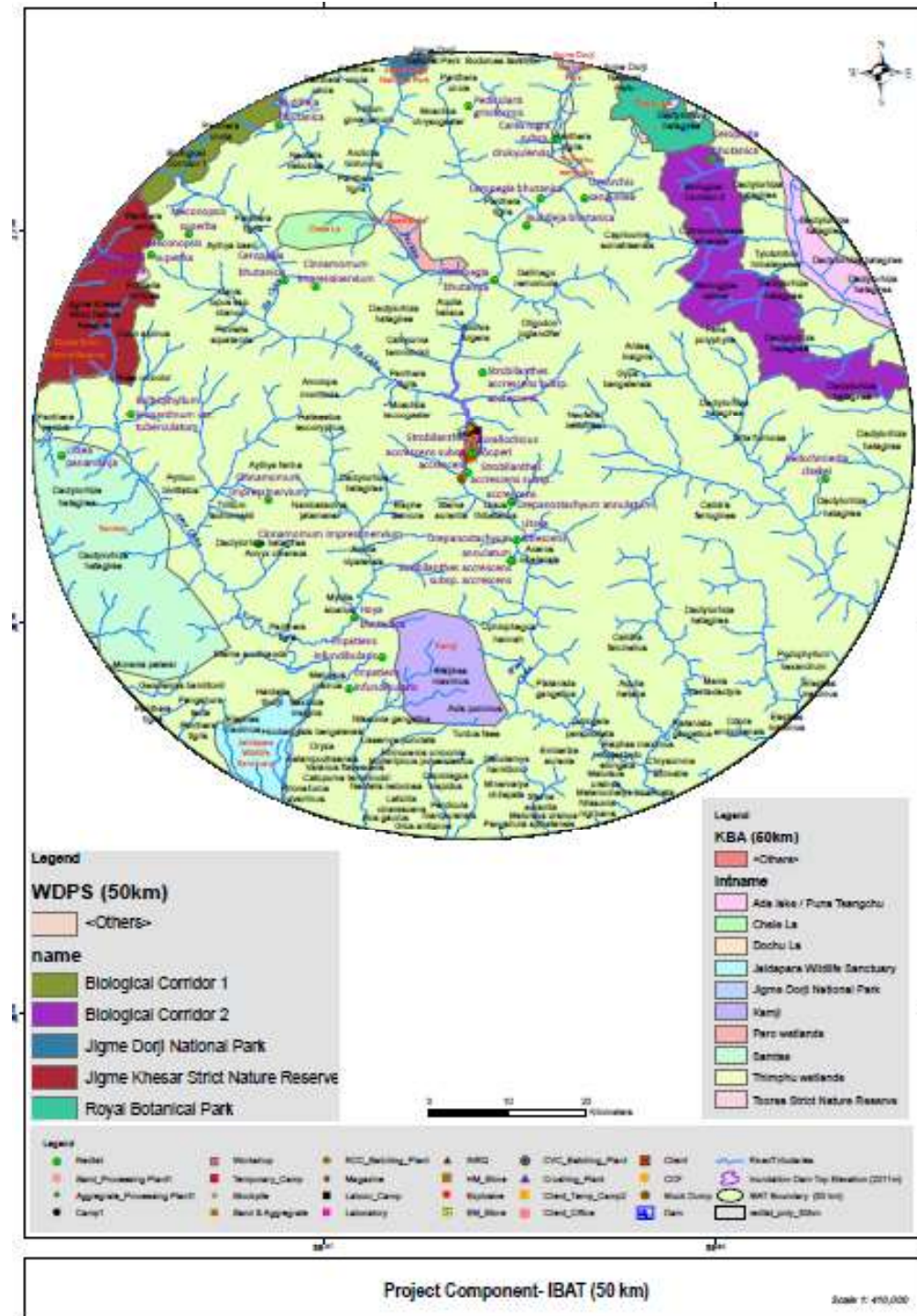


Figure 4-3 Terrestrial species listed in IBAT found in 50 kam radius from Bunakha HEP dam in Bhutan

4.4 Butterfly and moth

No butterfly or moth has been recorded during the surveys.

4.5 Herpetofauna (reptiles and amphibians)

No effort was made to survey reptiles and amphibians in this season considering the dry season.

25 IBAT listed threatened herpetofauna was found in 75 km radius of which four are absent in Bhutan. Of then 21 species, 16 species are found in 50 radii from the Bunakha dam. Four Amphibian species and 21 Reptiles species totaling 25 species of herpetofauna are listed in IBAT. One amphibian & three reptilians are absent in Bhutan, thus 21 species of herpetofauna is to be assessed for CHA (Table 9).

As of 2019, 158 species of herpetofauna have been reported in Bhutan (NBC, 2019 cited in NBSAP 2025).

Table 11 List of Amphibians and Reptiles (Herpetofauna) shown in IBAT records and summary of species proposed for CHA

S N	scientific_name	common_name	Category	Population trend	Movement pattern	is_restricted _ range	Absence / Presence	Alt. range (m) (from- to)	Distribution (location points or in district)
AMPHIBIA									
1	<i>Amolops monticola</i>	Mountain Cascade Frog	EN	D	Not a Migrant	FALSE	Present	0-1600	Lower altitudes in Bhutan
2	<i>Minervarya chilapata</i>	Chilapata Rainpool Frog	VU	D	Not a Migrant	TRUE	Present		Border regions with India
3	<i>Tylototriton himalayanus</i>	Himalayan Salamander	VU	D	Not a Migrant	FALSE	Present	1255-2679	Toebrongchhu zam (Punakha) & Lam Pelri Botanical Park
4	<i>Uperodon assamensis</i>	Assamese Balloon Frog	VU		Not a Migrant	TRUE	Absent		
REPTILIA									
5	<i>Batagur dhongoka</i>	Three-striped Roofed Turtle	CR	D		FALSE	Absent		
6	<i>Crocodylus palustris</i>	Mugger	VU	S		FALSE	Absent		
7	<i>Cuora amboinensis</i>	Southeast Asian Box Turtle	EN	D		FALSE	Present	253-390	Nobuling lake (RMNP, Sarpang) & Somrong (Zhemgang)
8	<i>Cuora mouhotii</i>	Keeled Box Turtle	EN	D		FALSE	Present	0-370	Gulabi top (Zhemgang)
9	<i>Elaphe taeniura</i>	Cave Racer	VU	D		FALSE	Present		
10	<i>Geoclemys hamiltonii</i>	Spotted Pond Turtle	EN	D		FALSE	Present		
11	<i>Hardella thurjii</i>	Crowned River Turtle	EN	D		FALSE	Absent		
12	<i>Indotestudo elongata</i>	Elongated Tortoise	CR	D		FALSE	Present		

S N	scientific_name	common_name	Category	Population trend	Movement pattern	is_restricted _range	Absence / Presence	Alt. range (m) (from- to)	Distribution (location points orin district)
13	<i>Lissemys punctata</i>	Indian Flapshell Turtle	VU	D		FALSE	Present		
14	<i>Melanochelys tricarinata</i>	Tricarinate Hill Turtle	EN	D		FALSE	Present		
15	<i>Morenia petersi</i>	Indian Eyed Turtle	EN	D		FALSE	Present		
16	<i>Nilssonia gangetica</i>	Indian Softshell Turtle	EN	D		FALSE	Present		
17	<i>Nilssonia hurum</i>	Indian Peacock Softshell Turtle	EN	D		FALSE	Present		
18	<i>Nilssonia nigricans</i>	Black Softshell Turtle	CR	D		FALSE	Present		
19	<i>Oligodon juglandifer</i>	Walnut Kukri Snake	VU	Un		FALSE	Present		
20	<i>Ophiophagus hannah</i>	King Cobra	VU	D		FALSE	Present		
21	<i>Pangshura sylhetensis</i>	Assam Roofed Turtle	CR	D		FALSE	Present		
22	<i>Pangshura tecta</i>	Indian Roofed Turtle	VU	D		FALSE	Present		
23	<i>Python bivittatus</i>	Burmese Python	VU	D		FALSE	Present		
24	<i>Varanus flavescens</i>	Yellow Monitor	EN	D		FALSE	Present		
25	<i>Xenochrophis cerasogaster</i>	Painted Keelback	VU	D		FALSE	Present		

Note: Un=Unknown, D=Decreasing and S=stable

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5 Annexures

5.1 FLORAL SPECIES BY STATION AND HABITAT

BROALEAF FORESTS

1.1 Vegetation assessment protocol for Trees

Data Sheet (Tree Vegetation> 1.3) Plot type (Square): Trees(20x20)

Altitude: 1338.100

Dzongkhag: Chukha

m

Locality: Tala Dam

Aspect: North

Transect name: 1

Slope%: 25

Plot no: 1

Canopy cover: Partial shade

Forest type:

North:27.04865

Broadleaf

East: 89.58015

sl no	Family	Scientific name	Common name	DBH (cm)	Height(m)	Status
1	Canabaceae	<i>Celtis tetranda</i>	Nilgiri elm	51	15	
2	Canabaceae	<i>Celtis tetranda</i>	Nilgiri elm	41	10	
3	Canabaceae	<i>Celtis tetranda</i>	Nilgiri elm	44	10	
4	Canabaceae	<i>Celtis tetranda</i>	Nilgiri elm	44	11	
5	Canabaceae	<i>Celtis tetranda</i>	Nilgiri elm	49	13	
6	Lauraceae	<i>Actinodaphne obovata</i>		51	13	
7	Lauraceae	<i>Actinodaphne obovata</i>		44	10	
8	Araliaceae	<i>Brassiopsis hainla</i>	Seto chuletro tree	53	8	
9	Araliaceae	<i>Brassiopsis hainla</i>	Seto chuletro tree	51	5	
10	Araliaceae	<i>Brassiopsis hainla</i>	Seto chuletro tree	51	5	

1.2 Vegetation assessment protocol for shrubs

Data Sheet (Shrub Vegetation) Plot type (Square): Shrubs (20x20)

sl no	Family	Scientific name	Common name	Height (m)	Nos	Status
1	Thymelaeaceae	<i>Edgeworthia gardneri</i>	Indian paper tree	1.5	5	
2	Araliaceae	<i>Brassiopsis hainla</i>	Seto chuletro tree	3	1	
3	Lauraceae	<i>Persea spp</i>	wild avocado	3	2	
4	Myrtaceae	<i>Syzygium cumini</i>	Java plum	2	3	
5	Araliaceae	<i>Eleutherococcus cissifolium</i>	Siberian Ginseng	1	1	
6	Primulaceae	<i>Maesa chisia</i>	Chisia wild berry	3	2	
7	Primulaceae	<i>Ardisia macrocarpa</i>	Himalayan coralberry	0.5	3	

8	Elaeagnaceae	<i>Elaeagnus parvifolia</i>	Oleaster	1	2	
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1.3 Vegetation assessment protocol for herbs

Data Sheet (herb Vegetation)

Plot type (Square): herbs (2mx2m)

sl no	Family	Scientific name	Common name	Nos	Status
1	Urticaceae	<i>Girardinia diversifolia</i>	Himalayan nettle	4	
2	Urticaceae	<i>Pouzolzia hirta</i>	Oyik	30	
3	Acanthaceae	<i>Strobilanthes spp</i>	Persian shield	10	
4	Piperaceae	<i>Piper pedicellatum</i>	Long pipla	2	
5	Araliaceae	<i>Hedera nepalensis</i>	Himalayan ivy	1	
6	Asparagaceae	<i>Ophiopogon spp</i>	Lily turf	2	
7	Violaceae	<i>Viola spp</i>	Violet	2	

Note: modified habitat

1.1 Vegetation assessment protocol for Trees

Data Sheet (Tree

Vegetation>1.3)

Plot type (Square): Trees (20x20)

Dzongkhag: Chukha

Altitude: 1881.200m

Locality: Below Tsimasham
(Camp area-3)

Aspect: Southwest

Transect name: 2

Slope%: 15

Plot no: 2

Canopy cover: Partial shade

North: 27.092710000

Forest type: Broadleaf

East: 89.5285811667

Date: 13/4/25

sl no	Family	Scientific name	Common name	DBH(c m)	Height (m)	Status
1	Symplocaceae	<i>Symplocos ramosissima</i>		78	7	
2	Symplocaceae	<i>Symplocos ramosissima</i>		26	5	
3	Symplocaceae	<i>Symplocos ramosissima</i>		31	7	
4	Adoxaceae	<i>Viburnum erubescens</i>		52	6	
5	Adoxaceae	<i>Viburnum erubescens</i>		33	5	
6	Symplocaceae	<i>Symplocos racemosa</i>		65	9	
7	Symplocaceae	<i>Symplocos racemosa</i>		144	10	
8	Symplocaceae	<i>Symplocos racemosa</i>		77	12	
9	Euphorbiaceae	<i>Macaranga pustulata</i>		151	13	
10	Cornaceae	<i>Benthamedia capitata</i>	Dogwood	77	12	
11	Adoxaceae	<i>Viburnum erubescens</i>		94	11	
12	Symplocaceae	<i>Symplocos racemosa</i>		55	8	
13	Symplocaceae	<i>Symplocos racemosa</i>		158	13	
14	Lauraceae	<i>Persea spp</i>		242	20	
15	Lauraceae	<i>Persea spp</i>	False camphor	233	15	

1.2 Vegetation assessment protocol for shrubs

Data Sheet (Shrub Vegetation)

Plot type (Square): Shrubs(20x20)

sl no	Family	Scientific name	Common name	Height(m)	Nos	Status
1	Symplocaceae	<i>Symplocos racemosa</i>		1m-4	15	
2	Symplocaceae	<i>Symplocos ramosissima</i>		0.5-7	10	
3	Verbanaceae	<i>Viburnum erubescens</i>		3m-5	3	
4	Thymelaeaceae	<i>Daphne bholua</i>		0.5-1	11	
5	Rutaceae	<i>Zanthoxylum armatum</i>		0.5-2	6	
6	Myrsinaceae	<i>Ardisia macrocarpa</i>		0.1-0.5	7	
7	Balsaminaceae	<i>Jasminum dispernum</i>		0.1-0.2	10	
8	Lardizabalaceae	<i>Holbelia latifolia</i>		3	1	

1.3 Vegetation assessment protocol for herbs

Data Sheet (herb Vegetation)

Plot type (Square): herbs (2mx2m)

sl no	Family	Scientific name	Common name	Nos	Status
1	Lamiaceae	<i>Perilla frutescens</i>	Beefsteak	2	
	Rubiaceae	<i>Rubia spp</i>		3	
	Araliaceae	<i>Hedera nepalensis</i>		3	

1.1 Vegetation assessment protocol for Trees

Data Sheet (Tree)

Vegetation>1.3)

Plot type (Square): Trees (20x20)

Dzongkhag: Chukha

Altitude: 1791.100 m

Locality: Chukha Dam

Aspect: Southeast

Transect name: 3

Slope%: 15

Plot no: 3

Canopy cover: partial shade

Forest type:

North:27.109348333

Broadleaf

East: 89.529831667

Date: 5/4/25

Recorder: Kelzang Dawa/Dorji Rinchen

sl no	Family	Scientific name	Common name	DBH(cm)	Height(m)	Status
1	Betulaceae	<i>Alnus nepalensis</i>	Himalayan Alder	129	18	
2	Betulaceae	<i>Alnus nepalensis</i>	Himalayan Alder	132	15	
3	Betulaceae	<i>Alnus nepalensis</i>	Himalayan Alder	109	12	
4	Betulaceae	<i>Alnus nepalensis</i>	Himalayan Alder	171	20	
5	Betulaceae	<i>Alnus nepalensis</i>	Himalayan Alder	136	19	
6	Betulaceae	<i>Alnus nepalensis</i>	Himalayan Alder	116	16	
7	Betulaceae	<i>Betula alnoides</i>	Himalayan birch	113	15	
8	Betulaceae	<i>Alnus nepalensis</i>	Himalayan Alder	83	10	
9	Betulaceae	<i>Alnus nepalensis</i>	Himalayan Alder	83	10	
10	Salicaceae	<i>Populus ciliata</i>	Himalayan poplar	41	15	
11	Araliaceae	<i>Brassiopsis hainla</i>	Seto chuletro tree	53	7	
12	Betulaceae	<i>Betula alnoides</i>	Himalayan birch	88	9	

1.2 Vegetation assessment protocol for shrubs

Data Sheet (Shrub Vegetation)

Plot type (Square): Shrubs(20x20)

sl no	Family	Scientific name	Common name	Height(m)	Nos	Status
1	Urticaceae	<i>Debregaesia longifolia</i>	Orange wild rhea	4	1	
2	Theaceae	<i>Eurya acuminata</i>	Tapering leaf eurya	6	1	
3	Ericaceae	<i>Lyonia ovalifolia</i>	Fetterbush	5	1	
4	Sapindaceae	<i>Acer oblongum</i>	Evergreen maple	3	2	
5	Polygonaceae	<i>Aconogonum molle</i>	Soft knotweed	4	15	

1.3 Vegetation assessment protocol for herbs

sl no	Family	Scientific name	Common name	Nos	Status
1	Urticaceae	<i>Urtica dioica</i>	common nettle	1	
2	Hypoxidaceae	<i>Curculigo capitulata</i>	Palm grass	2	
3	Oleaceae	<i>Jasminum gradiflorum</i>	Spanish jasmine	5	
4	Poaceae	<i>Oplismenus hirtellus</i>	Basket grass	7	
5	Polygonaceae	<i>Rumex nepalensis</i>	Nepal Dock	3	invasive
6	Asteraceae	<i>Laggera crispata</i>	Curly blumea	2	
7	Polygonaceae	<i>Persicaria capitata</i>	Pink knotweed	3	invasive

Habitat: Disturb area

1.1 Vegetation assessment protocol for Trees

Data Sheet (Tree

Vegetation>1.3)

Plot type (Square): Trees (20x20)

Dzongkhag: Chukha

Altitude: 2151.500m

Locality: Chanachen

(INQR-2)

Aspect: Southeast

Transect name: 4

Slope%: 10

Plot no: 4

Canopy cover: Partial shade

North: 27.119645000

Forest type: Broadleaf

East: 89.52952667

sl no	Family	Scientific name	Common name	DBH (cm)	Height(m)	Status
1	Fagaceae	<i>Quercus oxyodon</i>	Sharp-toothed oak	118	18	
2	Theaceae	<i>Eurya acuminata</i>	Tapering eurya	73	16	
3	Rosaceae	<i>Prunus carmesina</i>	Wild himalayan cherry	183	25	
4	Symplocaceae	<i>Symplocos ramosissima</i>	Sapphire berry	63	10	
5	Symplocaceae	<i>Symplocos racemosa</i>	Lodh tree	51	7	
6	Fagaceae	<i>Quercus oxyodon</i>	Sharp-toothed oak	190	21	
7	Fagaceae	<i>Quercus oxyodon</i>	Sharp-toothed oak	33	10	

8	Symplocaceae	<i>Symplocos ramosissima</i>	Sapphire berry	67	9	
9	Fagaceae	<i>Quercus oxyodon</i>	Sharp-toothed oak	64	10	
10	Anacardiaceae	<i>Rhus spp</i>	Tanners	56	10	
11	Anacardiaceae	<i>Rhus spp</i>	Tanners	41	5	
12	Symplocaceae	<i>Symplocos ramosissima</i>	Sapphire berry	41	7	
13	Lauraceae	<i>Dodecadenia grandiflora</i>	Tailiya	125	15	
14	Lauraceae	<i>Dodecadenia grandiflora</i>	Tailiya	104	17	
15	Symplocaceae	<i>Symplocos ramosissima</i>	Sapphire berry	46	10	
16	Symplocaceae	<i>Symplocos sumuntia</i>	Shan fan	129	17	
17	Fagaceae	<i>Quercus oxyodon</i>	Sharp-toothed oak	129	15	
18	Salicaceae	<i>Populus ciliata</i>	Himalayan poplar	194	15	
19	Fagaceae	<i>Quercus lanata</i>	Ban oak	232	20	

1.2 Vegetation assessment protocol for shrubs

sl no	Family	Scientific name	Common name	Height(m)	Nos	Status
1	Thymelaeaceae	<i>Daphne bholua</i>	Australian cheesewood	1cm	3	
2	Primulaceae	<i>Ardisia macrocarpa</i>	Himalayan coralberry	20cm	7	
3	Symplocaceae	<i>Symplocos racemosa</i>	Lodh tree	3 mt	20	
4	Lauraceae	<i>Cinnamomum glanduliferum</i>	Cinnamon	0.3	1	
5	Adoxaceae	<i>Viburnum erubescens</i>	reddish viburnum	3	1	
6	Oleaceae	<i>Ligustrum confusum</i>	Indian privet	0.2	1	
7	Poaceae	<i>Chimonobambusa callosa</i>		1mt-3mt	50	

1.3 Vegetation assessment protocol for herbs

sl no	Family	Scientific name	Common name	Nos	Status
1	Acanthaceae	<i>Strobilanthes spp</i>		2	
2	Urticaceae	<i>Pilea spp</i>		5	
3	Araliaceae	<i>Hedera nepalensis</i>	Ivy	2	
4	Poaceae	<i>Oplismenus hirtellus</i>	Basket grass	3	
5	Oleaceae	<i>Jasminum grandiflorum</i>	Spanish jasmine	1	
6	Dryopteridaceae	<i>Polystichum spp</i>		3	
7	Vitaceae	<i>Tetrastigma spp</i>		3	

1.4 Other Plants by RECEE (only Target species)

sl no	Family	Scientific name	Common name	Lat	long	Type of plant
1	Orchidaceae	<i>Calanthe griffithii</i>				orchid
2	Orchidaceae	<i>Calanthe plantaginea</i>				orchid
3	Fagaceae	<i>Quercus lamellosa</i>	Bull oak			Tree
4	Oleaceae	<i>Fraxinus floribunda</i>				Tree
5	Magnoliaceae	<i>Michelia doltsopa</i>	Sweet Michelia			Tree

1.1 Vegetation assessment protocol for Trees

Data Sheet (Tree Vegetation> 1.3)

Plot type (Square): Trees(20x20)

Altitude:

1969.600m

Dzongkhag: Chukha

Locality: Chanachen junction (MD-3,6,7-access road)

Aspect: west

Transect name: 5

Slope%: 10

Plot no: 5

Canopy cover: Partial shade

Forest type:

Broadleaf

North: 27.118275000

East: 89.538933333

sl no	Family	Scientific name	Common name	DBH(cm)	Height(m)	Status
1	Symplocaceae	<i>Symplocos ramosissima</i>		45	7	
2	Ericaceae	<i>Rhododendron arboreum</i>		52	8	
3	Fagaceae	<i>Quercus lanata</i>		353	15	
4	Schoepfiaceae	<i>Schoepfia jasminodora</i>		100	10	
5	Symplocaceae	<i>Symplocos ramosissima</i>		145	17	
6	Symplocaceae	<i>Symplocos ramosissima</i>		68	11	
7	Magnoliaceae	<i>Michelia doltsapa</i>		161	15	
8	Fagaceae	<i>Quercus glauca</i>		27	10	

1.2 Vegetation assessment protocol for shrubs

Data Sheet (Shrub Vegetation)

Plot type (Square): Shrubs(20x20)

sl no	Family	Scientific name	Common name	Height(m)	Nos	Status
1	Symplocaceae	<i>Symplocos ramosissima</i>		0.5-2	7	
2	Symplocaceae	<i>Symplocos racemosa</i>		0.3-2	10	
3	Theaceae	<i>Eurya acuminata</i>		0.2-2	20	
4	Lauraceae	<i>Cinnamomum spp</i>		0.1-1	3	
5	Poaceae	<i>Yushania spp</i>		0.7-1	50	
6	Moraceae	<i>Morus spp</i>		0.2	3	

1.3 Vegetation assessment protocol for herbs

Data Sheet (herb Vegetation)

Plot type (Square): herbs(2mx2m)

sl no	Family	Scientific name	Common name	Nos	Status
1	Rubiaceae	<i>Rubia spp</i>		3	
2	Asteraceae	<i>Bidens pilosa</i>		4	

1.1 Vegetation assessment protocol for Trees

Data Sheet (Tree

Vegetation>1.3)

Plot type (Square): Trees(20x20)

Dzongkhag: Chukha**Altitude:** 1821.800m**Locality:** Chanachen (Above bridge)**Aspect:** Southeast**Transect name:** 6**Slope%:** 15**Plot no:** 6**Canopy cover:** Partial shade**Forest type:****North:** 27.127936667

Broadleaf

East: 89.539026667

sl no	Family	Scientific name	Common name	DBH (cm)	Height(m)	Status
1	Fagaceae	<i>Quercus lanata</i>	Ban oak	170	15	
2	Pinaceae	<i>Pinus wallichiana</i>	Blue pine	310	45	
3	Betulaceae	<i>Carpinus viminea</i>	Himalayan hornbeam	55	10	
4	Fagaceae	<i>Quercus lanata</i>	Ban oak	117	9	
5	Betulaceae	<i>Carpinus viminea</i>	Himalayan hornbeam	93	15	
6	Betulaceae	<i>Carpinus viminea</i>	Himalayan hornbeam	74	13	
7	Fagaceae	<i>Quercus griffithii</i>	Oak	170	15	
8	Fagaceae	<i>Quercus lanata</i>	Ban oak	255	17	
9	Ericaceae	<i>Rhododendron arboreum</i>	Rhodo	25	5	
10	Betulaceae	<i>Carpinus viminea</i>	Himalayan hornbeam	35	12	
11	Betulaceae	<i>Carpinus viminea</i>	Himalayan hornbeam	56	13	
12	Ericaceae	<i>Rhododendron arboreum</i>	Rhodo	39	9	
13	Betulaceae	<i>Carpinus viminea</i>	Himalayan hornbeam	138	16	
14	Salicaceae	<i>Populus ciliata</i>	Himalayan poplar	147	15	

1.2 Vegetation assessment protocol for shrubs

Data Sheet (Shrub Vegetation)

Plot type (Square): Shrubs(20x20)

sl no	Family	Scientific name	Common name	Height(m)	Nos	Status
1	Theaceae	<i>Eurya acuminata</i>	Tapering leaf eurya	.20-2	25	
2	Myrsinaceae	<i>Ardisia macrocarpa</i>	Himalayan coralberry	0.3	5	

1.3 Vegetation assessment protocol for herbs

Data Sheet (herb Vegetation)

Plot type (Square): herbs(2mx2m)

sl no	Family	Scientific name	Common name	Nos	Status
1	Vitaceae	<i>Tetrastigma spp</i>		2	
2	Acanthaceae	<i>Strobilanthes spp</i>		5	
3	Dryopteridaceae	<i>Polystichum spp</i>		2	
4	Oleaceae	<i>Jasminum gradiflorum</i>	Spanish jasmine	1	
5	Asteraceae	<i>Ainsliaea aptera</i>		4	

1.1 Vegetation assessment protocol for Trees

Data Sheet (Tree

Vegetation>1.3)

Plot type (Square): Trees(20x20)

Altitude:

1923.800m

Dzongkhag: Chukha**Locality:** Below

Chanachen

Aspect: South**Transect name:** 7**Slope%:** 15**Plot no:** 7

Canopy cover: partial shade

Forest type:

Broadleaf

North: 27.137010000**East:** 89.539243333

sl no	Family	Scientific name	Common name	DBH(cm)	Height(m)	Status
1	Betulaceae	<i>Betula alnoides</i>	Himalayan birch	190	21	
2	Lauraceae	<i>Dodecadenia grandiflora</i>	Tailiya	65	10	
3	Betulaceae	<i>Alnus nepalensis</i>	Himalayan Alder	120	15	
4	Betulaceae	<i>Carpinus viminea</i>	Himalayan hornbeam	90	15	
5	Lauraceae	<i>Dodecadenia grandiflora</i>	Tailiya	86	15	
6	Lauraceae	<i>Dodecadenia grandiflora</i>	Tailiya	61	7	
7	Salicaceae	<i>Populus ciliata</i>	Himalayan poplar	212	17	
8	Lauraceae	<i>Dodecadenia grandiflora</i>	Tailiya	85	12	
9	Lauraceae	<i>Dodecadenia grandiflora</i>	Tailiya	68	7	
10	Betulaceae	<i>Alnus nepalensis</i>	Himalayan Alder	358	27	
11	Symplocaceae	<i>Symplocos sumuntia</i>	Shan fan	40	5	

1.2 Vegetation assessment protocol for shrubs

Data Sheet (Shrub Vegetation)

Plot type (Square): Shrubs(20x20)

sl no	Family	Scientific name	Common name	Height(m)	Nos	Status
1	Buxaceae	<i>Sarcococca saligna</i>	Christmas box	30cm-50cm	30	
2	Berberidaceae	<i>Berberis spp</i>	Barberry	1mt-2mt	8	

3	Myrsinaceae	<i>Ardisia macrocarpa</i>	Himalayan coralberry	30cm-70cm	15	
4	Thymelaeaceae	<i>Daphne bholua</i>	Australian cheesewood	50cm-1 mt	11	
5	Berberidaceae	<i>Mahonia napalensis</i>	Nepal barberry	1	2	

1.3 Vegetation assessment protocol for herbs

sl no	Family	Scientific name	Common name	Nos	Status
1	Poaceae	<i>Oplismenus hirtellus</i>	Basket grass	3	
2	Asparagaceae	<i>Ophiopogon spp</i>	Lily turf	4	
3	Athyriaceae	<i>Diplazium spp</i>	Fern	4	
4	Asteraceae	<i>Laggera crispata</i>	Curly blumea	3	
5	Solanaceae	<i>Solanum viarum</i>	Tropical soda apple	1	

1.4 Other Plants by RECEE (ONLY Target species)

sl no	Family	Scientific name	Common name	Lat	long	Type of plant	
1	Adoxaceae	<i>Viburnum cylindricum</i>	Tube flower			Shrub	
2	Rutaceae	<i>Zanthoxylum armatum</i>	Rattan pepper			Shrub	
3	Asteraceae	<i>Eupatorium adenophorum</i>	Crofton weed			herbs	
4	Juncaceae	<i>Juncus spp</i>	Soft rush			herbs	invasive
5	Fagaceae	<i>Quercus griffithii</i>	Oak			Tree	
6	Pinaceae	<i>Pinus wallichiana</i>	Blue pine			Tree	
7	Rosaceae	<i>Rubus ellipticus</i>	Golden himalayan raspberry			Shrub	invasive
8	Asteraceae	<i>Cirsium spp</i>				Shrub	
9	Ericaceae	<i>Rhododendron maddenii</i>				Shrub	
10	Rosaceae	<i>Malus baccata</i>	Siberian Crab apple			shrub	

1.1 Vegetation assessment protocol for Trees

Data Sheet (Tree

Plot type (Square):

Vegetation>1.3)

Trees(20x20)

Dzongkhag: Chukha

Altitude: 2076.700m

Locality: Bunagu (Camp area 5 and MD-1)

Transect name: 8

Aspect: South

Plot no: 8

Slope%: 5

Canopy cover: Partial

North: 27.138356667

shade

East: 89.544936667

Forest type: Broadleaf

sl no	Family	Scientific name	Common name	DBH(cm)	Height(m)	Status
1	Lauraceae	<i>Cinnamomum glanduliferum</i>	Cinnamon	480	15	
2	Symplocaceae	<i>Symplocos ramosissima</i>	Sapphire berry	45	7	

3	Fagaceae	<i>Quercus griffithii</i>	Oak	360	17	
4	Symplocaceae	<i>Symplocos ramosissima</i>	Sapphire berry	48	5	
5	Symplocaceae	<i>Symplocos ramosissima</i>	Sapphire berry	30	4	
6	Ericaceae	<i>Lyonia ovalifolia</i>		30	5	
7	Ericaceae	<i>Rhododendron griffithianum</i>		145	10	
8	Betulaceae	<i>Corylus ferox</i>		38	9	
9	Symplocaceae	<i>Symplocos sumuntia</i>	Shan fan	94	10	
10	Betulaceae	<i>Corylus ferox</i>		90	10	
11	Ericaceae	<i>Lyonia ovalifolia</i>		246	15	
12	Symplocaceae	<i>Symplocos sumuntia</i>	Shan fan	76	12	
13	Ericaceae	<i>Pieris formosa</i>		30	7	
14	Ericaceae	<i>Pieris formosa</i>		31	7	
15	Fagaceae	<i>Quercus glauca</i>		90	12	
16	Ericaceae	<i>Rhododendron griffithianum</i>		78	9	

1.2 Vegetation assessment protocol for shrubs

Data Sheet (Shrub

Vegetation)

Plot type (Square):Shrubs(20x20)

sl no	Family	Scientific name	Common name	Height(m)	Nos	Status
1	Myrsinaceae	<i>Ardisia macrocarpa</i>	Himalayan coralberry	0.50-1	50	
2	Thymelaeaceae	<i>Daphne bholua</i>	Australian cheesewood	0.5-1	6	
3	Berberidaceae	<i>Berberis aristata</i>		0.5-1	5	
4	Symplocaceae	<i>Symplocos ramosissima</i>		1m-2	7	
5	Symplocaceae	<i>Symplocos sumuntia</i>		1m-2	4	
6	Oleaceae	<i>Ligustrum confusum</i>	Chinese privet	1	2	
7	Berberidaceae	<i>Mahonia nepalensis</i>		0.3	1	

1.3 Vegetation assessment protocol for herbs

Data Sheet (herb Vegetation)

Plot type (Square): herbs(2mx2m)

sl no	Family	Scientific name	Common name	Nos	Status
1	Lamiaceae	<i>Perilla frutescens</i>	Beefsteak	9	
2	Asteraceae	<i>Bidens pilosa</i>	Black jack	3	

1.1 Vegetation assessment protocol for Trees

Data Sheet (Tree Vegetation> 1.3)

Plot type (Square):Trees(20x20)

Dzongkhag: Chukha

Locality: Chanachen-near village

(INRQ-3)

Transect name: 9

Plot no: 9

North:27.146230000

East: 89.528840000

Altitude:

2261.600m

Aspect: Southeast

Slope%: 25

Canopy cover: Partial shade

Forest type:

Broadleaf

sl no	Family	Scientific name	Common name	DBH(cm)	Height(m)	Status
1	Betulaceae	<i>Alnus nepalensis</i>	Himalayan Alder	141	20	
2	Betulaceae	<i>Betula alnoides</i>	Himalayan birch	59	12	
3	Salicaceae	<i>Populus ciliata</i>	Himalayan poplar	220	25	
4	Betulaceae	<i>Alnus nepalensis</i>	Himalayan Alder	170	25	
5	Betulaceae	<i>Corylus ferox</i>	Hazel tree	53	10	
6	Betulaceae	<i>Alnus nepalensis</i>	Himalayan Alder	73	13	
7	Lauraceae	<i>Dodecadenia grandiflora</i>	Tailiya	71	9	
8	Betulaceae	<i>Alnus nepalensis</i>	Himalayan Alder	108	20	
9	Betulaceae	<i>Alnus nepalensis</i>	Himalayan Alder	70	15	
10	Betulaceae	<i>Alnus nepalensis</i>	Himalayan Alder	71	15	
11	Betulaceae	<i>Alnus nepalensis</i>	Himalayan Alder	216	17	
12	Symplocaceae	<i>Symplocos ramosissima</i>	Sapphire berry	29	7	
13	Symplocaceae	<i>Symplocos ramosissima</i>	Sapphire berry	30	7	
14	Symplocaceae	<i>Symplocos ramosissima</i>	Sapphire berry	40	9	

1.2 Vegetation assessment protocol for shrubs

Data Sheet (Shrub Vegetation)

Plot type(Square):Shrubs(20x20)

sl no	Family	Scientific name	Common name	Height(m)	Nos	Status
1	Adoxaceae	<i>Viburnum erubescens</i>	reddish viburnum	1mt-2mt	8	
2	Theaceae	<i>Eurya acuminata</i>	Tapering leaf eurya	1mt-2mt	2	
3	Symplocaceae	<i>Symplocos ramosissima</i>	Sapphire berry	1mt-2mt	30	
4	Thymelaeaceae	<i>Daphne bholua</i>	Australian cheesewood	.5-2mts	3	
5	Myrsinaceae	<i>Ardisia macrocarpa</i>	Himalayan coralberry	0.3	2	
6	Berberidaceae	<i>Berberis spp</i>	Barberry	0.1	2	

1.3 Vegetation assessment protocol for herbs

Data Sheet (herb Vegetation)

Plot type(Square):herbs(2mx2m)

sl no	Family	Scientific name	Common name	Nos	Status
1	Poaceae	<i>Oplismenus hirtellus</i>	Basket grass	3	
2	Violaceae	<i>Viola spp</i>		3	
3	Urticaceae	<i>Girardinia diversifolia</i>		1	
4	Asteraceae	<i>Senecio diversifolia</i>		3	

1.1 Vegetation assessment protocol for Trees

Data Sheet (Tree

Vegetation>1.3)

Plot type(Square):Trees(20x20)

Altitude:

Dzongkhag: Chukha

1970.900m

Locality: Below Bunagu

Transect name: 10

Plot no: 10

North: 27.14516667

East: 89.536510000

Aspect: Southwest

Slope%: 35

Canopy cover: Partial shade
Forest

type: Broadleaf

sl no	Family	Scientific name	Common name	DBH(cm)	Height(m)	Status
1	Fagaceae	<i>Quercus griffithii</i>	Oak	136	15	
2	Fagaceae	<i>Quercus griffithii</i>	Oak	37	6	
3	Fagaceae	<i>Quercus griffithii</i>	Oak	47	7	
4	Fagaceae	<i>Quercus griffithii</i>	Oak	145	10	
5	Fagaceae	<i>Quercus griffithii</i>	Oak	51	7	
6	Fagaceae	<i>Quercus lanata</i>	Ban oak	140	15	
7	Fagaceae	<i>Quercus lanata</i>	Ban oak	118	12	
8	Fagaceae	<i>Quercus lanata</i>	Ban oak	36	7	
9	Fagaceae	<i>Quercus lanata</i>	Ban oak	225	17	
10	Fagaceae	<i>Quercus lanata</i>	Ban oak	28	5	
11	Fagaceae	<i>Quercus lanata</i>	Ban oak	160	15	

1.2 Vegetation assessment protocol for shrubs

Data Sheet (Shrub Vegetation) Plot type(Square): Shrubs(20x20)

sl no	Family	Scientific name	Common name	Height(m)	Nos	Status
1	Elaeagnaceae	<i>Elaeagnus parvifolia</i>	Silver thorn	0.5-2	2	
2	Berberidaceae	<i>Berberis aristata</i>		0.5-1	5	
3	Theaceae	<i>Eurya acuminata</i>		0.2-2	13	
4	Poaceae	<i>Yushania spp</i>		0.5-2	20	

1.3 Vegetation assessment protocol for herbs

Data Sheet (herb Vegetation) Plot type(Square): herbs(2mx2m)

sl no	Family	Scientific name	Common name	Nos	Status
1	Lamiaceae	<i>Perilla frutescens</i>	Beefsteak	2	
	Poaceae	<i>Grass</i>		5	

1.1 Vegetation assessment protocol for Trees

Dzongkhag: Chukha

Locality: Above Bunakha

Transect name: 11(Camp
area-6)

Plot no: 11

North: 27.150410000

East: 89.547240000

Altitude: 2336.200m

Aspect: Southwest

Slope%: 5

Canopy cover: Partial
shade

Forest type: Broadleaf

sl no	Family	Scientific name	Common name	DBH(cm)	Height(m)	Status
1	Lauraceae	<i>Cinnamomum glanduliferum</i>	Cinnamon	57	10	

2	Lauraceae	<i>Cinnamomum glanduliferum</i>	Cinnamon	58	10	
3	Lauraceae	<i>Cinnamomum glanduliferum</i>	Cinnamon	30	7	
4	Symplocaceae	<i>Symplocos racemosa</i>	Lodhra	24	6	
5	Symplocaceae	<i>Symplocos racemosa</i>	Lodhra	22	6	
6	Symplocaceae	<i>Symplocos racemosa</i>	Lodhra	25	5	
7	Betulaceae	<i>Corylus ferox</i>	Himalayan hazelnut	25	7	
8	Symplocaceae	<i>Symplocos racemosa</i>	Lodhra	24	7	
9	Symplocaceae	<i>Symplocos racemosa</i>	Lodhra	23	5	
10	Salicaceae	<i>Salix spp</i>	Willow	26	7	
11	Ericaceae	<i>Lyonia ovalifolia</i>		30	7	
12	Ericaceae	<i>Lyonia ovalifolia</i>		22	6	
13	Symplocaceae	<i>Symplocos racemosa</i>	Lodhra	25	4	
14	Symplocaceae	<i>Symplocos racemosa</i>	Lodhra	36	5	
15	Lauraceae	<i>Dodecadenia grandiflora</i>	Tailiya	170	15	
16	Lauraceae	<i>Dodecadenia grandiflora</i>	Tailiya	116	15	
17	Lauraceae	<i>Dodecadenia grandiflora</i>	Tailiya	75	6	
18	Betulaceae	<i>Corylus ferox</i>	Himalayan hazelnut	27	8	

1.2 Vegetation assessment protocol for shrubs

Data Sheet (Shrub

Vegetation)

Plot type(Square):Shrubs(20x20)

sl no	Family	Scientific name	Common name	Height(m)	Nos	Status
1	Elaeagnaceae	<i>Elaeagnus parvifolia</i>	Silverthorn	1m-2	3	
	Thymelaeaceae	<i>Daphne bholua</i>	Australian cheesewood	0.3-1	7	
	Fagaceae	<i>Lithocarpus fenestratus</i>	Stone oak	0.5	2	
	Aceraceae	<i>Acer campbellii</i>	Himalayan maple	1m-2	3	
	Symplocaceae	<i>Symplocos racemosa</i>		1	2	
	Betulaceae	<i>Corylus ferox</i>				

1.3 Vegetation assessment protocol for herbs

Data Sheet (herb Vegetation)

Plot type(Square):herbs(2mx2m)

sl no	Family	Scientific name	Common name	Nos	Status
1	Rosaceae	<i>Rubus calycinus</i>		4	
2	Araliaceae	<i>Hedera nepalensis</i>	Ivy	2	
3	Lamiaceae	<i>Perilla frutescens</i>	Beefsteak	6	

1.1 Vegetation assessment protocol for Trees				
Data Sheet (Tree Vegetation>1.3)	Plot type(Square):Trees(20x20)			
Dzongkhag: Chukha				
Locality: Near Tanalun new Bridge	Altitude: 1974.000m			
Transect name: 12	Aspect: Southwest			

Plot no: 12		Slope%:15				
North:27.154913333		Canopy cover: Partial shade				
East: 89.536795000		Forest type:Broadleaf				
sl no	Family	Scientific name	Common name	DBH(cm)	Height(m)	Status
1	Salicaceae	<i>Populus ciliata</i>	Himalayan poplar	106	20	
2	Salicaceae	<i>Populus ciliata</i>	Himalayan poplar	120	20	
3	Salicaceae	<i>Populus ciliata</i>	Himalayan poplar	123	20	
4	Salicaceae	<i>Populus ciliata</i>	Himalayan poplar	183	22	
5	Salicaceae	<i>Populus ciliata</i>	Himalayan poplar	127	20	
6	Salicaceae	<i>Populus ciliata</i>	Himalayan poplar	73	115	
7	Fagaceae	<i>Quercus lanata</i>	Ban oak	55	9	
8	Fagaceae	<i>Quercus lanata</i>	Ban oak	35	7	
9	Fagaceae	<i>Quercus lanata</i>	Ban oak	69	10	
#	Betulaceae	<i>Carpinus viminea</i>		50	15	
#	Toricelliaceae	<i>Toricellia tiliifolia</i>		55	6	
#	Toricelliaceae	<i>Toricellia tiliifolia</i>		63	5	
1.2 Vegetation assessment protocol for shrubs						
Data Sheet (Shrub Vegetation)			Plot type(Square):Shrubs(20x20)			
sl no	Family	Scientific name	Common name	Height(m)	Nos	Status
1	Myrsinaceae	<i>Ardisia macrocarpa</i>	Himalayan coralberry	0.5	6	
2	Thymelaeaceae	<i>Daphne bholua</i>	Australian cheesewood	0.5-1	5	
3	Theaceae	<i>Eurya acuminata</i>	Tapering leaf eurya	0.5-3	20	
1.3 Vegetation assessment protocol for herbs						
Data Sheet (herb Vegetation)			Plot type(Square):herbs(2mx2m)			
sl no	Family	Scientific name	Common name	Nos	Status	
1	Vitaceae	<i>Tetrasigma spp</i>		3		
2	Poaceae	Grass		4		
1.4 Other Plants by RECEE(ONLY Target species)						
sl no	Family	Scientific name	Common name	Lat	long	Type of plant
1	Boraginaceae	<i>Ehretia macrophylla</i>	Fukien tree			Tree
2	Scrophulariaceae	<i>Buddleja spp</i>	Butterflybush			Shrub

1.1 Vegetation assessment protocol for Trees

Data Sheet (Tree

Vegetation>1.3)

Plot type(Square):Trees(20x20)

Dzongkhag: Chukha **Altitude:** 2198.100m
Locality: Near Tanalum(Quarry-4 and 5)
Transect name: 13 Aspect: North
Plot no: 13 **Slope%:** 35
North: 27.160778333 Canopy cover: Partial shade
East: 89.553545000 Forest type: Broadleaf

sl no	Family	Scientific name	Common name	DBH (cm)	Height(m)	Status
1	Betulaceae	<i>Alnus nepalensis</i>	Himalayan Alder	48	13	
2	Betulaceae	<i>Alnus nepalensis</i>	Himalayan Alder	53	14	
3	Betulaceae	<i>Alnus nepalensis</i>	Himalayan Alder	60	14	
4	Betulaceae	<i>Alnus nepalensis</i>	Himalayan Alder	44	12	
5	Betulaceae	<i>Alnus nepalensis</i>	Himalayan Alder	67	15	
6	Betulaceae	<i>Alnus nepalensis</i>	Himalayan Alder	60	15	
7	Betulaceae	<i>Alnus nepalensis</i>	Himalayan Alder	80	15	
8	Betulaceae	<i>Alnus nepalensis</i>	Himalayan Alder	56	15	
9	Betulaceae	<i>Alnus nepalensis</i>	Himalayan Alder	54	15	
10	Betulaceae	<i>Alnus nepalensis</i>	Himalayan Alder	46	12	
11	Betulaceae	<i>Alnus nepalensis</i>	Himalayan Alder	44	12	
12	Betulaceae	<i>Alnus nepalensis</i>	Himalayan Alder	49	14	
13	Betulaceae	<i>Alnus nepalensis</i>	Himalayan Alder	53	12	
14	Betulaceae	<i>Alnus nepalensis</i>	Himalayan Alder	45	12	
15	Betulaceae	<i>Alnus nepalensis</i>	Himalayan Alder	72	14	
16	Betulaceae	<i>Alnus nepalensis</i>	Himalayan Alder	67	15	
17	Betulaceae	<i>Alnus nepalensis</i>	Himalayan Alder	80	15	
18	Betulaceae	<i>Alnus nepalensis</i>	Himalayan Alder	54	13	
19	Betulaceae	<i>Alnus nepalensis</i>	Himalayan Alder	59	13	
20	Betulaceae	<i>Alnus nepalensis</i>	Himalayan Alder	66	14	

1.2 Vegetation assessment protocol for shrubs

Data Sheet (Shrub Vegetation)

Plot type(Square):Shrubs(20x20)

sl no	Family	Scientific name	Common name	Height(m)	Nos	Status
1	Trochodendraceae	<i>Tetracentron sinense</i>	Qing pi tree	1m	2	
2	Adoxaceae	<i>Viburnum cylindricum</i>	Tubeflower viburnum	1m	1	
3	Caprifoliaceae	<i>Lycesteria formosa</i>	Pheasant berry	1m	1	

1.3 Vegetation assessment protocol for herbs

Data Sheet (herb Vegetation)

Plot type(Square):herbs(2mx2m)

sl no	Family	Scientific name	Common name	Nos	Status
1	Araliaceae	<i>Hedera nepalensis</i>	Wild ivy	0.1	2
2	Ranunculaceae	<i>Clematis spp</i>		0.5	3
3	Urticaceae	<i>Girardinia diversifolia</i>	Himalayan nettle	1	3

1.1 Vegetation assessment protocol for Trees

Data Sheet (Tree

Vegetation>1.3)

Dzongkhag: Chukha

Locality: Near-Geeling

goenpa

Transect name: 14

Plot no: 14

North: 27.16363666

East: 89.524805000

Plot type(Square):Trees(20x20)

Altitude: 2464.300m

Aspect: Southeast

Slope%: 25

Canopy cover: Partial shade

Forest type:Broadleaf

sl no	Family	Scientific name	Common name	DBH(cm)	Height(m)	Status
1	Betulaceae	<i>Alnus nepalensis</i>	Himalayan Alder	83	15	
2	Ericaceae	<i>Rhododendron arboreum</i>	Rhodo	59	10	
3	Betulaceae	<i>Carpinus viminea</i>	Himalayan hornbeam	50	9	
4	Pinaceae	<i>Pinus wallichiana</i>	Blue pine	124	20	
5	Betulaceae	<i>Carpinus viminea</i>	Himalayan hornbeam	52	9	
6	Pinaceae	<i>Pinus wallichiana</i>	Blue pine	160	22	
7	Betulaceae	<i>Alnus nepalensis</i>	Himalayan Alder	89	15	
8	Ericaceae	<i>Rhododendron arboreum</i>	Rhodo	38	5	
9	Ericaceae	<i>Rhododendron arboreum</i>	Rhodo	37	5	
10	Ericaceae	<i>Rhododendron arboreum</i>	Rhodo	39	5	
11	Pinaceae	<i>Pinus wallichiana</i>	Blue pine	83	15	
12	Ericaceae	<i>Pieris formosa</i>		28	5	
13	Fagaceae	<i>Lithocarpus fenestratus</i>	Stone oak	58	10	
14	Fagaceae	<i>Lithocarpus fenestratus</i>	Stone oak	80	12	
15	Pinaceae	<i>Pinus wallichiana</i>	Blue pine	64	15	
16	Pinaceae	<i>Pinus wallichiana</i>	Blue pine	99	20	
17	Betulaceae	<i>Alnus nepalensis</i>	Himalayan Alder	90	15	
18	Betulaceae	<i>Alnus nepalensis</i>	Himalayan Alder	80	10	
19	Ericaceae	<i>Rhododendron arboreum</i>	Rhodo	35	7	
20	Fagaceae	<i>Lithocarpus fenestratus</i>	Stone oak	90	13	
21	Fagaceae	<i>Lithocarpus fenestratus</i>	Stone oak	73	12	
22	Fagaceae	<i>Lithocarpus fenestratus</i>	Stone oak	90	13	
23	Betulaceae	<i>Carpinus viminea</i>	Himalayan hornbeam	89	15	
24	Symplocaceae	<i>Symplocos sumuntia</i>	Shan fan	35	9	

1.2 Vegetation assessment protocol for shrubs

Data Sheet (Shrub Vegetation)

sl no	Family	Scientific name	Common name	Height(m)	Nos	Status
1	Symplocaceae	<i>Symplocos sumantia</i>	Shan fan	.5-2	6	
2	Theaceae	<i>Eurya acuminata</i>	Tapering eurya	.5-1	7	
3	Ericaceae	<i>Pieris formosa</i>		0.5	4	
4	Berberidaceae	<i>Berberis spp</i>		1	4	
5	Symplocaceae	<i>Symplocos ramosissima</i>	Sapphire berry	5	3	
6	Rosaceae	<i>Rubus acuminatus</i>		5	3	
7	Lauraceae	<i>Dodecadenia grandiflora</i>	Tailiya	0.9	2	
8	Smilacaceae	<i>Smilax spp</i>		0.5	10	
9	Poaceae	<i>Yushiania spp</i>		3	50	
10	Rutaceae	<i>Zanthoxylum armatum</i>	Rattan pepper	2	1	

1.3 Vegetation assessment protocol for herbs

Data Sheet (herb Vegetation)

Plot type(Square):herbs(2mx2m)

sl no	Family	Scientific name	Common name	Nos	Status
1	Asparagaceae	<i>Ophiopogon spp</i>	Lily turf	3	
2	Asteraceae	<i>Ainsliaea aptera</i>		3	
3	Araliaceae	<i>Hedera nepalensis</i>	Himalayan ivy	4	

1.1 Vegetation assessment protocol for Trees

Data Sheet (Tree

Vegetation>1.3)

Plot type(Square):Trees(20x20)

Dzongkhag: Chukha

Altitude: 2128.900m

Locality:Near Tanalum(INQR-6)

Aspect: Southwest

Transect name: 15

Slope%: 35

Plot no: 15

Canopy cover: Partial shade

North:27.164180000

Forest type:Broadleaf

East: 89.548663333

sl no	Family	Scientific name	Common name	DBH(cm)	Height(m)	Status
1	Pinaceae	<i>Pinus wallichiana</i>	Bluepine	120	15	
2	Pinaceae	<i>Pinus wallichiana</i>	Bluepine	85	13	
3	Fagaceae	<i>Quercus lanata</i>		60	7	
4	Fagaceae	<i>Quercus lanata</i>		55	6	
5	Fagaceae	<i>Quercus lanata</i>		53	6	
6	Pinaceae	<i>Pinus wallichiana</i>	Bluepine	66	11	
7	Betulaceae	<i>Betula alnoides</i>		63	12	

1.2 Vegetation assessment protocol for shrubs

Data Sheet (Shrub Vegetation)

Plot type(Square):Shrubs(20x20)

sl no	Family	Scientific name	Common name	Height(m)	Nos	Status
1	Theaceae	<i>Eurya acuminata</i>	Tapering leaf eurya	1m-2m	2	
2	Betulaceae	<i>Betula alnoides</i>		1m-2m	3	

3	Ericaceae	<i>Rhododendron arboreum</i>		1m-2	3	
4	Ericaceae	<i>Rhododendron maddenii</i>		2	4	
5	Ericaceae	<i>Lyonia ovalifolia</i>		0.5-1	4	
6	Fagaceae	<i>Quercus lanata</i>		1	3	

1.3 Vegetation assessment protocol for herbs

Data Sheet (herb Vegetation)

Plot type(Square):herbs(2mx2m)

sl no	Family	Scientific name	Common name	Nos	Status
1	Dryopteridaceae	<i>Polysticum</i>		8	

1.1 Vegetation assessment protocol for Trees

Data Sheet (Tree

Vegetation>1.3)

Plot type(Square):Trees(20x20)

Dzongkhag: Chukha

Altitude: 1974.100m

Locality: Near Bunakha

Aspect: Southwest

Transect name: 16

Slope%: 25

Plot no: 16

Canopy cover: Partial shade

North: 27.173826667

Forest type: Broadleaf

East: 89.532836667

sl no	Family	Scientific name	Common name	DBH(cm)	Height(m)	Status
1	Fagaceae	<i>Quercus lanata</i>	Ban oak	250	17	
2	Fagaceae	<i>Quercus lanata</i>	Ban oak	239	15	
3	Fagaceae	<i>Quercus lanata</i>	Ban oak	110	12	
4	Fagaceae	<i>Quercus lanata</i>	Ban oak	115	12	
5	Pinaceae	<i>Pinus wallichiana</i>	Bluepine	34	6	
6	Fagaceae	<i>Quercus lanata</i>	Ban oak	151	15	
7	Fagaceae	<i>Quercus lanata</i>	Ban oak	148	15	
8	Fagaceae	<i>Quercus lanata</i>	Ban oak	112	15	
9	Fagaceae	<i>Quercus lanata</i>	Ban oak	130	15	
10	Fagaceae	<i>Quercus lanata</i>	Ban oak	46	7	
11	Fagaceae	<i>Quercus lanata</i>	Ban oak	167	20	
12	Fagaceae	<i>Quercus lanata</i>	Ban oak	49	8	
13	Fagaceae	<i>Quercus lanata</i>	Ban oak	28	8	
14	Toricelliaceae	<i>Toricellia tiliifolia</i>		69	7	

1.2 Vegetation assessment protocol for shrubs

Data Sheet (Shrub Vegetation)

Plot type(Square):Shrubs(20x20)

sl no	Family	Scientific name	Common name	Height(m)	Nos	Status
1	Theaceae	<i>Eurya acuminata</i>	Tapering eurya	1m-3	25	
2	Ericaceae	<i>Lyonia ovalifolia</i>		2m-3	3	
3	Fagaceae	<i>Quercus lanata</i>	Ban oak	0,5-2	4	

1.3 Vegetation assessment protocol for herbs

Data Sheet (herb Vegetation)

Plot type(Square):herbs(2mx2m)

sl no	Family	Scientific name	Common name	Nos	Status
1	Poaceae	<i>Carex spp</i>		20	
	Rubiaceae	<i>Galium spp</i>		2	

1.1 Vegetation assessment protocol for Trees

Data Sheet (Tree

Vegetation>1.3)

Plot type(Square):Trees(20x20)

Dzongkhag: Chukha

Altitude: 2063.200m

Locality: Near Tanalun new Bridge

Aspect: South

Transect name: 18

Slope%: 45

Plot no: 18

Canopy cover: Partial shade

North: 27.183955000

Forest type: Broadleaf

East: 89.528225000

sl no	Family	Scientific name	Common name	DBH(cm)	Height(m)	Status
1	Fagaceae	<i>Quercus lanata</i>	Ban oak	86	11	
2	Fagaceae	<i>Quercus lanata</i>	Ban oak	99	11	
3	Fagaceae	<i>Quercus lanata</i>	Ban oak	93	11	
4	Fagaceae	<i>Quercus lanata</i>	Ban oak	72	10	
5	Fagaceae	<i>Quercus lanata</i>	Ban oak	60	10	
6	Fagaceae	<i>Quercus lanata</i>	Ban oak	68	10	
7	Fagaceae	<i>Quercus lanata</i>	Ban oak	77	10	
8	Fagaceae	<i>Quercus lanata</i>	Ban oak	23	4	
9	Fagaceae	<i>Quercus lanata</i>	Ban oak	78	9	
10	Fagaceae	<i>Quercus lanata</i>	Ban oak	86	9	

1.2 Vegetation assessment protocol for shrubs

Data Sheet (Shrub Vegetation)

Plot type(Square):Shrubs(20x20)

sl no	Family	Scientific name	Common name	Height(m)	Nos	Status
1	Ericaceae	<i>Lyonia ovalifolia</i>		0.5-3	20	
2	Fagaceae	<i>Quercus lanata</i>		0.1-0.5	15	
3	Pinaceae	<i>Pinus wallichiana</i>		0.5	3	

1.3 Vegetation assessment protocol for herbs

Data Sheet (herb Vegetation)

Plot type(Square):herbs(2mx2m)

sl no	Family	Scientific name	Common name	Nos	Status
1	Poaceae	Grass		20	

1.1 Vegetation assessment protocol for Trees

Data Sheet (Tree Vegetation> 1.3)

Dzongkhag: Paro

Locality: Near the HAA
bridge(Riverine)

Transect name: 20

Plot no: 20

North: 27.200471667

East: 89.520813333

Plot type(Square):Trees(20x20)

Altitude: 1964.900m

Aspect: East

Slope%: 35

Canopy cover: Partial shade

Forest type:Broadleaf and Bluepine

sl no	Family	Scientific name	Common name	DBH(cm)	Height(m)	Status
1	Fagaceae	<i>Quercus griffithii</i>	Oak	201	18	
2	Fagaceae	<i>Quercus griffithii</i>	Oak	145	15	
3	Fagaceae	<i>Quercus griffithii</i>	Oak	210	20	
4	Fagaceae	<i>Quercus griffithii</i>	Oak	240	20	
5	Lauraceae	<i>Dodecadenia grandiflora</i>	Tailiya	167	13	
6	Lauraceae	<i>Dodecadenia grandiflora</i>	Tailiya	68	7	
7	Lauraceae	<i>Dodecadenia grandiflora</i>	Tailiya	67	7	
8	Betulaceae	<i>Carpinus viminea</i>		26	5	
9	Betulaceae	<i>Carpinus viminea</i>		28	15	
10	Fagaceae	<i>Quercus griffithii</i>	Oak	279	18	
11	Fagaceae	<i>Quercus griffithii</i>	Oak	198	16	

1.2 Vegetation assessment protocol for shrubs

Data Sheet (Shrub Vegetation)

Plot type(Square):Shrubs(20x20)

sl no	Family	Scientific name	Common name	Height(m)	Nos	Status
1	Theaceae	<i>Eurya acuminata</i>		1m-3	30	
2	Berberidaceae	<i>Mahonia nepalensis</i>		0.7	2	
3	Elaeagnaceae	<i>Elaeagnus parvifolia</i>	Silverthorn	3	4	
4	Anacardiaceae	<i>Rhus spp</i>		0.5	2	
5	Oleaceae	<i>Ligustrum compactum</i>		0.1-0.5	3	
6	Betulaceae	<i>Carpinus viminea</i>		0.5-2	3	
7	Smilicaceae	<i>Smilax spp</i>		0.5	5	
8	Berberidaceae	<i>Berberis aristata</i>		0.5	3	
9	Poaceae	<i>Yushania spp</i>		0.5-2	15	

1.3 Vegetation assessment protocol for herbs

Data Sheet (herb Vegetation)

Plot type(Square):herbs(2mx2m)

sl no	Family	Scientific name	Common name	Nos	Status
1	Rubiaceae	<i>Rubia spp</i>		3	
2	Fabaceae	<i>Desmodium spp</i>		4	
3	Lamiaceae	<i>Salvia spp</i>		2	

1.1 Vegetation assessment protocol for Trees

Data Sheet (Tree Vegetation> 1.3)

Dzongkhag: Paro

Locality: Near the HAA bridge
(Riverine)

Transect name: 21

Plot no: 21

North: 27.204816667

East: 89.518853333

Plot type (Square): Trees(20x20)

Altitude: 1920.400m

Aspect: East

Slope%: 5

Canopy cover: Partial shade

Forest type: Broadleaf

sl no	Family	Scientific name	Common name	DBH(cm)	Height(m)	Status
1	Fagaceae	<i>Quercus griffithii</i>	Oak	290	18	
2	Fagaceae	<i>Quercus griffithii</i>	Oak	220	17	
3	Fagaceae	<i>Quercus griffithii</i>	Oak	138	15	
4	Fagaceae	<i>Quercus griffithii</i>	Oak	235	15	
5	Fagaceae	<i>Quercus griffithii</i>	Oak	105	15	
6	Fagaceae	<i>Quercus griffithii</i>	Oak	125	15	
7	Cornaceae	<i>Benthamedia capitata</i>	Dogwood	30	7	
8	Betulaceae	<i>Carpinus viminea</i>		25	5	
9	Pinaceae	<i>Pinus wallichiana</i>	Bluepine	70	15	
10	Pinaceae	<i>Pinus wallichiana</i>	Bluepine	55	10	
11	Pinaceae	<i>Pinus wallichiana</i>	Bluepine	54	10	
12	Pinaceae	<i>Pinus wallichiana</i>	Bluepine	43	9	
13	Pinaceae	<i>Pinus wallichiana</i>	Bluepine	55	10	

1.2 Vegetation assessment protocol for shrubs

Data Sheet (Shrub Vegetation)

Plot type(Square):Shrubs(20x20)

sl no	Family	Scientific name	Common name	Height(m)	Nos	Status
1	Elaeagnaceae	<i>Elaeagnus parvifolia</i>	silverthorn	2m-5	19	
2	Theaceae	<i>Eurya acuminata</i>		0.5-2	10	
3	Lauraceae	<i>Cinnamomum glanduliferum</i>	Cinnamon	1.5	1	
4	Berberidaceae	<i>Berberis aristata</i>		1m-2	4	
5	Pinaceae	<i>Pinus wallichiana</i>	Bluepine	0.5-2	6	

1.3 Vegetation assessment protocol for herbs

Data Sheet (herb Vegetation)

Plot type (Square): herbs(2mx2m)

sl no	Family	Scientific name	Common name	Nos	Status
1	Euphorbiaceae	<i>Euphorbia griffithii</i>		20	

1.1 Vegetation assessment protocol for Trees

Data Sheet (Tree

Vegetation> 1.3)

Dzongkhag: Chukha

Locality: Damchu (INRQ-10)

Transect name: 23

Plot no: 23

Plot type (Square):Trees(20x20)

Altitude: 2238.800m

Aspect: North

Slope%: 45

Canopy cover: Partial shade

North:27.232386667

Forest type:Broadleaf

East: 89.528786667

sl no	Family	Scientific name	Common name	DBH(cm)	Height(m)	Status
1	Pinaceae	<i>Pinus wallichiana</i>	Bluepine	59	8	
2	Pinaceae	<i>Pinus wallichiana</i>	Bluepine	65	9	
3	Pinaceae	<i>Pinus wallichiana</i>	Bluepine	41	7	
4	Pinaceae	<i>Pinus wallichiana</i>	Bluepine	38	6	
5	Pinaceae	<i>Pinus wallichiana</i>	Bluepine	75	12	
6	Pinaceae	<i>Pinus wallichiana</i>	Bluepine	66	11	
7	Fagaceae	<i>Quercus griffithii</i>	Oak	63	7	
8	Betulaceae	<i>Carpinus viminea</i>		34	6	
9	Betulaceae	<i>Carpinus viminea</i>		41	15	
10	Pinaceae	<i>Pinus wallichiana</i>	Bluepine	148	15	

1.2 Vegetation assessment protocol for shrubs

Data Sheet (Shrub Vegetation)

Plot type(Square):Shrubs(20x20)

sl no	Family	Scientific name	Common name	Height(m)	Nos	Status
1	Betulaceae	<i>Carpinus viminea</i>		0.5-1	35	
	Rosaceae	<i>Cotoneaster spp</i>		1m-3	4	
	Caprifoliaceae	<i>Lonicera quinquelocularis</i>		0.5-3	5	
	Oleaceae	<i>Ligustrum compactum</i>		0.5-1	3	
	Berberidaceae	<i>Berberis spp</i>		1m-3	3	
	Salicaceae	<i>Populus ciliata</i>		3	2	

1.3 Vegetation assessment protocol for herbs

sl no	Family	Scientific name	Common name	Nos	Status
1	Asteraceae	<i>Artemisia vulgaris</i>		3	
2	Poaceae		Grass	60	
3	Rubiaceae	<i>Galium spp</i>		2	

1.1 Vegetation assessment protocol for Trees

Data Sheet (Tree

Vegetation>1.3)

Plot type(Square):Trees(20x20)

Dzongkhag: Chukha

Altitude: 2005.900m

Locality:Damchu(Riverine)

Aspect: Northwest

Transect name: 24

Slope%:35

Plot no: 24

Canopy cover: Partial shade

North:27.262618333

Forest type:Broadleaf

East: 89.528415000

sl no	Family	Scientific name	Common name	DBH(cm)	Height(m)	Status
1	Aceraceae	<i>Acer campbellii</i>		36	4	
2	Aceraceae	<i>Acer campbellii</i>		34	4	

3	Aceraceae	<i>Acer campbellii</i>		107	9	
4	Aceraceae	<i>Acer campbellii</i>		8	5	
5	Pinaceae	<i>Pinus wallichiana</i>		124	20	
6	Salicaceae	<i>Salix wallichiana</i>		65	5	
7	Salicaceae	<i>Salix wallichiana</i>		45	3	
8	Salicaceae	<i>Salix wallichiana</i>		58	4	
9	Salicaceae	<i>Salix wallichiana</i>		48	3	
10	Salicaceae	<i>Salix wallichiana</i>		62	4	
11	Salicaceae	<i>Salix wallichiana</i>		41	7	
12	Adoxaceae	<i>Viburnum cylindricum</i>		20	6	

1.2 Vegetation assessment protocol for shrubs

Data Sheet (Shrub Vegetation)

Plot type(Square):Shrubs(20x20)

sl no	Family	Scientific name	Common name	Height(m)	Nos	Status
1	Rutaceae	<i>Zanthoxylum armatum</i>		0.7	2	
2	Caprifoliaceae	<i>Lonicera quinquelocularis</i>		2m-3	7	
3	Oleaceae	<i>Ligustrum compactum</i>		1	3	
4	Pinaceae	<i>Pinus wallichiana</i>		2m-5	3	
5	Coriariaceae	<i>Coriaria nepalensis</i>		3		
6	Rosaceae	<i>Rosa brunonii</i>		3	4	
7	Aceraceae	<i>Acer oblongum</i>		1	1	
8	Rosaceae	<i>Rosa sericea</i>		1	3	

1.3 Vegetation assessment protocol for herbs

Data Sheet (herb Vegetation)

Plot type(Square):herbs(2mx2m)

sl no	Family	Scientific name	Common name	Nos	Status
1	Plumbaginaceae	<i>Ceratostigma griffithii</i>		5	
2	Asparagaceae	<i>Asparagus racemosus</i>		6	

1.1 Vegetation assessment protocol for Trees

Data Sheet (Tree

Vegetation>1.3)

Plot type(Square):Trees(20x20)

Dzongkhag: Chukha

Altitude: 2011.700m

Locality:Bunagu(Below road)

Aspect: Northeast

Transect name: 25

Slope%:35

Plot no: 25

Canopy cover: Partial shade

North:27.131876667

Forest type:Broadleaf and Bluepine

East: 89.542165000

sl no	Family	Scientific name	Common name	DBH(cm)	Height(m)	Status
1	Fagaceae	<i>Quercus glauca</i>		95	20	
2	Fagaceae	<i>Quercus glauca</i>		65	15	
3	Betulaceae	<i>Carpinus vimenea</i>		27	9	
4	Fagaceae	<i>Quercus glauca</i>		87	15	

5	Fagaceae	<i>Quercus glauca</i>		98	15	
6	Fagaceae	<i>Quercus glauca</i>		355	20	
7	Fagaceae	<i>Quercus glauca</i>		67	11	

1.2 Vegetation assessment protocol for shrubs

Data Sheet (Shrub Vegetation)

Plot type(Square):Shrubs(20x20)

sl no	Family	Scientific name	Common name	Height(m)	Nos	Status
1	Myrsinaceae	<i>Ardisia macrocarpa</i>		0.5	10	
2	Symplocaceae	<i>Symplocos ramosissima</i>		0.5	15	
3	Thymelaeaceae	<i>Daphne bholua</i>		0.5-1	4	

1.3 Vegetation assessment protocol for herbs

Data Sheet (herb Vegetation)

Plot type(Square):herbs(2mx2m)

sl no	Family	Scientific name	Common name	Nos	Status
1	Rubiaceae	<i>Rubia spp</i>		3	
2	Araliaceae	<i>Hedera spp</i>		2	
3	Poaceae		Grass	4	

.1 Vegetation assessment protocol for Trees

Data Sheet (Tree

Vegetation>1.3)

Plot type (Square): Trees(20x20)

Dzongkhag: Chukha

Altitude: 2007.100m

Locality:Bunagu(Below road)

Aspect: Northeast

Transect name: 27

Slope%:10

Plot no: 27

Canopy cover: Partial shade

North:27.136948333

Forest type: Broadleaf and Blue pine

East: 89.543318333

sl no	Family	Scientific name	Common name	DBH(cm)	Height(m)	Status
1	Fagaceae	<i>Quercus lanata</i>	Ban oak	114	7	
2	Ericaceae	<i>Rhododendron arboreum</i>	Rhodo	103	7	
3	Ericaceae	<i>Lyonia ovalifolia</i>		105	8	
4	Ericaceae	<i>Lyonia ovalifolia</i>		28	5	
5	Fagaceae	<i>Quercus lanata</i>	Ban oak	68	10	
6	Schoepfiaceae	<i>Schoepfia jasminodora</i>		70	7	
7	Pinaceae	<i>Pinus wallichiana</i>	Bluepine	150	20	
8	Fagaceae	<i>Quercus griffithii</i>	Oak	120	15	
9	Ericaceae	<i>Rhododendron arboreum</i>		70	7	
10	Ericaceae	<i>Lyonia ovalifolia</i>		70	7	
11	Pinaceae	<i>Pinus wallichiana</i>	Bluepine	134	15	

12	Ericaceae	<i>Lyonia ovalifolia</i>		54	7	
13	Ericaceae	<i>Rhododendron arboreum</i>		52	6	
14	Fagaceae	<i>Quercus lanata</i>		35	6	
15	Pinaceae	<i>Pinus wallichiana</i>	Bluepine	146	20	
16	Fagaceae	<i>Quercus lanata</i>	Ban oak	48	6	
17	Fagaceae	<i>Quercus lanata</i>	Ban oak	84	7	
18	Pinaceae	<i>Pinus wallichiana</i>	Bluepine	121	20	

1.2 Vegetation assessment protocol for shrubs

Data Sheet (Shrub Vegetation)

sl no	Family	Scientific name	Common name	Height(m)	Nos	Status
1	Ericaceae	<i>Rhododendron maddenii</i>		0.5-3	20	
2	Ericaceae	<i>Rhododendron arboreum</i>		1	1	
3	Betulaceae	<i>Carpinus viminea</i>		1	1	
4	Ericaceae	<i>Vaccinium vacciniaceum</i>		0.5	5	

1.3 Vegetation assessment protocol for herbs

Data Sheet (herb Vegetation) Plot type(Square):herbs(2mx2m)

sl no	Family	Scientific name	Common name	Nos	Status
1	Poaceae	Grass		10	

1.1 Vegetation assessment protocol for Trees

Data Sheet (Tree

Vegetation>1.3)

Plot type(Square):Trees(20x20)

Dzongkhag: Chukha

Altitude: 1653.600m

Locality: Chukha

Aspect: North

Transect name: 30

Slope%: 15

Plot no: 30

Canopy cover: Partial shade

North: 27.057893333

Forest type: Broadleaf

East: 89.555813333

sl no	Family	Scientific name	Common name	DBH(cm)	Height(m)	Status
1	Betulaceae	<i>Carpinus viminea</i>		28	7	
2	Betulaceae	<i>Carpinus viminea</i>		34	8	
3	Fagaceae	<i>Quercus glauca</i>		121	11	
4	Betulaceae	<i>Carpinus viminea</i>		63	10	
5	Betulaceae	<i>Carpinus viminea</i>		65	10	
6	Fagaceae	<i>Quercus glauca</i>		66	10	
7	Betulaceae	<i>Carpinus viminea</i>		34	8	

1.2 Vegetation assessment protocol for shrubs

Data Sheet (Shrub Vegetation)

Plot type(Square):Shrubs(20x20)

sl no	Family	Scientific name	Common name	Height(m)	Nos	Status
1	Myrsinaceae	<i>Ardisia macrocarpa</i>		0.5-1	8	
2	Poaceae	<i>Yushania</i>		0.5-2	50	
3	Oleaceae	<i>Fraxinus spp</i>		0.3-0.5	4	

1.3 Vegetation assessment protocol for herbs

Data Sheet (herb Vegetation) Plot type(Square):herbs(2mx2m)

sl no	Family	Scientific name	Common name	Nos	Status
1	Dryopteridaceae	<i>Polysticum spp</i>		5	
2	Poaceae	<i>Ophiopogon</i>		3	
3	Piperaceae	<i>Piper</i>		4	

1.1 Vegetation assessment protocol for Trees

Data Sheet (Tree

Vegetation > 1.3)

Plot type(Square):Trees(20x20)

Altitude:

2557.000m

Dzongkhag: Chukha

Locality: Above

Chanachen village

Aspect: Southwest

Transect name: 32

Slope%: 10

Canopy cover:

Plot no: 32

Partial shade

Forest

North: 27.147958333

type:Broadleaf

East: 89.513200000

sl no	Family	Scientific name	Common name	DBH(cm)	Height(m)	Status
1	Pinaceae	<i>Tsuga dumosa</i>	Hemlock	520	30	
2	Salicaceae	<i>Populus ciliata</i>	Himalayan poplar	521	25	
3	Lauraceae	<i>Dodecadenia grandiflora</i>	Tailiya	174	10	
4	Symplocaceae	<i>Symplocos sumuntia</i>	Shan fan	65	10	
5	Fagaceae	<i>Lithocarpus elegans</i>	Spike oak	156	18	
6	Aceraceae	<i>Acer campbellii</i>	Himalayan Maple	220	15	
7	Rosaceae	<i>Prunus nepalensis</i>	wild cherry	255	13	
8	Fagaceae	<i>Lithocarpus fenestratus</i>	Stone oak	293	20	
9	Theaceae	<i>Eurya acuminata</i>	Tapering leaf eurya	75	9	
10	Pinaceae	<i>Tsuga dumosa</i>	Hemlock	289	25	
11	Theaceae	<i>Eurya acuminata</i>	Tapering leaf eurya	115	10	
12	Lauraceae	<i>Cinnamomum glanduliferum</i>	Cinnamon tree	95	8	

1.2 Vegetation assessment protocol for shrubs

Data Sheet (Shrub

Vegetation)

Plot type(Square):Shrubs(20x20)

sl no	Family	Scientific name	Common name	Height(m)	Nos	Status
1	Buxaceae	<i>Sarcococca saligna</i>	Christmas box	0.30-0.50	100	
2	Aceraceae	<i>Acer campbellii</i>	Himalayan Maple	2m	2	
3	Adoxaceae	<i>Viburnum erubescens</i>	reddish viburnum	1m-2m	12	
4	Thymelaeaceae	<i>Daphne bholua</i>	Australian cheesewood	0.5-2	13	
5	Berberidaceae	<i>Mahonia napalensis</i>	Nepal barberry	0.7-1	4	
6	Aquifoliaceae	<i>Ilex dipyrrena</i>	Himalayan holly	2m	2	
7	Berberidaceae	<i>Berberis spp</i>		4	2	
8	Poaceae	<i>Yushania spp</i>	Bamboo	4	100	
9	Smilacaceae	<i>Smilax spp</i>		0.3	5	

1.3 Vegetation assessment protocol for herbs

Data Sheet (herb Vegetation)

Plot type(Square):herbs(2mx2m)

sl no	Family	Scientific name	Common name	Nos	Status
1	Rosaceae	<i>Rubus calycinus</i>	Wild raspberry	20	
2	Asteraceae	<i>Ainsliaea aptera</i>		4	
3	Poaceae	<i>Oplismenus hirtellus</i>	Basket grass	4	
4	Rubiaceae	<i>Galium spp</i>		6	
5	Melanthiaceae	<i>Paris polyphylla</i>	Himalayan Paris	2	
6	Polygonaceae	<i>Persicaria spp</i>		5	

1.4 Other Plants by RECEE(ONLY Target species)

sl no	Family	Scientific name	Common name	Lat	long	Type of plant
1	Liliaceae	<i>Cardiocrinum giganteum</i>	Gaint lily			herb
2	Orchidaceae	<i>Goodyera vittata</i>				Orchid
3	Ericaceae	<i>Rhododendron grande</i>	Grande			Shrub
4	Ericaceae	<i>Rhododendron barbatum</i>				Shrub

BLUEPINE FORESTS

1.1 Vegetation assessment protocol for Trees

Data Sheet (Tree

Vegetation>1.3)

Plot type(Square):Trees(20x20)

Dzongkhag: Chukha

Altitude: 2169.900m

Locality: Near

Tanalum(Quarry 7)

Aspect: North east

Transect name: 17

Slope%: 5%

Plot no: 17

Canopy cover: Partial shade

North: 27.183995000

Forest type: Bluepine

East: 89.545820000

sl no	Family	Scientific name	Common name	DBH(cm)	Height(m)	Status
1	Pinaceae	<i>Pinus wallichiana</i>	Bluepine	155	20	
2	Adoxaceae	<i>Viburnum cylindricum</i>		61	6	
3	Pinaceae	<i>Pinus wallichiana</i>		120	18	
4	Adoxaceae	<i>Viburnum cylindricum</i>		38	5	
5	Adoxaceae	<i>Viburnum cylindricum</i>		65	7	
6	Pinaceae	<i>Pinus wallichiana</i>		183	20	
7	Betulaceae	<i>Alnus nepalensis</i>		158	20	
8	Pinaceae	<i>Pinus wallichiana</i>		68	12	
9	Betulaceae	<i>Alnus nepalensis</i>		95	20	
10	Pinaceae	<i>Pinus wallichiana</i>		10	5	
11	Pinaceae	<i>Pinus wallichiana</i>		220	20	
12	Adoxaceae	<i>Viburnum cylindricum</i>		60	6	
13	Ericaceae	<i>Lyonia ovalifolia</i>		42	5	
14	Ericaceae	<i>Lyonia ovalifolia</i>		43	5	
15	Ericaceae	<i>Lyonia ovalifolia</i>		42	5	
16	Betulaceae	<i>Carpinus viminea</i>	Himalayan hornbeam	34	6	
17	Betulaceae	<i>Corylus ferox</i>		40	7	
18	Betulaceae	<i>Alnus nepalensis</i>		150	18	
19	Theaceae	<i>Eurya acumintata</i>		30	7	
20	Salicaceae	<i>Populus ciliata</i>		173	30	
21	Pinaceae	<i>Pinus wallichiana</i>		180	25	
22	Betulaceae	<i>Carpinus viminea</i>		40	8	

1.2 Vegetation assessment protocol for shrubs

Data Sheet (Shrub

Vegetation)

Plot type(Square): Shrubs(20x20)

sl no	Family	Scientific name	Common name	Height(m)	Nos	Status
1	Buxaceae	<i>Sarcococca saligna</i>		0.5-1	60	
2	Smilacaceae	<i>Smilax spp</i>		1	2	
3	Rosaceae	<i>Rubus acuminatus</i>		0.5-1	3	
4	Oleaceae	<i>Fraxinus spp</i>		0.5	3	
5	Theaceae	<i>Eurya acuminata</i>		2	4	
6	Betulaceae	<i>Carpinus viminea</i>		1	5	
7	Rutaceae	<i>zanthoxylum armatum</i>		1 m	2	
8	Thymelaeaceae	<i>Daphne bholua</i>		1m	3	
9	Lauraceae	<i>Dodecadenia grandiflora</i>	Tailiya	1m	2	
10	Symplocaceae	<i>Symplocos paniculata</i>		1.5	2	
11	Aceraceae	<i>Acer campbellii</i>		2	3	

1.3 Vegetation assessment protocol for herbs

Data Sheet (herb Vegetation)

Plot type(Square): herbs(2mx2m)

sl no	Family	Scientific name	Common name	Nos	Status
	Athyriaceae	<i>Diplazium esculentum</i>		6	
	Rosaceae	<i>Rubus calycinus</i>		3	
	Asteraceae	<i>Artemisia spp</i>		6	

1.4 Other Plants by RECEE(ONLY Target species)

sl no	Family	Scientific name	Common name	Lat	long	Type of plant
1	Orchidaceae	<i>Goodyera fusca</i>				Orchid
2		<i>Rhus spp</i>				
3		<i>Docynia indica</i>				
4		<i>Rumax nepalensis</i>				
5	Lauraceae	<i>Cinnamomum glanduliferum</i>	Cinnamon			Shrub

1.1 Vegetation assessment protocol for Trees

Data Sheet (Tree Vegetation> 1.3)

Plot type(Square):Trees(20x20)

Dzongkhag: Paro

Altitude: 2058.800m

Locality: Below Bjizhigang (Riverine-Haachu)

Aspect:East

Transect name: 19

Slope%: 5

Plot no: 19

Canopy cover: Partial shade

North:27.193660000

Forest type:Bluepine

East: 89.48675000

sl no	Family	Scientific name	Common name	DBH(cm)	Height(m)	Status
1	Betulaceae	<i>Carpinus viminea</i>		173	8	
2	Lauraceae	<i>Dodecadenia grandiflora</i>	Tailiya	127	13	
3	Betulaceae	<i>Carpinus viminea</i>		95	11	
4	Cornaceae	<i>Benthamedia capitata</i>		48	8	
5	Fagaceae	<i>Quercus griffithii</i>		103	13	
6	Betulaceae	<i>Carpinus viminea</i>		98	12	
7	Betulaceae	<i>Carpinus viminea</i>		92	12	
8	Pinaceae	<i>Pinus wallichiana</i>	Blue pine	58	8	
9	Pinaceae	<i>Pinus wallichiana</i>	Blue pine	60	9	
10	Pinaceae	<i>Pinus wallichiana</i>	Blue pine	61	9	
11	Pinaceae	<i>Pinus wallichiana</i>	Blue pine	58	7	
12	Pinaceae	<i>Pinus wallichiana</i>	Blue pine	59	7	

1.2 Vegetation assessment protocol for shrubs

Data Sheet (Shrub Vegetation)

Plot type(Square):Shrubs(20x20)

sl no	Family	Scientific name	Common name	Height(m)	Nos	Status
1	Pinaceae	<i>Pinus wallichiana</i>	Blue pine	0.5-2	9	
2	Betulaceae	<i>Carpinus viminea</i>		0.1-0.5	60	

3	Elaeagnaceae	<i>Elaeagnus parvifolia</i>	Silverthorn	1m-2	30	
4	Adoxaceae	<i>Viburnum cylindricum</i>		0.5-1	3	
5	Berberidaceae	<i>Berberis aristata</i>		0.1-1	3	

1.3 Vegetation assessment protocol for herbs

Data Sheet (herb Vegetation)

Plot type(Square):herbs(2mx2m)

sl no	Family	Scientific name	Common name	Nos	Status
1	Asteraceae	<i>Artemisia vulgaris</i>	Mugwort	4	
2	Equisetaceae	<i>Equisetum diffusum</i>	Horsetail	7	

1.1 Vegetation assessment protocol for Trees

Data Sheet (Tree

Vegetation>1.3)

Plot type(Square):Trees(20x20)

Dzongkhag: Chukha

Altitude: 1821.800m

Locality: Near
bridge(Chanachen)

Aspect: West

Transect name: 26

Slope%: 5

Plot no: 26

Canopy cover: Partial shade

North:27.129773333

Forest type:Bluepine

East: 89.540440000

sl no	Family	Scientific name	Common name	DBH(cm)	Height(m)	Status
1	Pinaceae	<i>Pinus wallichiana</i>	Bluepine	282	30	
2	Fagaceae	<i>Quercus griffithii</i>	Oak	103	10	
3	Fagaceae	<i>Quercus glauca</i>	Japanese Blue oak	64	9	
4	Fagaceae	<i>Quercus glauca</i>	Japanese Blue oak	198	20	
5	Fagaceae	<i>Quercus glauca</i>	Japanese Blue oak	66	15	
6	Betulaceae	<i>Betula alnoides</i>	Himalayan birch	281	20	
7	Betulaceae	<i>Carpinus viminea</i>	Himalayan hornbeam	79	15	
8	Betulaceae	<i>Betula alnoides</i>	Himalayan birch	250	23	
9	Betulaceae	<i>Betula alnoides</i>	Himalayan birch	220	20	
10	Pinaceae	<i>Pinus wallichiana</i>	Bluepine	270	35	
11	Betulaceae	<i>Betula alnoides</i>	Himalayan birch	218	18	

1.2 Vegetation assessment protocol for shrubs

Data Sheet (Shrub Vegetation)

Plot type(Square):Shrubs(20x20)

sl no	Family	Scientific name	Common name	Height(m)	Nos	Status
1	Myrsinaceae	<i>Ardisia macrocarpa</i>	Himalayan coralberry	0.1-.03	30	
2	Thymelaeaceae	<i>Daphne bholua</i>	Australian cheesewood	0.3-1	10	
3	Symplocaceae	<i>Symplocos racemosa</i>	Lodh tree	4	7	
4	Theaceae	<i>Eurya acuminata</i>	Tapering leaf eurya	1m-3	6	
5	Lauraceae	<i>Dodecadenia grandiflora</i>	Tailiya	2m-3	4	
6	Lauraceae	<i>Persea spp</i>	Wild avacado	3	1	
7	Poaceae	<i>Yushania spp</i>	Bamboo	1m-4	100	

1.3 Vegetation assessment protocol for herbs

Data Sheet (herb Vegetation)

Plot type(Square):herbs(2mx2m)

sl no	Family	Scientific name	Common name	Nos	Status
1	Poaceae	<i>Oplismenus hirtellus</i>	Basket grass	10	
2	Balsaminaceae	<i>Impatiens spp</i>		5	
3	Asparagaceae	<i>Tupistra spp</i>		2	

MIXED CONIFER

1.1 Vegetation assessment protocol for Trees

Data Sheet (Tree

Vegetation>1.3)

Plot type(Square):Trees(20x20)

Dzongkhag: Chukha

Altitude: 2798.200m

Locality: Paga Goenpa

Aspect: West

Transect name: 28

Slope%: 5

Plot no: 28

Canopy cover: Partial Shade

North: 27.285971667

Forest type: Mixed Conifer and Bluepine

East: 89.561858333

sl no	Family	Scientific name	Common name	DBH(cm)	Height(m)	Status
1	Pinaceae	<i>Pinus wallichiana</i>	Bluepine	105	19	
2	Pinaceae	<i>Pinus wallichiana</i>	Bluepine	143	19	
3	Pinaceae	<i>Pinus wallichiana</i>	Bluepine	145	19	
4	Salicaceae	<i>Populus ciliata</i>		84	16	
5	Salicaceae	<i>Populus ciliata</i>		98	18	
6	Pinaceae	<i>Pinus wallichiana</i>	Bluepine	54	7	
7	Pinaceae	<i>Pinus wallichiana</i>	Bluepine	136	18	
8	Salicaceae	<i>Populus ciliata</i>		47	11	
9	Salicaceae	<i>Populus ciliata</i>		94	14	
#	Salicaceae	<i>Populus ciliata</i>		68	13	
#	Pinaceae	<i>Pinus wallichiana</i>	Bluepine	37	6	
#	Salicaceae	<i>Populus ciliata</i>		85	13	
#	Salicaceae	<i>Populus ciliata</i>		71	12	

1.2 Vegetation assessment protocol for shrubs

Data Sheet (Shrub Vegetation)

Plot type(Square):Shrubs(20x20)

sl no	Family	Scientific name	Common name	Height(m)	Nos	Status
1	Buxaceae	<i>Sarcococca saligna</i>	Christmas Box	0.3	50	
2	Scrophulariaceae	<i>Buddleja crispa</i>	Butterflybush	1.5	11	
3	Celastraceae	<i>Euonymus tingens</i>		0.5	2	
4	Rosaceae	<i>Rubus biflorus</i>		0.3	6	

1.3 Vegetation assessment protocol for herbs

Data Sheet (herb Vegetation)

Plot type(Square):herbs(2mx2m)

sl no	Family	Scientific name	Common name	Nos	Status
1	Araliaceae	<i>Hedera nepalensis</i>		3	
2	Asteraceae	<i>Artemisia vulgaris</i>		3	
3	Euphorbiaceae	<i>Euphorbia griffithii</i>		4	

1.1 Vegetation assessment protocol for Trees

Data Sheet (Tree

Vegetation>1.3)

Plot type(Square):Trees(20x20)

Altitude:

2794.300m

Dzongkhag: Chukha

Locality:Below Shema

Goenpa

Aspect: NorthWest

Transect name: 29

Slope%: 10

Plot no: 29

Canopy cover: Partial shade

North:27.220886667

Forest type:Mixed conifer

East: 89.547620000

sl no	Family	Scientific name	Common name	DBH(cm)	Height(m)	Status
1	Pinaceae	<i>Pinus wallichiana</i>	Blue pine	165	18	
2	Pinaceae	<i>Pinus wallichiana</i>	Blue pine	95	15	
3	Fagaceae	<i>Quercus semecarpifolia</i>	Brown oak	45	5	
4	Pinaceae	<i>Pinus wallichiana</i>	Blue pine	85	13	
5	Pinaceae	<i>Pinus wallichiana</i>	Blue pine	87	13	
6	Pinaceae	<i>Pinus wallichiana</i>	Blue pine	75	13	
7	Pinaceae	<i>Pinus wallichiana</i>	Blue pine	40	11	
8	Pinaceae	<i>Tsuga dumosa</i>	Hemlock	65	7	
9	Pinaceae	<i>Tsuga dumosa</i>	Hemlock	144	13	
10	Pinaceae	<i>Picea spinulosa</i>	Spruce	60	12	
11	Pinaceae	<i>Picea spinulosa</i>	Spruce	38	7	
12	Symplocaceae	<i>Symplocos paniculata</i>	Sapphire berry	55	9	

1.2 Vegetation assessment protocol for shrubs

Data Sheet (Shrub Vegetation)

Plot type(Square):Shrubs(20x20)

sl no	Family	Scientific name	Common name	Height(m)	Nos	Status
1	Ericaceae	<i>Pieris formosa</i>	Taipei pieris	0.5-2	30	
2	Symplocaceae	<i>Symplocos paniculata</i>	Sapphire berry	0.5	2	
3	Rosaceae	<i>Cotoneaster spp</i>		0.5-2	3	
4	Pinaceae	<i>Picea spinulosa</i>	Spruce	1m-2	4	
5	Pinaceae	<i>Tsuga dumosa</i>	Hemlock	0.5-2	11	

6	Aquifoliaceae	<i>Ilex dipyrrena</i>	Himalayan holly	0.5-1	3	
7	Betulaceae	<i>Carpinus viminea</i>	Himalayan hornbeam	0.1-1	3	
8	Rosaceae	<i>Rosa sericea</i>	Silky rose	1m-2	8	
9	Adoxaceae	<i>Viburnum erubescens</i>	reddish viburnum	1.5	3	
10	Hydrangeaceae	<i>Philadelphus spp</i>		1	1	
11	Berberidaceae	<i>Berberis aristata</i>		0.5-2	3	
12	Thymelaeaceae	<i>Daphne bholua</i>	Australian cheesewood	0.5-1	4	
13	Ericaceae	<i>Rhododendron triflorum</i>		0.5-1	4	
14	Ericaceae	<i>Rhododendron arboreum</i>		1m-2	3	

1.3 Vegetation assessment protocol for herbs

Data Sheet (herb Vegetation)

Plot type(Square):herbs(2mx2m)

sl no	Family	Scientific name	Common name	Nos	Status
1	Rosaceae	<i>Rubus calycinus</i>		5	
2	Ericaceae	<i>Pyrola spp</i>	Wintergreen	20	

1.4 Other Plants by RECEE(ONLY Target species)

sl no	Family	Scientific name	Common name	Lat	long	Type of plant
1	Ericaceae	<i>Enkianthus deflexus</i>	Himalayan redbell			shrub
2	Poaceae	<i>Yushania mycophylla</i>	Yushan cane			Bamboo
3	Primulaceae	<i>Primula denticulata</i>				herb
4	Euphorbiaceae	<i>Euphorbia griffithii</i>	Fireglow spurge			herb
5	Celastraceae	<i>Euonymus tingens</i>				shrub

SHRUB

1.1 Vegetation assessment protocol for Trees

Data Sheet (Tree

Vegetation>1.3)

Plot type(Square):Trees(20x20)

Altitude:

2038.100m

Dzongkhag: Chukha

Locality:Damchu(below road)

Aspect: West

Transect name: 22

Slope%:35

Plot no: 22

Canopy cover: Open

North:27.228008333

Forest type:Shrub

East: 89.517783333

sl no	Family	Scientific name	Common name	DBH(cm)	Height(m)	Status
1	Fagaceae	<i>Quercus griffithii</i>	Oak	187	8	

Data Sheet (Shrub Vegetation)

Plot type(Square):Shrubs(20x20)

sl no	Family	Scientific name	Common name	Height(m)	Nos	Status
1	Rosacea	<i>Rosa sericea</i>		1m-2	20	
2	Berberidaceae	<i>Berberis spp</i>		1m-3	20	
3	Oleaceae	<i>Ligustrum compactum</i>		0.5-1	3	
4	Rutaceae	<i>Zanthoxylum armatum</i>		0.5-1	3	

1.3 Vegetation assessment protocol for herbs

Data Sheet (herb Vegetation)

Plot type(Square):herbs(2mx2m)

sl no	Family	Scientific name	Common name	Nos	Status
1	Poaceae	Grass		100	

1.1 Vegetation assessment protocol for Trees

Data Sheet (Tree

Vegetation>1.3)

Plot type(Square):Trees(20x20)

Dzongkhag: Chukha**Altitude:** 2011.500m**Locality:** Damchu**Aspect:** South**Transect name:** 33**Slope%:** 15**Plot no:** 33

Canopy cover: Open

North: 27.241800000

Forest type: Shrub

East: 89.524776667

sl no	Family	Scientific name	Common name	DBH(cm)	Height(m)	Status
1	Fagaceae	<i>Quercus lanata</i>	Ban oak	93	5	
2	Fagaceae	<i>Quercus lanata</i>	Ban oak	134	7	
3	Anacardiaceae	<i>Rhus spp</i>		55	6	
4	Anacardiaceae	<i>Rhus spp</i>		32	5	
5	Rutaceae	<i>Zanthoxylum armatum</i>		32	5	
6	Rutaceae	<i>Zanthoxylum armatum</i>		23	4	
7	Rutaceae	<i>Zanthoxylum armatum</i>		24	4	

1.2 Vegetation assessment protocol for shrubs

Data Sheet (Shrub

Vegetation)

Plot type(Square):Shrubs(20x20)

sl no	Family	Scientific name	Common name	Height(m)	Nos	Status
1	Rosaceae	<i>Rosa sericea</i>		1m-2	6	
2	Caprifoliaceae	<i>Lonicera quinquelocularis</i>	Honey suckle	1m-3	9	
3	Berberidaceae	<i>Berberis spp</i>		1m-3	7	
4	Rosaceae	<i>Cotoneaster spp</i>		2m-4	5	

1.3 Vegetation assessment protocol for herbs

Data Sheet (herb Vegetation)

Plot type(Square):herbs(2mx2m)

sl no	Family	Scientific name	Common name	Nos	Status
1	Poaceae	Grass		10	
2	Asteraceae	<i>Artemisia vulgaris</i>		8	

1.1 Vegetation assessment protocol for Trees

Data Sheet (Tree

Vegetation>1.3)

Plot type(Square):Trees(20x20)

Dzongkhag: Paro

Altitude: 2296.800m

Locality:Wanakha

Aspect: East

Transect name: 34

Slope%:15

Plot no: 34

Canopy cover: Open

North:27.215681667

Forest type:Shrub

East: 89.509671667

sl no	Family	Scientific name	Common name	DBH(cm)	Height(m)	Status
1	Fagaceae	<i>Quercus lanata</i>	Ban oak	43	2	
2	Fagaceae	<i>Quercus lanata</i>	Ban oak	156	5	
3	Fagaceae	<i>Quercus lanata</i>	Ban oak	65	3	
4	Fagaceae	<i>Quercus lanata</i>	Ban oak	20	2	
5	Fagaceae	<i>Quercus lanata</i>	Ban oak	120	4	
	Fagaceae	<i>Quercus semecarpifolia</i>		40	3	
	Fagaceae	<i>Quercus semecarpifolia</i>		45	3	
	Fagaceae	<i>Quercus lanata</i>	Ban oak	85	5	

1.2 Vegetation assessment protocol for shrubs

Data Sheet (Shrub Vegetation)

Plot type(Square):Shrubs(20x20)

sl no	Family	Scientific name	Common name	Height(m)	Nos	Status
1	Fagaceae	<i>Quercus semicarpifolia</i>		2m-3	7	
2	Fagaceae	<i>Quercus lanata</i>	Ban oak	1m-2	10	
3	Theaceae	<i>Eurya acuminata</i>		1m-2	15	
4	Ericaceae	<i>Rhododendron maddenii</i>		1m-2	7	
5	Rosaceae	<i>Malus baccata</i>		1	1	
6	Rosaceae	<i>Rosa brunonii</i>		2	1	
7	Pinaceae	<i>Pinus wallichiana</i>		0.5-3	6	

1.3 Vegetation assessment protocol for herbs

Data Sheet (herb Vegetation)

Plot type(Square):herbs(2mx2m)

sl no	Family	Scientific name	Common name	Nos	Status
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1	Poaceae	Grass		20	
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MEADOW

1.1 Vegetation assessment protocol for Trees

Data Sheet (Tree Vegetation>1.3)

Plot type(Square):Trees(20x20)

Dzongkhag: Chukha

Altitude: 2625.200m

Locality: Near Lobneykha school(Meadow)

Aspect: South

Transect name: 31

Slope%: 5

Plot no: 31

Canopy cover: Open

North: 27.175095000

Forest type: Meadow

East: 89.545270000

sl no	Family	Scientific name	Common name	DBH(cm)	Height(m)	Status
1	No tree					

1.2 Vegetation assessment protocol for shrubs

Data Sheet (Shrub Vegetation)

Plot type(Square):Shrubs(20x20)

sl no	Family	Scientific name	Common name	Height(m)	Nos	Status
1	Berberidaceae	<i>Berberis aristata</i>		0.5-1	15	
2	Rosaceae	<i>Cotoneaster mycrophyllus</i>		0.3-0.7	30	
3	Pinaceae	<i>Pinus wallichiana</i>	Blue pine	0.5-1	18	

1.3 Vegetation assessment protocol for herbs

Data Sheet (herb Vegetation)

Plot type(Square):herbs(2mx2m)

sl no	Family	Scientific name	Common name	Nos	Status
1	Rosaceae	<i>Potentilla spp</i>		5	
	Dennstaedtiaceae	<i>Pteridium aquilinum</i>	Fern	9	

1.4 Other Plants by RECEE(only Target species)

sl no	Family	Scientific name	Common name	Lat	long	Type of plant
1	Fabaceae	<i>Piptanthus nepalensis</i>				Shrub
2	Pinaceae	<i>Picea spinulosa</i>				Tree
3	Salicaceae	<i>Salix spp</i>				Shrub
4	Adoxaceae	<i>Viburnum cylindricum</i>				Shrub
	Conaceae	<i>Benthamedia capitata</i>				Tree
	Ericaceae	<i>Rhododendron maddenii</i>				Shrub
	Ericaceae	<i>Rhododendron arboreum</i>				Shrub
	Rosaceae	<i>Rhus spp</i>				Shrub

5.2 STATUS OF FLORA AS PER NATIONAL LEGISLATION, IUCN STATUS AND CITES LISTING

Tree							
Family name	Botanical name	Comon name	Local name	Uses	National legislation	CITES listing	IUCN status
Aceraceae	<i>Acer campbellii</i>	Himalayan Maple	Chalam(Dz), Sermaling shing(Sh), Kapasey(Lh)	Ph, Co, Arts & craft, Fe	Schedule-II		LC
Adoxaceae	<i>Viburnum erubescens</i>	Reddish viburnum		Ph, Fo, Fe			LC
Anacardiaceae	<i>Rhus spp</i>	Tanners	Choka shing(Dz), Roptang shing(Sh)	Ph, Fo			LC
Araliaceae	<i>Brassiopsis hainla</i>	Seto chuletro tree		Fo			LC
Betulaceae	<i>Alnus nepalensis</i>	Himalayan Alder	Gama(Dz), Utis(Lh)	Ph, Fe, Co, Dy	Schedule-III		LC
Betulaceae	<i>Betula alnoides</i>	Himalayan birch	Taab(Dz), Charr Shing(Sh), Saur(Lh)	Ph, Fo, CO,	Schedule-II		LC
Betulaceae	<i>Carpinus viminea</i>	Himalayan hornbeam	Rootoshing(Dz), Loong shing(sh)	Ph, Co, En,	Schedule-II		LC
Betulaceae	<i>Corylus ferox</i>	Himalayam hazelnut		Fo, Co, Arts& craft			LC
Canabaceae	<i>Celtis tetranda</i>	Nilgiri elm	Sok sokpa shing(Sh), Khari(Lh)	Ph, fo, Co			LC
Cornaceae	<i>Benthamedia capitata</i>	Dogwood	Phoetse(Dz), Ramkattar(Lh)	Ph, Fo, Arts & craft			LC
Ericaceae	<i>Rhododendron arboreum</i>	Rhodo	Aeto meto(Dz), Gurass(Lh)	Ph, Fo, Dy, Arts &crafts	Schedule-III		LC
Ericaceae	<i>Lyonia ovalifolia</i>	Fetterbush	Zentu shing(Dz), Shajur shing(Sh),Angeri(Lh)	Ph, En,	Schedule-III		LC
Ericaceae	<i>Rhododendron griffithianum</i>		Tag-shar-meto(Dz), Seto chimal(Lh),	Ph, Arts & crafts	Schedule-III		LC

Tree							
Family name	Botanical name	Comon name	Local name	Uses	National legislation	CITES listing	IUCN status
Ericaceae	<i>Pieris formosa</i>	Himalayan andromeda	Kheppchhey(Dz), Balu(Lh)	Ph			LC
Euphorbiaceae	<i>Macaranga pustulata</i>	Blistery Macaranga		Ph, Co, En,	Schedule-III		LC
Fagaceae	<i>Quercus oxyodon</i>	Sharp-toothed oak	Thomp shing(Dz), Thongpa shing(Sh)		Schedule-III		LC
Fagaceae	<i>Quercus glauca</i>	Japanese blue oak	Thomp(Dz), Thongpa shing(Sh), Musre phalant(Lh)	Ph, Fe, En	Schedule-III		LC
Fagaceae	<i>Quercus lanata</i>	Ban oak	Goom shing(Dz), Betsinang shing(Sh), Banj(Lh)	Ph, Fe, En	Schedule-III		LC
Fagaceae	<i>Lithocarpus fenestratus</i>	Stone oak	Shakor shing(Sh), Arkaula(Lh)	Arts & craft, Dy, En	Schedule-III		LC
Lauraceae	<i>Actinodaphne obovata</i>		Runchey pat(Lh)	Ph, Fe			LC
Lauraceae	<i>Persea spp</i>	Wild avocado	Golee shing(Sh), Chiplicawla(Lh)	Ph, Fo	Schedule-III		LC
Lauraceae	<i>Dodecadenia grandiflora</i>	One flowered litsea		Ph, Fo, Co, Fe			LC
Lauraceae	<i>Cinnamomum glanduliferum</i>	Cinnamon tree	Kipchu shing(Sh), Kawla(Lh)	Ph, Co			LC
Magnoliaceae	<i>Michelia doltsapa</i>	Temple magnolia	Champe shing(Sh), Champ(Lh)	Ph, Co, Arts & crafts			LC
Pinaceae	<i>Pinus wallichiana</i>	Bluepine	Tongphu(Dz), Changshing(Sh), Dhupi(Lh)	Ph, Fo, Arts & crafts, Co, En	Schedule-II		LC
Pinaceae	<i>Tsuga dumosa</i>	Hemlock	Sey shing(Dz), Threngre salla	Ph, Co, En,			LC
Pinaceae	<i>Picea spinulosa</i>	Spruce	Ba shing(Dz), Kalo salla(Lh)	Ph, Co, En,	Schedule-III		LC

Tree							
Family name	Botanical name	Comon name	Local name	Uses	National legislation	CITES listing	IUCN status
Rosaceae	<i>Prunus carmesina</i>	Wild himalayan cherry		Ph, Fo			LC
Rosaceae	<i>Prunus nepalensis</i>	wild cherry	Khamgo shing(Dz), Arupate(Lh)	Ph, Fo,			LC
Rutaceae	<i>Zanthoxylum armatum</i>	Prickly ash	Khaigee(Sh), Bale timbur(Lh)	Ph, Fo			LC
Salicaceae	<i>Salix spp</i>	Willow	Changma(Dz)	Ph			LC
Salicaceae	<i>Populus ciliata</i>	Himalayan poplar	Kashing(Dz)	Co, Ph, Arts & crafts, Fe			LC
Schoepfiaceae	<i>Schoepfia jasminodora</i>	Green bark tree		Ph			LC
Symplocaceae	<i>Symplocos ramosissima</i>	Many branched sapphire berry		Ph, Fo, Co			LC
Symplocaceae	<i>Symplocos racemosa</i>	Lodh tree		Ph			LC
Symplocaceae	<i>Symplocos sumuntia</i>	Shan fan		Ph, Dy, Fo			LC
Symplocaceae	<i>Symplocos paniculata</i>	Sapphire berry	Pang tse shing(Dz),	Ph, Fo, Dy			LC
Theaceae	<i>Eurya acuminata</i>	Tapering leaf eurya		Ph, Fo			LC
Toricelliaceae	<i>Toricellia tiliifolia</i>	Linden leaf	Dhengboor-laga(Sh)	Ph			LC
Fagaceae	<i>Quercus semicarpifolia</i>	Brown oak	Bji Shing(Dz), Betsnang shing(Sh)	Ph, Fo, Fe, Co, En	Schedule-III		LC
Fagaceae	<i>Quercus griffithii</i>	Oak	Sisi shing(Dz), Bainang shing(Sh), Kasru(Lh)	Ph, Fo, Fe, En	Schedule-III		LC
Salicaceae	<i>Salix wallichiana</i>	Willow	Changma(Dz)	Ph, Fo, Arts & crafts			LC

Shrub

Family name	Botanical name	Comon name	Local name	Uses	National legislation	CITES listing	IUCN status
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Tree							
Family name	Botanical name	Comon name	Local name	Uses	National legislation	CITES listing	IUCN status
Thymelaeaceae	<i>Edgeworthia gardneri</i>	Indian paper tree	Dheykap(Dz), Argayle(Lh)	Ph, Arts & crafts	Schedule-III		LC
Myrtaceae	<i>Syzygium cumini</i>	Java plum	Nyasse shing(Dz), Menntse shing(Sh),Jamuna(Lh)	Ph, Fo, Fe, En			LC
Araliaceae	<i>Eleutherococcus cissifolium</i>	Siberian Ginseng		Ph			LC
Primulaceae	<i>Maesa chisia</i>	Chisia wild berry		Fe			LC
Primulaceae	<i>Ardisia macrocarpa</i>	Himalayan coralberry	Ressim(Dz), Damai phal(Lh)	Ph, Fo			LC
Elaeagnaceae	<i>Elaeagnus parvifolia</i>	Oleaster	Bji(Dz), Dhang-boor zoo(Sh)	Ph, Fo			LC
Thymelaeaceae	<i>Daphne bholua</i>	Paper daphne	Dheynap(Dz), Shogo shing(Sh), Kagate(Lh)	Ph, Arts & crafts	Schedule-III		LC
Balsaminaceae	<i>Jasminum dispersum</i>	Pink jasmine		Ph			LC
Lardizabalaceae	<i>Holbelia latifolia</i>	Sausage vine	Trogchangsey(Sh)	Ph, Fo			LC
Urticaceae	<i>Debregaesia longifolia</i>	Orange wild rhea	Chammbatang boning(Sh), Tusare(Lh)	Ph, Fo, Arts & crafts			LC
Sapindaceae	<i>Acer oblongum</i>	Evergreen maple	Chibla shing(Dz), Phirphiri(Lh)	Ph, Co	Schedule-II		LC
Polygonaceae	<i>Aconogonum molle</i>	Soft knotweed	Kochoma(Sh), Thothney(Lh)	Ph, Fo, Fe, En			LC
Poaceae	<i>Chimonobambusa callosa</i>	Bamboo	Rashi(Sh)	Co, Fe, Fo Arts & crafts			LC
Poaceae	<i>Yushania spp</i>	Bamboo	Mingma(Dz),	Co,			LC
Moraceae	<i>Morus spp</i>	Mulberries	Shakhongma shing(Sh), sanu kimbu(Lh)	Ph, Fo, Fe,			LC

Tree							
Family name	Botanical name	Comon name	Local name	Uses	National legislation	CITES listing	IUCN status
Buxaceae	<i>Sarcococca saligna</i>	Willow-leaf sweet box	Jaheom goenhoe(Dz)	Ph, Arts & crafts			LC
Berberidaceae	<i>Berberis spp</i>	Barberry	Kapia tsang(Dz), Kerpa zoo(Sh)	Ph, Arts & crafts			LC
Berberidaceae	<i>Mahonia napalensis</i>	Nepal mahonia	Kesari(Lh)	Ph, Arts & crafts,			LC
Trochodendraceae	<i>Tetracentron sinense</i>	Qing pi tree	Yangdar shing(Sh),	Ph, Arts & crafts		Appendix-III	DD
Adoxaceae	<i>Viburnum cylindricum</i>	Tubeflower viburnum	Nom shing(Sh),	Ph, Fo, Arts & crafts			LC
Caprifoliaceae	<i>Lycesteria formosa</i>	Pheasant berry		Ph, Fe			LC
Rosaceae	<i>Rubus acuminatus</i>	Gaint bramble	Komatsang(Sh), Sanu aselu(Lh)	Ph			LC
Smilacaceae	<i>Smilax spp</i>	Prickly ivy	Kukoor zoo(Sh), Runche(Lh)	Ph,			LC
Oleaceae	<i>Fraxinus spp</i>	Common ash	Draythub(Dz), Lakuri(Lh)	Co,			LC
Rosacea	<i>Rosa sericea</i>	Silky rose	Sew meto(Dz), Sisi(Lh)	Ph, Arts & crafts			LC
Rosaceae	<i>Cotoneaster spp</i>	Rockspray cotoneaster	Katragpa roo(Sh)	Ph, Arts & crafts			LC
Caprifoliaceae	<i>Lonicera quinquelocularis</i>	Honey suckle		Ph, En			LC
Coriariaceae	<i>Coriaria nepalensis</i>	Masuri berry	Limphu shing(Dz), Thabshing(Sh)	Ph, Fo			LC
Rosaceae	<i>Rosa brunonii</i>	Himalayan musk rose	Tagtsher(Dz),	Ph, Fo, Arts & crafts			LC
Ericaceae	<i>Rhododendron maddenii</i>	Pink trumpets	Saga meto(Dz)	Arts & crafts			LC
Ericaceae	<i>Vaccinium vacciniaceum</i>	Tibetan blueberry		Ph, Fo			LC
Scrophulariaceae	<i>Buddleja crispa</i>	Himalayan butterfly bush	Omsa nesma(Sh)	Ph			LC

Tree							
Family name	Botanical name	Comon name	Local name	Uses	National legislation	CITES listing	IUCN status
Celastraceae	<i>Euonymus tingens</i>	Purple veined spindle tree	Nga pa meto shing(Dz)	Ph, Fe, Arts & crafts			LC
Rosaceae	<i>Rubus biflorus</i>	Himalayan raspberry	Thulu gong sey(Sh)	Fo, Dye			LC
Aquifoliaceae	<i>Ilex dipyrena</i>	Himalayan holly	Ratsa shing(Sh), Ilse(Lh)	Ph,			LC
Hydrangeaceae	<i>Philadelphus spp</i>	Mock orange		Ph, Arts & crafts			LC
Berberidaceae	<i>Berberis aristata</i>	Indian barberry	Kerpa zoo(Sh), Chutro(Lh)	Ph			LC
Ericaceae	<i>Rhododendron triflorum</i>		Pahenle Chimal(Lh)	Ph, Arts & crafts	Schedule-III		LC
Rosaceae	<i>Malus baccata</i>	Siberian crap apple	Nyera leetong(Sh)	Fo, Arts & crafts			LC

Herbs

Family name	Botanical name	Comon name	Local name	Uses	National legislation	CITES listing	IUCN status
Acanthaceae	<i>Strobilanthes spp</i>	Persian shield	Khamkha nagma(Sh)	Ph			LC
Araliaceae	<i>Hedera nepalensis</i>	Himalayan ivy	Loyee mekha(Dz), Pan roo(Sh)	Ph, Fe			LC
Asparagaceae	<i>Ophiopogon spp</i>	Lily turf		Arts & crafts			LC
Asparagaceae	<i>Asparagus racemosus</i>	Buttermilk root	Reege nya khagchu(Dz), Borang nga-la nyom(Sh)	Ph, Fo			LC
Asparagaceae	<i>Tupistra spp</i>		Nakima(Lh)	Ph			LC
Asteraceae	<i>Laggera crispata</i>	Curly blumea		Ph			LC
Asteraceae	<i>Bidens pilosa</i>	Plackjack	Zoompee thoorpang(Sh), Kuro(Lh)	Ph			LC
Asteraceae	<i>Ainsliaea aptera</i>	Wingless ainsliaea		Ph			LC
Asteraceae	<i>Senecio diversifolia</i>	Mexican sunflower		Ph			LC
Asteraceae	<i>Artemisia vulgaris</i>	Mugwort	Khempa (Dz)	Ph			LC
Athyriaceae	<i>Diplazium esculentum</i>	Fern	Nakay (Dz), Dawia(Sh)	Ph, Fo, Fe			LC

Tree							
Family name	Botanical name	Comon name	Local name	Uses	National legislation	CITES listing	IUCN status
Balsaminaceae	<i>Impatiens spp</i>	Busy lizzie	Nakay(Dz), Dawia(Sh)	Ph, Dy,			LC
Dennstaedtiaceae	<i>Pteridium aquilinum</i>	Bracken fern	Nakay(Dz), Dawia(Sh)	Ph, Fe, Dy, Arts & crafts			LC
Dryopteridaceae	<i>Polystichum spp</i>	Shield fern	Nakay(Dz), Dawia(Sh)	Ph			LC
Equisetaceae	<i>Equisetum diffusum</i>	Horsetail	Tentso(Sh), Salley(Lh)	Ph			LC
Ericaceae	<i>Pyrola spp</i>	Wintergreen		Ph			LC
Euphorbiaceae	<i>Euphorbia griffithii</i>	Griffith's spurge	Dhoor-jeedh(DZ)	Arts & crafts			DD
Fabaceae	<i>Desmodium spp</i>	Begger's lice		Ph, Fe			LC
Hypoxidaceae	<i>Curculigo capitulata</i>	Palm grass		Ph			LC
Lamiaceae	<i>Perilla frutescens</i>	Beefsteak plant		Ph, Arts & crafts			LC
Lamiaceae	<i>Salvia spp</i>	Sage	Jipshi karmo(Dz)	Ph			LC
Melanthiaceae	<i>Paris polyphylla</i>	Himalayan Paris	Dochu kewa(Dz), Thogsampa(Sh), satuwa(Lh)	Ph	Schedule-III		VU
Piparaceae	<i>Piper pedicellatum</i>	Long pipla	Peepeeling(Sh), Pipla(Lh)	Ph, Fo			VU
Plumbaginaceae	<i>Ceratostigma griffithii</i>	Burmese plumbago	Yoodroen meto(Sh)	Arts & crafts			LC
Poaceae	<i>Oplismenus hirtellus</i>	Basket grass		Arts & crafts, Fe			LC
Poaceae	<i>Carex spp</i>	Sedge		Ph, Fe			LC
Polygonaceae	<i>Rumax nepalensis</i>	Nepal Dock	Sheylempa(Sh)	Ph, Dy, Fo			LC
Polygonaceae	<i>Persicaria capitata</i>	Pink knotweed	Lha lop(Dz), Gangchimeen(Sh)	Ph, Arts & crafts			LC
Ranunculaceae	<i>Clematis spp</i>	Old man's beard		Ph, Arts & crafts			LC
Rosaceae	<i>Potentilla spp</i>	Barren strawberries	Chiriya(Lh)	Ph, Fo, Fe			LC
Rosaceae	<i>Rubus calycinus</i>	Wild raspberry	Gong zoo(Sh),	Ph, Dye			LC
Rubiaceae	<i>Rubia spp</i>	Madder	Tsoey(Dz), La-nye-roo(Sh)	Ph, Dy			LC

Tree							
Family name	Botanical name	Comon name	Local name	Uses	National legislation	CITES listing	IUCN status
Rubiaceae	<i>Galium spp</i>	Bedstraw	Roo-roba(Sh)	Ph, Fo			LC
Solanaceae	<i>Solanum viarum</i>	Tropical soda apple		Ph			LC
Urticaceae	<i>Girardinia diversifolia</i>	Himalayan nettle	Zocha(Dz), Zangroo(Sh)	Ph, Fo, Arts & crafts			LC
Urticaceae	<i>Pouzolzia hirta</i>	Oyik	Mizuma laga ngon(Sh)	Ph, Fo			LC
Urticaceae	<i>Urtica dioica</i>	common nettle	Zocha(Dz), Khee jazoo(Sh)	Ph			LC
Urticaceae	<i>Pilea spp</i>	Friendship plant	Jazoo boning(Sh)	Ph, Arts & crafts			LC
Violaceae	<i>Viola spp</i>	Pansy	Mamphoong ngon(Sh)	Ph			LC
Vitaceae	<i>Tetrastigma spp</i>	Chestnut vine		Ph			LC

5.3 STATIONWISE MAMMAL DATA FOR BUNAKHA HPP

Plot No.	Locality	North	East	Altitude(m)	Family name	Scientific name	Common name	Direct observation	No. of pellets	Other evidence
ST-1	Tala dam upper end reservoir	27.048065	89.58015	1338.100	-	-	-	-	-	-
ST-2	Below Tsimasham (camp area-3)	27.092710000	89.5285811667	1881.2000	Cervidae	<i>Rusa unicolor</i>	Sambar	-	3	Foot prints
ST-3	Chukha dam (below dam)	27.109348333	89.529831667	1791.100	-	-	-	-	-	-
ST-4	Chanachan (INRQ-2)	27.119645000	89.52952667	2151.500	Cervidae	<i>Rusa unicolor</i>	Sambar	-	-	Rubbing on pole
					Cervidae	<i>Rusa unicolor</i>	Sambar	-	-	Foot prints
					Cervidae	<i>Rusa unicolor</i>	Sambar	-	-	Resting place
ST-5	Above Chanachan junction (MD-3,6,7 & access road)	27.118275000	89.538933333	1969.600	-	-	-	-	-	-
ST-6	Chanachen (above bridge) downstream of Bunakha dam	27.127936667	89.539026667	1821.800	-	-	-	-	-	-
ST-7	Below Chanachan (upstream right bank)	27.137010000	89.539243333	1923.800	Cervidae	<i>Rusa unicolor</i>	Sambar	-	1	-
					Cervidae	<i>Muntiacus muntjak</i>	Barking Deer	-	1	-

Plot No.	Locality	North	East	Altitude(m)	Family name	Scientific name	Common name	Direct observation	No. of pellets	Other evidence
					Suidae	<i>Sus scrofa</i>	Wild Pig	-	-	Poop
ST-8	Bunagu (camp area-5 & MD-1)	27.138356667	89.544936667	2076.700	Cervidae	<i>Rusa unicolor</i>	Sambar	-	1	
ST-9	Chanachan (near village INRQ-3)	27.164230000	89.528840000	2261.600	Cervidae	<i>Muntiacus muntjak</i>	Barking Deer	-	1	
ST-10	Below Bunagu (upstream left bank)	27.145166667	89.536510000	1970.900	Cervidae	<i>Rusa unicolor</i>	Sambar	-	6	1 bed
					Bovidae	<i>Naemorhedus goral</i>	Himalayan Goral	-	4	-
					Cervidae	<i>Muntiacus muntjak</i>	Barking Deer	-	1	Hoof prints
ST-11	Above Bunakha (camp area-6)	27.150410000	89.547240000	2336.200	Cervidae	<i>Rusa unicolor</i>	Sambar	-	5	-
ST-12	Tanalum new bridge	27.154913333	89.536795000	1974.000	Cervidae	<i>Rusa unicolor</i>	Sambar	-	-	1 bed
ST-13	Near old Tanalum bridge (INRQ-4)	27.160778333	89.553545000	2198.100	-	-	-	-	-	-
ST-14	Geling Goenpa	27.16363666	89.524805000	2464.300	-	-	-	-	-	-
ST-15	Near old Tanalum highway (INRQ-6)	27.164180000	89.548663333	2128.900	-	-	-	-	-	-
ST-16	Near Bunakha	27.173826667	89.53283666	1974.1000	Cervidae	<i>Rusa unicolor</i>	Sambar	-	3	-

Plot No.	Locality	North	East	Altitude(m)	Family name	Scientific name	Common name	Direct observation	No. of pellets	Other evidence
					Cervidae	<i>Muntiacus muntjak</i>	Barking Deer		3	
ST-17	Near Tanalum old highway (INRQ-7)	27.183995000	89.545820000	2169.900	Suidae	<i>Sus scrofa</i>	Wild Pig	-	-	4 burrows
					Cervidae	<i>Rusa unicolor</i>	Sambar	-	1	-
ST-18	New Tanalum Bridge (along tributary left bank)	27.183955000	89.528225000	2063.200	Bovidae	<i>Naemorhedus goral</i>	Himalayan Goral	-	1	-
ST-19	Along Haachhu below Bjizhigang village	27.193660000	89.48675000	2058.800	Cervidae	<i>Rusa unicolor</i>	Sambar	-	1	-
					Cervidae	<i>Muntiacus muntjak</i>	Barking Deer	-	1	-
					Suidae	<i>Sus scrofa</i>	Wild Pig			4 Poops
ST-20	Near Haa bridge (Wangchhu right bank)	27.200471667	89.520813333	1964.900	-	-	-	-	-	-
ST-21	Near Haa bridge (Wangchhu upstream right bank)	27.204816667	89.51883333	1920.400	-	-	-	-	-	-
ST-22	Damchu below highway	27.228008333	89.517783333	2038.100	-	-	-	-	-	-
ST-23	Damchu (INRQ-10)	27.232386667	89.528786667	2238.800	Cervidae	<i>Muntiacus muntjak</i>	Barking Deer	-	1	-
					Cervidae	<i>Rusa unicolor</i>	Sambar	-	2	-

Plot No.	Locality	North	East	Altitude(m)	Family name	Scientific name	Common name	Direct observation	No. of pellets	Other evidence
					Cercopithecidae	<i>Semnopithecus schistaceus</i>	Grey Langur	7 nos	-	-
ST-24	Damchu (riverine)	27.262618333	89.528415000	2005.900	-	-	-	-	-	-
ST-25	Bunagu below highway (near 1st bore hole)	27.131876667	89.542165000	2011.700	Cercopithecidae	<i>Macaca assamensis</i>	Assamese macaque	-	-	Poof (droppings)
ST-26	Near Bridge (Chanachan)	27.129773333	89.540440000	1821.800	-	-	-	-	-	-
ST-27	Below Bunagu highway	27.136948333	89.543318333	2007.100	Cervidae	<i>Rusa unicolor</i>	Sambar		1	1 bed
ST-28	Paga Goenpa	27.285971667	89.561858333	2798.200	Cervidae	<i>Muntiacus muntjak</i>	Barking Deer	-	4	-
ST-29	Below Shema Goenpa	27.220886667	89.547620000	2794.300	-	-	-	-	-	-
ST-30	Chukha (Wangkha above highway)	27.057893333	89.555813333	1653.600	-	-	-	-	-	-
ST-31	Near Lobneykha Primary School	27.175095000	89.545270000	2625.200	-	-	-	-	-	-
ST-32	Above Chananchan village	27.147958333	89.513200000	2557.000	-	-	-	-	-	-
ST-33	Damchu above highway	27.241800000	89.524776667	2011.500	Cervidae	<i>Muntiacus muntjak</i>	Barking Deer	-	6	-
ST-34	Near Wanakha village	27.215681667	89.509671667	2296.800	-	-	-	-	-	-

5.4 STATUS OF MAMMALS AS PER NATIONAL LEGISLATION, IUCN RED LIST AND CITES LISTING

SN	Family name	Scientific name	Common name	National legislation	CITES listing	IUCN Red list
1	Cervidae	<i>Muntiacus muntjak</i>	Barking Deer	FNCA III	II	LC
2	Cervidae	<i>Rusa unicolor</i>	Sambar	FNCA II	II	VU
3	Suidae	<i>Sus scrofa</i>	Wild Pig	FNCA III	II	LC
4	Cercopithecidae	<i>Semnopithecus schistaceus</i>	Grey Langur	FNCA II	I	LC
5	Mustelidae	<i>Martes flavigula</i>	Himalayan Yellow Throated Marten	FNCA III	III	LC
6	Cercopithecidae	<i>Macaca assamensis</i>	Assamese macaque	FNCA III	II	NT
7	Bovidae	<i>Nemorhaedus goral</i>	Himalayan Goral	FNCA II	I	NT

5.5 FIRST SEASON STATION-WISE BIRD SURVEY DATA SHEET FOR BUNAKHA HPP

ST N o	SL N o	Common name	Species	M	F	Ju v	Coun t	Total	Locality	Habitat	Northing	Easting
1	1	Golden-throated Barbet	<i>Megalaima franklinii</i>	2	2	0	0	4	Beside Tala Dam	R	27.048105000°	89.58015000°
	2	Oriental Cuckoo	<i>Cuculus saturatus</i>	1	1	0	0	2	Beside Tala Dam	R	27.048105000°	89.58015000°
	3	Great Barbet	<i>Megalaima virens</i>	1	1	0	1	3	Beside Tala Dam	R	27.048105000°	89.58015000°
	4	Red-faced Liocichla	<i>Liocichla phoenicea</i>	1	0	0	0	1	Beside Tala Dam	R	27.048105000°	89.58015000°
	5	Brownish-flanked Bush Warbler	<i>Cettia pallidipes</i>	1	1	0	0	2	Beside Tala Dam	R	27.048105000°	89.58015000°
	6	Common Green Magpie	<i>Cissa chinensis</i>	1	1	0	0	2	Beside Tala Dam	R	27.048105000°	89.58015000°
2	1	Great Barbet	<i>Megalaima virens</i>	0	0	0	2	2	Below Tsimasam	CBLF	27.092710000°	89.528581667°
	2	Golden-throated Barbet	<i>Megalaima franklinii</i>	0	0	0	1	1	Below Tsimasam	CBLF	27.092710000°	89.528581667°
	3	Rufous Sibia	<i>Heterophasia capistrata</i>	1	1	0	0	2	Below Tsimasam	CBLF	27.092710000°	89.528581667°
3	1	Maroon Oriole	<i>Oriolus traillii</i>	2	2	0	0	4	Chukha Dam, downstream	R	27.109405000°	89.530028333°
	2	White-capped Water Redstart	<i>Chaimarrornis leucocephalus</i>	1	1	0	0	2	Chukha Dam, downstream	R	27.109405000°	89.530028333°
	3	Chestnut-crowned Laughingthrush	<i>Garrulax erythrocephalus</i>	0	1	0	1	2	Chukha Dam, downstream	R	27.109405000°	89.530028333°
	4	Blyth's Leaf Warbler	<i>Phylloscopus reguloides</i>	0	0	0	1	1	Chukha Dam, downstream	R	27.109405000°	89.530028333°
	5	Long-tailed Minivet	<i>Pericrocotus ethologus</i>	0	1	1	0	2	Chukha Dam, downstream	R	27.109405000°	89.530028333°

ST N o	SL N o	Common name	Species	M	F	Ju v	Coun t	Total	Locality	Habitat	Northing	Easting
	6	Striated Laughingthrush	<i>Garrulax striatus</i>	2	1	0	0	3	Chukha Dam, downstream	R	27.109405000 °	89.530028333°
	7	Ashy Drongo	<i>Dicrurus leucophaeus</i>	1	1	0	0	2	Chukha Dam, downstream	R	27.109405000 °	89.530028333°
	8	Rufous Sibia	<i>Heterophasia capistrata</i>	3	2	0	0	5	Chukha Dam, downstream	R	27.109405000 °	89.530028333°
4	1	Rufous Sibia	<i>Heterophasia capistrata</i>	5	3	0	0	8	Nearby Chanachen village	CBLF	27.119645000 °	89.529526667°
	2	Striated Laughingthrush	<i>Garrulax striatus</i>	1	1	0	0	2	Nearby Chanachen village	CBLF	27.119645000 °	89.529526667°
	3	White-tailed Nuthatch	<i>Sitta himalayensis</i>	3	3	0	0	6	Nearby Chanachen village	CBLF	27.119645000 °	89.529526667°
	4	Grey-winged Blackbird	<i>Turdus boulboul</i>	0	1	1	0	2	Nearby Chanachen village	CBLF	27.119645000 °	89.529526667°
	5	Long-tailed Minivet	<i>Pericrocotus ethologus</i>	1	1	0	0	2	Nearby Chanachen village	CBLF	27.119645000 °	89.529526667°
	6	Green-tailed Sunbird	<i>Aethopyga nipalensis</i>	1	1	0	0	2	Nearby Chanachen village	CBLF	27.119645000 °	89.529526667°
	7	Asian Barred Owlet	<i>Glaucidium cuculoides</i>	0	0	0	1	1	Nearby Chanachen village	CBLF	27.119645000 °	89.529526667°
	8	Mountain Hawk Eagle	<i>Spizaetus nipalensis</i>	1	0	0	0	1	Nearby Chanachen village	CBLF	27.119645000 °	89.529526667°
5	1	Striated Laughingthrush	<i>Garrulax striatus</i>	3	2	0	0	5	Above Chanachen	CBLF	27.118275000 °	89.538933333°
	2	Streak-breasted Scimitar Babbler	<i>Pomatorhinus ruficollis</i>	1	1	0	0	2	Above Chanachen	CBLF	27.118275000 °	89.538933333°
	3	Whiskered Yuhina	<i>Yuhina flavicollis</i>	4	6	0	0	10	Above Chanachen	CBLF	27.118275000 °	89.538933333°
	4	Large Hawk Cuckoo	<i>Hierococcyx sparveroides</i>	0	0	0	2	2	Above Chanachen	CBLF	27.118275000 °	89.538933333°

ST N o	SL N o	Common name	Species	M	F	Ju v	Coun t	Total	Locality	Habitat	Northing	Easting
	5	Ashy Drongo	<i>Dicrurus leucophaeus</i>	0	0	1	0	1	Above Chanachen	CBLF	27.118275000°	89.538933333°
	1	Black-winged Cuckooshrike	<i>Coracina melaschistos</i>	1	1	1	0	3	Galing	CBLF	27.127936667°	89.539026667°
	2	Black Bulbul	<i>Hypsipetes leucocephalus</i>	2	2	0	0	4	Galing	CBLF	27.127936667°	89.539026667°
	3	Black-headed shrike Babbler	<i>Pteruthius rufiventer</i>	1	1	0	0	2	Galing	CBLF	27.127936667°	89.539026667°
	4	Rufous Sibia	<i>Heterophasia capistrata</i>	3	3	0	0	6	Galing	CBLF	27.127936667°	89.539026667°
	5	Indian Cuckoo	<i>Cuculus micropterus</i>	0	0	0	1	1	Galing	CBLF	27.127936667°	89.539026667°
	1	Kalij Pheasant	<i>Lophura leucomelanos</i>	3	2	2	0	7	Chanachen	CBLF	27.13701000°	89.539243333°
	2	Rufous Sibia	<i>Heterophasia capistrata</i>	5	6	0	0	11	Chanachen	CBLF	27.13701000°	89.539243333°
	3	Hodgson's Redstart	<i>Phoenicurus ochrurus</i>	1	1	0	0	2	Chanachen	CBLF	27.13701000°	89.539243333°
	4	Grey-backed Shrike	<i>Lanius tephronotus</i>	1	1	0	0	2	Chanachen	CBLF	27.13701000°	89.539243333°
	5	Great Barbet	<i>Megalaima virens</i>	1	0	0	0	1	Chanachen	CBLF	27.13701000°	89.539243333°
	6	Black Bulbul	<i>Hypsipetes leucocephalus</i>	1	0	0	0	1	Chanachen	CBLF	27.13701000°	89.539243333°
	7	Maroon Oriole	<i>Oriolus traillii</i>	0	0	0	1	1	Chanachen	CBLF	27.13701000°	89.539243333°
	1	Eurasian Cuckoo	<i>Cuculus canorus</i>	0	0	0	2	2	Near Bunaghau	CBLF	27.138356667°	89.544936667°
	2	Rufous Sibia	<i>Heterophasia capistrata</i>	0	2	1	0	3	Below Dunaghau	CBLF	27.138356667°	89.544936667°
	3	Whiskered Yuhina	<i>Yuhina flavicollis</i>	4	4	0	0	8	Below Dunaghau	CBLF	27.138356667°	89.544936667°

ST No	SL No	Common name	Species	M	F	Ju v	Coun t	Total	Locality	Habitat	Northing	Easting
	4	Brown Parrotbill	<i>Paradoxornis unicolor</i>	2	2	0	0	4	Below Dunaghau	CBLF	27.138356667°	89.544936667°
	5	White-throated fantail	<i>Rhipidura albicollis</i>	1	0	0	0	1	Below Dunaghau	CBLF	27.138356667°	89.544936667°
9	1	Black-throated Tit	<i>Aegithalos concinnus</i>	5	5	0	0	10	Chanachen	CBLF	27.146230000°	89.528840000°
	2	Black Bulbul	<i>Hypsipetes leucocephalus</i>	1	1	0	0	2	Chanachen	CBLF	27.146230000°	89.528840000°
	3	Grey-winged Blackbird	<i>Turdus boulboul</i>	0	1	0	0	1	Chanachen	CBLF	27.146230000°	89.528840000°
	4	Striated Bulbul	<i>Pycnonotus striatus</i>	0	0	0	1	1	Chanachen	CBLF	27.146230000°	89.528840000°
	5	Long-tailed Minivet	<i>Pericrocotus ethologus</i>	1	1	0	0	2	Chanachen	CBLF	27.146230000°	89.528840000°
	6	Whiskered Yuhina	<i>Yuhina flavicollis</i>	1	0	0	2	3	Chanachen	CBLF	27.146230000°	89.528840000°
	7	Golden-throated Barbet	<i>Megalaima franklinii</i>	1	1	0	0	2	Chanachen	CBLF	27.146230000°	89.528840000°
10	1	Ashy Drongo	<i>Dicrurus leucophaeus</i>	2	0	0	0	2	Below Dunaghau	CBLF	27.145166667°	89.536510000°
	2	Rufous Sibia	<i>Heterophasia capistrata</i>	1	1	0	0	2	Below Dunaghau	CBLF	27.145166667°	89.536510000°
	3	Green-backed Tit	<i>Parus monticolus</i>	3	2	0	0	5	Below Dunaghau	CBLF	27.145166667°	89.536510000°
	4	Large Hawk Cuckoo	<i>Hierococcyx sparveroides</i>	0	0	0	1	1	Below Dunaghau	CBLF	27.145166667°	89.536510000°
	5	Red-tailed Minla	<i>Minla ignotincta</i>	6	4	0	0	10	Below Dunaghau	CBLF	27.145166667°	89.536510000°
11	1	Crimson sunbird	<i>Aethopyga siparaja</i>	1	1	0	0	2	Above Bunakha	CBLF	27.150410000°	89.547240000°

ST No	SL No	Common name	Species	M	F	Ju v	Coun t	Total	Locality	Habitat	Northing	Easting
	2	Rufous Sibia	<i>Heterophasia capistrata</i>	1	1	0	0	2	Above Bunakha	CBLF	27.150410000 °	89.547240000°
	3	Whiskered Yuhina	<i>Yuhina flavicollis</i>	0	0	0	0	11	Above Bunakha	CBLF	27.150410000 °	89.547240000°
	4	Red-tailed Minla	<i>Minla ignotincta</i>	5	5	0	0	10	Above Bunakha	CBLF	27.150410000 °	89.547240000°
	5	Brown -throated Treecreeper	<i>Certhia discolor</i>	2	2	0	0	4	Above Bunakha	CBLF	27.150410000 °	89.547240000°
	6	Nepal Fulvetta	<i>Alcippe nipalensis</i>	6	6	0	0	12	Above Bunakha	CBLF	27.150410000 °	89.547240000°
12	1	Rufous-bellied Woodpecker	<i>Dendrocopos hyperythrus</i>	1	1	0	0	2	Tanalung	CBLF	27.154913333 °	89.536795000°
	2	Maroon Oriole	<i>Oriolus traillii</i>	2	2	0	0	4	Tanalung	CBLF	27.154913333 °	89.536795000°
	3	Whiskered Yuhina	<i>Yuhina flavicollis</i>	5	6	0	0	11	Tanalung	CBLF	27.154913333 °	89.536795000°
	4	Great Barbet	<i>Megalaima virens</i>	0	0	0	2	2	Tanalung	CBLF	27.154913333 °	89.536795000°
	5	Oriental Cuckoo	<i>Cuculus saturatus</i>		0	0	1	1	Tanalung	CBLF	27.154913333 °	89.536795000°
	6	Rufous Sibia	<i>Heterophasia capistrata</i>	2	2	0	0	4	Tanalung	CBLF	27.154913333 °	89.536795000°
	7	White-spectacled Warbler	<i>Seicercus affinis</i>	1	1	0	0	2	Near Tanalung	CBLF	27.154913333 °	89.536795000°
13	1	Blue Whistling Thrush	<i>Myophonus caeruleus</i>	2	1	0	0	3	Stone quarry	CBLF	27.160778533 °	89.553545000°
	2	Rufous Sibia	<i>Heterophasia capistrata</i>	4	2	0	0	6	Stone quarry	CBLF	27.160778533 °	89.553545000°
	3	Ashy Drongo	<i>Dicrurus leucophaeus</i>	1	1	0	0	2	Stone quarry	CBLF	27.160778533 °	89.553545000°

ST N o	SL N o	Common name	Species	M	F	Ju v	Coun t	Total	Locality	Habitat	Northing	Easting
	4	Olive-backed Pipit	<i>Anthus hodgsoni</i>	3	5	0	0	8	Stone quarry	CBLF	27.160778533 °	89.553545000°
14	1	Mrs Gould's Sunbird	<i>Aethopyga gouldiae</i>	1	1	0	0	2	Galing	CBLF	27.164180000 °	89.548663333°
	2	Rufous Sibia	<i>Heterophasia capistrata</i>	2	2	0	0	4	Galing	CBLF	27.164180000 °	89.548663333°
	3	White-tailed Nuthatch	<i>Sitta himalayensis</i>	1	1	0	0	2	Galing	CBLF	27.164180000 °	89.548663333°
	4	Large Hawk Cuckoo	<i>Hierococcyx sparveroides</i>	0	0	0	2	2	Galing	CBLF	27.164180000 °	89.548663333°
	5	Short-billed Minivet	<i>Pericrocotus brevirostris</i>	2	2	1	0	5	Galing	CBLF	27.164180000 °	89.548663333°
	6	Rufous -vented Yuhina	<i>Yuhina occipitalis</i>	0	0	0	8	8	Galing	CBLF	27.164180000 °	89.548663333°
	7	Yellow-billed Blue Magpie	<i>Urocissa flavirostris</i>	1	0	0	0	1	Galing	CBLF	27.164180000 °	89.548663333°
15	1	Kalij Pheasant	<i>Lophura leucomelanos</i>	4	4	0	0	8	Tanalung	CBLF	27.175095000 °	89.545270000°
	2	Long-tailed Minivet	<i>Pericrocotus ethologus</i>	2	3	0	0	5	Tanalung	CBLF	27.175095000 °	89.545270000°
	3	Rufous Sibia	<i>Heterophasia capistrata</i>	2	2	0	0	4	Tanalung	CBLF	27.175095000 °	89.545270000°
	4	Whiskered Yuhina	<i>Yuhina flavicollis</i>	4	5	0	0	9	Tanalung	CBLF	27.175095000 °	89.545270000°
	5	Blue Whistling Thrush	<i>Myophonus caeruleus</i>	1	0	0	0	1	Tanalung	CBLF	27.175095000 °	89.545270000°
16	1	Rufous Sibia	<i>Heterophasia capistrata</i>	1	1	0	0	2	Bunakha	CBLF	27.173826667 °	89.532536667°
	2	Great Barbet	<i>Megalaima virens</i>	1	0	0	3	4	Bunakha	CBLF	27.173826667 °	89.532536667°

ST No	SL No	Common name	Species	M	F	Ju v	Coun t	Total	Locality	Habitat	Northing	Easting
	3	White-throated Laughingthrush	<i>Gauuulax albugularis</i>	3	3	0	0	6	Bunakha	CBLF	27.173826667°	89.532536667°
	4	Ashy Drongo	<i>Dicrurus leucophaeus</i>	1	1	0	0	2	Bunakha	CBLF	27.173826667°	89.532536667°
	5	Oriental White-eye	<i>Zosterops palpebrosus</i>	0	0	0	2	2	Bunakha	CBLF	27.173826667°	89.532536667°
	6	Verditer Flycatcher	<i>Eumyias thalassina</i>	0	1	0	0	1	Bunakha	CBLF	27.173826667°	89.532536667°
	7	Chestnut-bellied Nuthatch	<i>Sitta castanea</i>	1	1	0	0	2	Bunakha	CBLF	27.173826667°	89.532536667°
17	1	Yellow-billed Blue Magpie	<i>Urocissa flavirostris</i>	2	2	0	0	4	Tanalung hoka	BP	27.183995000°	89.545820000°
	2	Large Hawk Cuckoo	<i>Hierococcyx sparveroides</i>	0	0	0	2	2	Tanalung hoka	BP	27.183995000°	89.545820000°
	3	Oriental White-eye	<i>Zosterops palpebrosus</i>	2	1	0	0	3	Tanalung hoka	BP	27.183995000°	89.545820000°
	4	Rufous Sibia	<i>Heterophasia capistrata</i>	5	3	0	0	8	Tanalung hoka	BP	27.183995000°	89.545820000°
	5	Hume's Warbler	<i>Phylloscopus humei</i>	1	1	0	0	2	Tanalung hoka	BP	27.183995000°	89.545820000°
18	1	Whiskered Yuhina	<i>Yuhina flavicollis</i>	4	3	0	0	7	Tanalung	CBLF	27.183955000°	89.528225000°
	2	Oriental White-eye	<i>Zosterops palpebrosus</i>	2	2	0	0	4	Tanalung	CBLF	27.183955000°	89.528225000°
	3	Long-tailed Minivet	<i>Pericrocotus ethologus</i>	1	1	0	0	2	Tanalung	CBLF	27.183955000°	89.528225000°
	4	Hodgson's Redstart	<i>Phoenicurus hodgsoni</i>	0	1	0	0	1	Tanalung	CBLF	27.183955000°	89.528225000°
19	1	Rufous Sibia	<i>Heterophasia capistrata</i>	4	4	0	0	8	Jazhigang	R	27.193660000°	89.486765000°

ST N o	SL N o	Common name	Species	M	F	Ju v	Coun t	Total	Locality	Habitat	Northing	Easting
	2	Black Bulbul	<i>Hypsipetes leucocephalus</i>	2	0	0	0	2	Jazhigang	R	27.193660000 °	89.486765000°
	3	Great Barbet	<i>Megalaima virens</i>	1	1	0	0	2	Jazhigang	R	27.193660000 °	89.486765000°
	4	Rufous-bellied Woodpecker	<i>Dendrocopos hyperythrus</i>	1	1	0	0	2	Jazhigang	R	27.193660000 °	89.486765000°
	5	Ashy Drongo	<i>Dicrurus leucophaeus</i>	3	2	0	0	5	Jazhigang	R	27.193660000 °	89.486765000°
	6	Darjeeling Woodpecker	<i>Dendrocopos darjellensis</i>	1	0	0	0	1	Jazhigang	R	27.193660000 °	89.486765000°
20	1	Black Bulbul	<i>Hypsipetes leucocephalus</i>	0	0	0	2	2	Nearby Haa bridge	R	27.200471667 °	89.520813333°
	2	Rufous Sibia	<i>Heterophasia capistrata</i>	1	1	0	0	2	Nearby Haa bridge	R	27.200471667 °	89.520813333°
	3	White-capped Water Redstart	<i>Chaimarrornis leucocephalus</i>	0	0	0	1	1	Nearby Haa bridge	R	27.200471667 °	89.520813333°
	4	White-tailed Nuthatch	<i>Sitta himalayensis</i>	1	0	0	1	2	Nearby Haa bridge	R	27.204816667 °	89.518853333°
21	1	White-tailed Nuthatch	<i>Sitta himalayensis</i>	0	0	0	2	2	Nearby Haa bridge	R	27.204816667 °	89.518853333°
	2	Plumbeous Water Redstart	<i>Rhyacornis fuliginosus</i>	1	1	0	0	2	Nearby Haa bridge	R	27.204816667 °	89.518853333°
	3	Black Bulbul	<i>Hypsipetes leucocephalus</i>	0	0	0	2	2	Nearby Haa bridge	R	27.204816667 °	89.518853333°
	4	White-capped Water Redstart	<i>Chaimarrornis leucocephalus</i>	2	0	0	0	2	Nearby Haa bridge	R	27.204816667 °	89.518853333°
22	1	Rufous Sibia	<i>Heterophasia capistrata</i>	1	1	0	0	2	Damchu	SL	27.228013333 °	89.517873333°
	2	Oriental White-eye	<i>Zosterops palpebrosus</i>	2	3	0	0	5	Damchu	SL	27.228013333 °	89.517873333°

ST N o	SL N o	Common name	Species	M	F	Ju v	Coun t	Total	Locality	Habitat	Northing	Easting
	3	Black Bulbul	<i>Hypsipetes leucocephalus</i>	1	1	0	0	2	Damchu	SL	27.228013333°	89.517873333°
	4	Red-vented Bulbul	<i>Pycnonotus cafer</i>	3	3	1	0	7	Damchu	SL	27.228013333°	89.517873333°
23	1	Streak-breasted Scimitar Babbler	<i>Pomatorhinus ruficollis</i>	1	1	0	2	4	Stone quarry	BP	27.232386667°	89.528786667°
	2	Whiskered Yuhina	<i>Yuhina flavicollis</i>	2	2	1	0	5	Stone quarry	BP	27.232386667°	89.528786667°
	3	Brown Parrotbill	<i>Paradoxornis unicor</i>	2	4	1	0	7	Stone quarry	BP	27.232386667°	89.528786667°
	4	Green-tailed Sunbird	<i>Aethopyga nipalensis</i>	1	1	0	0	2	Stone quarry	BP	27.232386667°	89.528786667°
	5	Blyth's Leaf Warbler	<i>Phylloscopus reguloides</i>	2	2	0	0	4	Stone quarry	BP	27.232386667°	89.528786667°
24	1	Brown Dipper	<i>Cinclus pallasii</i>	2	2	0	0	4	Damchu	R	27.262618333°	89.5284150250°
	2	Rufous Sibia	<i>Heterophasia capistrata</i>	2	2	0	0	4	Damchu	R	27.262618333°	89.5284150250°
	3	Yellow-browed Warbler	<i>Phylloscopus inornatus</i>	3	0	0	0	3	Damchu	R	27.262618333°	89.5284150250°
	4	Green-backed Tit	<i>Parus monticolus</i>	2	2	0	0	4	Damchu	R	27.262618333°	89.5284150250°
25	1	Rufous Sibia	<i>Heterophasia capistrata</i>	0	0	0	3	3	Below Bunaghau	CBLF	27.131876667°	89.542165000°
	2	Golden-throated Barbet	<i>Megalaima franklinii</i>	0	0	0	1	1	Below Bunaghau	CBLF	27.131876667°	89.542165000°
	3	Great Barbet	<i>Megalaima virens</i>	0	0	0	1	1	Below Bunaghau	CBLF	27.131876667°	89.542165000°
	4	Hill Partridge	<i>Arborophila torqueola</i>	0	0	0	3	3	Below Bunaghau	CBLF	27.131876667°	89.542165000°

ST N o	SL N o	Common name	Species	M	F	Ju v	Coun t	Total	Locality	Habitat	Northing	Easting
	5	Ashy Drongo	<i>Dicrurus leucophaeus</i>	1	0	0	0	1	Below Bunaghau	CBLF	27.131876667 °	89.542165000°
	6	Grey Bushchat	<i>Saxicola</i>	0	1	0	0	1	Below Bunaghau	CBLF	27.131876667 °	89.542165000°
	7	Oriental Turtle Dove	<i>Streptopelia orientalis</i>	1	1	0	0	2	Below Bunaghau	CBLF	27.131876667 °	89.542165000°
	8	Spotted Laughingthrush	<i>Garrulax ocellatus</i>	0	0	0	2	2	Below Bunaghau	CBLF	27.131876667 °	89.542165000°
	9	House Crow	<i>Corvus splendens</i>	3	5	0	0	8	Below Bunaghau	CBLF	27.131876667 °	89.542165000°
	10	Plumbeous Water Redstart	<i>Rhyacornis fuliginosus</i>	1	1	0	0	2	Below Bunaghau	CBLF	27.131876667 °	89.542165000°
26	1	Stripe-throated Yuhina	<i>Yuhina gularis</i>	2	2	3	0	7	Galing	CBLF	27.129773333 °	89.540440000°
	2	Golden-throated Barbet	<i>Megalaima franklinii</i>	0	0	0	2	2	Galing	CBLF	27.129773333 °	89.540440000°
	3	Great Barbet	<i>Megalaima virens</i>	0	0	0	2	2	Galing	CBLF	27.129773333 °	89.540440000°
	4	White-tailed Nuthatch	<i>Sitta himalayensis</i>	0	0	0	1	1	Galing	CBLF	27.129773333 °	89.540440000°
	5	Kalij Pheasant	<i>Lophura leucomelanos</i>	2	2	0	0	4	Galing	CBLF	27.129773333 °	89.540440000°
	6	Scarlet Minivet	<i>Pericrocotus flammeus</i>	4	3	0	0	7	Galing	CBLF	27.129773333 °	89.540440000°
27	1	Golden-throated Barbet	<i>Megalaima franklinii</i>	1	0	0	0	1	Below Bunaghau	BP	27.136948333 °	89.543318333°

ST N o	SL N o	Common name	Species	M	F	Ju v	Coun t	Total	Locality	Habitat	Northing	Easting
	2	Rufous Sibia	<i>Heterophasia capistrata</i>	2	2	0	0	4	Below Bunaghau	BP	27.136948333 °	89.543318333°
	3	Maroon Oriole	<i>Oriolus traillii</i>	0	0	0	1	1	Below Bunaghau	BP	27.136948333 °	89.543318333°
	4	Hill Partridge	<i>Arborophila torqueola</i>	0	0	0	0	1	Below Bunaghau	BP	27.136948333 °	89.543318333°
28	1	Black Bulbul	<i>Hypsipetes leucocephalus</i>	0	0	0	2	2	Paga Goenpa	CF	27.285971667 °	89.561858333°
	2	Rufous Sibia	<i>Heterophasia capistrata</i>	0	0	0	2	2	Paga Goenpa	CF	27.285971667 °	89.561858333°
	3	Red-billed Chough	<i>Pyrrhocorax</i>	0	0	3	7	10	Paga Goenpa	CF	27.285971667 °	89.561858333°
	4	Spotted Nutcracker	<i>Pica pica</i>	1	1	0	0	2	Paga Goenpa	CF	27.285971667 °	89.561858333°
	5	Green-backed Tit	<i>Parus monticolus</i>	2	1	0	1	4	Paga Goenpa	CF	27.285971667 °	89.561858333°
29	1	Long-tailed Minivet	<i>Pericrocotus ethologus</i>	2	2	0	0	4	Sema Goenpa	MC	27.220886667 °	89.547620000°
	2	Blue Whistling Thrush	<i>Myophonus caeruleus</i>	1	0	0	0	1	Sema Goenpa	MC	27.220886667 °	89.547620000°
	3	Common Hoopoe	<i>Upupa epops</i>	1	2	0	0	3	Sema Goenpa	MC	27.220886667 °	89.547620000°
	4	Brown Parrotbill	<i>Paradoxornis unicolor</i>	3	4	0	0	7	Sema Goenpa	MC	27.220886667 °	89.547620000°
30	1	Oriental Cuckoo	<i>Cuculus saturatus</i>	0	0	0	1	1	Chukha	CBLF	27.057893333 °	89.555813333°
	2	Grey-headed Canary Fycatcher	<i>Culicicapa ceylonensis</i>	1	0	0	0	1	Chukha	CBLF	27.057893333 °	89.555813333°
	3	Eurasian Jay	<i>Garrulus glandarius</i>	1	1	0	0	2	Chukha	CBLF	27.057893333 °	89.555813333°

ST N o	SL N o	Common name	Species	M	F	Ju v	Coun t	Total	Locality	Habitat	Northing	Easting
	4	Grey-backed Shrike	<i>Lanius tephronotus</i>	2	1	0	0	3	Chukha	CBLF	27.057893333 °	89.555813333°
	5	White-throated fantail	<i>Rhipidura albicollis</i>	1	1	0	0	2	Chukha	CBLF	27.057893333 °	89.555813333°
	6	Ashy Drongo	<i>Dicrurus leucophaeus</i>	3	3	0	0	6	Chukha	CBLF	27.057893333 °	89.555813333°
	7	Brownish-flanked Bush Warbler	<i>Cettia pallidipes</i>	1	1	0	0	2	Chukha	CBLF	27.057893333 °	89.555813333°
	8	Pied Bushchat	<i>Saxicola caprata</i>	0	1	0	1	1	Chukha	CBLF	27.057893333 °	89.555813333°
31	1	Spotted Nutcracker	<i>Pica</i>	0	0	0	1	1	Loknaykha	M	27.175095000 °	27.175095000°
	2	Green-backed Tit	<i>Parus monticolus</i>	1	2	0	0	3	Loknaykha	M	27.175095000 °	27.175095000°
	3	Yellow-browed Fulvetta	<i>Alcippe cinerea</i>	4	2	0	0	6	Loknaykha	M	27.175095000 °	27.175095000°
	4	Common Stonechat	<i>Saxicola torquata</i>	1	0	0	0	1	Loknaykha	M	27.175095000 °	89.545270000°
32	1	Yellow-bellied Fantail	<i>Rhipidura hypoxantha</i>	1	1	0	0	2	Galing	CBLF	27.147958333 °	89.513200000°
	2	Short-billed Minivet	<i>Pericrocotus brevirostris</i>	2	2	0	0	4	Galing	CBLF	27.147958333 °	89.513200000°
	3	Rufous Sibia	<i>Heterophasia capistrata</i>	3	4	0	0	7	Galing	CBLF	27.147958333 °	89.513200000°
	4	Rufous -vented Yuhina	<i>Yuhina occipitalis</i>	3	4	3	0	10	Galing	CBLF	27.147958333 °	89.513200000°
	5	White-tailed Nuthatch	<i>Sitta himalayensis</i>	2	2	0	0	4	Galing	CBLF	27.147958333 °	89.513200000°
	6	Mrs Gould's Sunbird	<i>Aethopyga gouldiae</i>	1	0	0	0	1	Galing	CBLF	27.147958333 °	89.513200000°

ST N o	SL N o	Common name	Species	M	F	Ju v	Coun t	Total	Locality	Habitat	Northing	Easting
	7	Buff-barred Warbler	<i>Phylloscopus pulcher</i>	1	1	0	0	2	Galing	CBLF	27.147958333°	89.513200000°
	8	Yellow-vented Warbler	<i>Phylloscopus cantator</i>	1	0	0	1	2	Galing	CBLF	27.147958333°	89.513200000°
33	1	Oriental White-eye	<i>Zosterops palpebrosus</i>	0	0	0	2	2	Damchu	SL	27.241800000°	89.5247766617°
	2	Green-backed Tit	<i>Parus monticolus</i>	4	2	0	0	6	Damchu	SL	27.241800000°	89.5247766671°
	3	Stripe-throated Yuhina	<i>Yuhina gularis</i>	1	2	0	1	4	Damchu	SL	27.241800000°	89.5247766671°
34	1	Great Barbet	<i>Megalaima virens</i>	1	1	0	0	2	Wangkha	R	27.21568166°	89.509671667°
	2	Verditer Flycatcher	<i>Eumyias thalassina</i>	2	2	1	0	5	Wangkha	R	27.21568166°	89.509671667°
	3	Blue Whistling Thrush	<i>Myophonus caeruleus</i>	1	2	0	0	3	Wangkha	R	27.21568166°	89.509671667°

Annexure 5.5.1 Bird density in the plots with major habitat in the project site and outside project site (rep sites) in increasing order				
ST No	Total No.	Locality	Habitat	Density (A=5.004Ha)
2	5	Below Tsimasam	CBLF	1.00
20	7	Nearby Haa bridge	R	1.39
27	7	Below Bunaghau	BP	1.39
21	8	Nearby Haa bridge	R	1.59
34	10	Wangkha	R	1.98
31	11	Loknaykha	M	2.18
33	12	Damchu	SL	2.38
18	14	Tanalung	CBLF	2.78
1	14	Beside Tala Dam	R	2.80
24	15	Damchu	R	2.98
29	15	Sema Goenpa	MC	2.98
6	16	Galing	CBLF	3.17
22	16	Damchu	SL	3.17
8	18	Below Dunaghau	CBLF	3.57
30	18	Chukha	CBLF	3.57
13	19	Stone quarry	CBLF	3.77
16	19	Bunakha	CBLF	3.77
17	19	Tanalung hoka	BP	3.77
5	20	Above Chanachen	CBLF	3.97
10	20	Below Dunaghau	CBLF	3.97
19	20	Jazhigang	R	3.97
28	20	Paga Goenpa	CF	3.97
7	21	Chanachen	CBLF	4.17
9	21	Chanachen	CBLF	4.17
3	21	Chukha Dam, downstream	R	4.20
23	22	Stone quarry	BP	4.37

26	23	Galing	CBLF	4.56
4	24	Nearby Chanachen village	CBLF	4.76
14	24	Galing	CBLF	4.76
25	24	Below Bunaghau	CBLF	4.76
12	26	Tanalung	CBLF	5.16
15	31	Tanalung	CBLF	6.15
32	32	Galing	CBLF	6.35
11	41	Above Bunakha	CBLF	8.13

Colors indicate the different categories of density (density classes: 1-3, 3.1-5, 5.1-7, 7.1-9)

Annexure 5.5.2 Bird density in the plots with major habitat in the project site and outside project site (rep.sites)								
ST No	SL No	Common name	Species	Total	Locality	Habitat	Density (A=5.004Ha)	Observed in plots
16	4	Ashy Drongo	<i>Dicrurus leucophaeus</i>	2	Bunakha	CBLF	0.40	6
4	7	Asian Barred Owlet	<i>Glaucidium cuculoides</i>	1	Nearby Chanachen village	CBLF	0.20	1
6	2	Black Bulbul	<i>Hypsipetes leucocephalus</i>	4	Galing	CBLF	0.80	8
6	3	Black-headed shrike Babbler	<i>Pteruthius rufiventer</i>	2	Galing	CBLF	0.40	1
7	1	Black-winged Cuckooshrike	<i>Coracina melaschistos</i>	3	Chanachen	CBLF	0.60	2
13	1	Blue Whistling Thrush	<i>Myophonus caeruleus</i>	3	Stone quarry	CBLF	0.60	4
3	4	Blyth's Leaf Warbler	<i>Phylloscopus reguloides</i>	1	Chukha Dam, downstream	R	0.20	1
24	1	Brown Dipper	<i>Cinclus pallasi</i>	4	Damchu	R	0.79	1
8	4	Brown Parrotbill	<i>Paradoxornis unicolor</i>	4	Below Dunaghau	CBLF	0.80	1
11	5	Brown -throated Treecreeper	<i>Certhia discolor</i>	4	Above Bunakha	CBLF	0.80	1
1	5	Brownish-flanked Bush Warbler	<i>Cettia pallidipes</i>	2	Beside Tala Dam	R	0.40	2
32	7	Buff-barred Warbler	<i>Phylloscopus pulcher</i>	2	Galing	CBLF	0.40	1
16	7	Chestnut-bellied Nuthatch	<i>Sitta castanea</i>	2	Bunakha	CBLF	0.40	1
3	3	Chestnut-crowned Laughingthrush	<i>Garrulax erythrocephalus</i>	2	Chukha Dam, downstream	R	0.40	1
1	6	Common Green Magpie	<i>Cissa chinensis</i>	2	Beside Tala Dam	R	0.40	1
29	3	Common Hoopoe	<i>Upupa epops</i>	3	Sema Goenpa	MC	0.60	1
31	4	Common Stonechat	<i>Saxicola torquata</i>	1	Loknaykha	M	0.20	1
11	1	Crimson sunbird	<i>Aethopyga siparaja</i>	2	Above Bunakha	CBLF	0.40	1
19	6	Darjeeling Woodpecker	<i>Dendrocopos darjellensis</i>	1	Jazhigang	R	0.20	1
8	1	Eurasian Cuckoo	<i>Cuculus canorus</i>	2	Near Bunaghau	CBLF	0.40	1
30	3	Eurasian Jay	<i>Garrulus glandarius</i>	2	Chukha	CBLF	0.40	1
1	1	Golden-throated Barbet	<i>Megalaima franklinii</i>	4	Beside Tala Dam	R	0.80	6
1	3	Great Barbet	<i>Megalaima virens</i>	3	Beside Tala Dam	R	0.60	9
28	5	Green-backed Tit	<i>Parus monticolus</i>	4	Paga Goenpa	CF	0.79	3

Annexure 5.5.2 Bird density in the plots with major habitat in the project site and outside project site (rep.sites)								
ST No	SL No	Common name	Species	Total	Locality	Habitat	Density (A=5.004Ha)	Observed in plots
4	6	Green-tailed Sunbird	<i>Aethopyga nipalensis</i>	2	Nearby Chanachen village	CBLF	0.40	2
25	6	Grey Bushchat	<i>Saxicola</i>	1	Below Bunaghau	CBLF	0.20	1
30	4	Grey-backed Shrike	<i>Lanius tephronotus</i>	3	Chukha	CBLF	0.60	2
30	2	Grey-headed Canary Fycatcher	<i>Culicicapa ceylonensis</i>	1	Chukha	CBLF	0.20	1
4	4	Grey-winged Blackbird	<i>Turdus boulboul</i>	2	Nearby Chanachen village	CBLF	0.40	2
25	4	Hill Partridge	<i>Arborophila torqueola</i>	3	Below Bunaghau	CBLF	0.60	2
7	3	Hodgson's Redstart	<i>Phoenicurus ochruros</i>	2	Chanachen	CBLF	0.40	2
17	5	Hume's Warbler	<i>Phylloscopus humei</i>	2	Tanalung hoka	BP	0.40	1
6	5	Indian Cuckoo	<i>Cuculus micropterus</i>	1	Galing	CBLF	0.20	1
26	5	Kalij Pheasant	<i>Lophura leucomelanos</i>	4	Galing	CBLF	0.79	1
17	2	Large Hawk Cuckoo	<i>Hierococcyx sparveroides</i>	2	Tanalung hoka	BP	0.40	4
29	1	Long-tailed Minivet	<i>Pericrocotus ethologus</i>	4	Sema Goenpa	MC	0.79	5
12	2	Maroon Oriole	<i>Oriolus traillii</i>	4	Tanalung	CBLF	0.80	4
4	8	Mountain Hawk Eagle	<i>Spizaetus nipalensis</i>	1	Nearby Chanachen village	CBLF	0.20	1
14	1	Mrs Gould's Sunbird	<i>Aethopyga gouldiae</i>	2	Galing	CBLF	0.40	2
1	2	Oriental Cuckoo	<i>Cuculus saturatus</i>	2	Beside Tala Dam	R	0.40	3
25	7	Oriental Turtle Dove	<i>Streptopelia orientalis</i>	2	Below Bunaghau	CBLF	0.40	1
18	2	Oriental White-eye	<i>Zosterops palpebrosus</i>	4	Tanalung	CBLF	0.80	4
30	8	Pied Bushchat	<i>Saxicola caprata</i>	1	Chukha	CBLF	0.20	1
21	2	Plumbeous Water Redstart	<i>Rhyacornis fuliginosus</i>	2	Nearby Haa bridge	R	0.40	2
1	4	Red-faced Liocichla	<i>Liocichla phoenicea</i>	1	Beside Tala Dam	R	0.20	1
15	3	Rufous Sibia	<i>Heterophasia capistrata</i>	4	Tanalung	CBLF	0.80	14
19	4	Rufous-bellied Woodpecker	<i>Dendrocopos hyperythrus</i>	2	Jazhigang	R	0.40	2
32	2	Short-billed Minivet	<i>Pericrocotus brevirostris</i>	4	Galing	CBLF	0.79	1
25	8	Spotted Laughingthrush	<i>Garrulax ocellatus</i>	2	Below Bunaghau	CBLF	0.40	1

Annexure 5.5.2 Bird density in the plots with major habitat in the project site and outside project site (rep.sites)								
ST No	SL No	Common name	Species	Total	Locality	Habitat	Density (A=5.004Ha)	Observed in plots
28	4	Spotted Nutcracker	<i>Pica pica</i>	2	Paga Goenpa	CF	0.40	2
23	1	Streak-breasted Scimitar Babbler	<i>Pomatorhinus ruficollis</i>	4	Stone quarry	BP	0.79	2
9	4	Striated Bulbul	<i>Pycnonotus striatus</i>	1	Chanachen	CBLF	0.20	1
3	6	Striated Laughingthrush	<i>Garrulax striatus</i>	3	Chukha Dam, downstream	R	0.60	2
33	3	Stripe-throated Yuhina	<i>Yuhina gularis</i>	4	Damchu	SL	0.79	1
16	6	Verditer Flycatcher	<i>Eumyias thalassina</i>	1	Bunakha	CBLF	0.20	1
9	6	Whiskered Yuhina	<i>Yuhina flavicollis</i>	3	Chanachen	CBLF	0.60	1
21	4	White-capped Water Redstart	<i>Chaimarrornis leucocephalus</i>	2	Nearby Haa bridge	R	0.40	3
12	7	White-spectacled Warbler	<i>Seicercus affinis</i>	2	Near Tanalung	CBLF	0.40	1
32	5	White-tailed Nuthatch	<i>Sitta himalayensis</i>	4	Galing	CBLF	0.79	5
8	5	White-throated fantail	<i>Rhipidura albicollis</i>	1	Below Dunaghau	CBLF	0.20	1
30	5	White-throated fantail	<i>Rhipidura albicollis</i>	2	Chukha	CBLF	0.40	1
32	1	Yellow-bellied Fantail	<i>Rhipidura hypoxantha</i>	2	Galing	CBLF	0.40	1
17	1	Yellow-billed Blue Magpie	<i>Urocissa flavirostris</i>	4	Tanalung hoka	BP	0.80	2
24	3	Yellow-browed Warbler	<i>Phylloscopus inornatus</i>	3	Damchu	R	0.60	1
32	8	Yellow-vented Warbler	<i>Phylloscopus cantator</i>	2	Galing	CBLF	0.40	1
30	6	Ashy Drongo	<i>Dicrurus leucophaeus</i>	6	Chukha	CBLF	1.19	2
29	4	Brown Parrotbill	<i>Paradoxornis unicolor</i>	7	Sema Goenpa	MC	1.39	2
33	2	Green-backed Tit	<i>Parus monticolus</i>	6	Damchu	SL	1.19	2
15	2	Long-tailed Minivet	<i>Pericrocotus ethologus</i>	5	Tanalung	CBLF	1.00	1
22	2	Oriental White-eye	<i>Zosterops palpebrosus</i>	5	Damchu	SL	1.00	1
22	4	Red-vented Bulbul	<i>Pycnonotus cafer</i>	7	Damchu	SL	1.40	1
32	3	Rufous Sibia	<i>Heterophasia capistrata</i>	7	Galing	CBLF	1.39	3
26	6	Scarlet Minivet	<i>Pericrocotus flammeus</i>	7	Galing	CBLF	1.39	1
5	1	Striated Laughingthrush	<i>Garrulax striatus</i>	5	Above Chanachen	CBLF	1.00	1

Annexure 5.5.2 Bird density in the plots with major habitat in the project site and outside project site (rep.sites)								
ST No	SL No	Common name	Species	Total	Locality	Habitat	Density (A=5.004Ha)	Observed in plots
26	1	Stripe-throated Yuhina	<i>Yuhina gularis</i>	7	Galing	CBLF	1.39	1
34	2	Verditer Flycatcher	<i>Eumyias thalassina</i>	5	Wangkha	R	0.99	1
18	1	Whiskered Yuhina	<i>Yuhina flavicollis</i>	7	Tanalung	CBLF	1.40	2
4	3	White-tailed Nuthatch	<i>Sitta himalayensis</i>	6	Nearby Chanachen village	CBLF	1.20	1
16	3	White-throated Laughingthrush	<i>Gauuulax albogularis</i>	6	Bunakha	CBLF	1.20	1
31	3	Yellow-browed Fulvetta	<i>Alcippe cinerea</i>	6	Loknaykha	M	1.19	1
9	1	Black-throated Tit	<i>Aegithalos concinnus</i>	10	Chanachen	CBLF	2.00	1
25	9	House Crow	<i>Corvus splendens</i>	8	Below Bunaghau	CBLF	1.59	1
15	1	Kalij Pheasant	<i>Lophura leucomelanos</i>	8	Tanalung	CBLF	1.60	1
13	4	Olive-backed Pipit	<i>Anthus hodgsoni</i>	8	Stone quarry	CBLF	1.60	1
28	3	Red-billed Chough	<i>Pyrrhocorax</i>	10	Paga Goenpa	CF	1.98	1
11	4	Red-tailed Minla	<i>Minla ignotincta</i>	10	Above Bunakha	CBLF	2.00	2
19	1	Rufous Sibia	<i>Heterophasia capistrata</i>	8	Jazhigang	R	1.60	3
32	4	Rufous -vented Yuhina	<i>Yuhina occipitalis</i>	10	Galing	CBLF	1.98	2
5	3	Whiskered Yuhina	<i>Yuhina flavicollis</i>	10	Above Chanachen	CBLF	2.00	3
7	2	Rufous Sibia	<i>Heterophasia capistrata</i>	11	Chanachen	CBLF	2.20	1
12	3	Whiskered Yuhina	<i>Yuhina flavicollis</i>	11	Tanalung	CBLF	2.20	2
11	6	Nepal Fulvetta	<i>Alcippe nipalensis</i>	12	Above Bunakha	CBLF	2.40	1

Annexure 5.5.3 Diversity/number of birds in survey plots with species in increasing order				
ST No	Locality	Habitat	# of species in plots	Total number of birds
2	Below Tsimasam	CBLF	3	5
33	Damchu	SL	3	12
34	Wangkha	R	3	10
13	Stone quarry	CBLF	4	19
18	Tanalung	CBLF	4	14
20	Nearby Haa bridge	R	4	7
21	Nearby Haa bridge	R	4	8
22	Damchu	SL	4	16
24	Damchu	R	4	15
27	Below Bunaghau	BP	4	7
29	Sema Goenpa	MC	4	15
31	Loknaykha	M	4	11
5	Above Chanachen	CBLF	5	20
6	Galing	CBLF	5	16
8	Below Dunaghau	CBLF	5	18
10	Below Dunaghau	CBLF	5	20
15	Tanalung	CBLF	5	31
17	Tanalung hoka	BP	5	19
23	Stone quarry	BP	5	22
28	Paga Goenpa	CF	5	20
1	Beside Tala Dam	R	6	14
11	Above Bunakha	CBLF	6	41
19	Jazhigang	R	6	20
26	Galing	CBLF	6	23
7	Chanachen	CBLF	7	21
9	Chanachen	CBLF	7	21

Annexure 5.5.3 Diversity/number of birds in survey plots with species in increasing order				
ST No	Locality	Habitat	# of species in plots	Total number of birds
12	Tanalung	CBLF	7	26
14	Galing	CBLF	7	24
16	Bunakha	CBLF	7	19
3	Chukha Dam, downstream	R	8	21
4	Nearby Chanachen village	CBLF	8	24
30	Chukha	CBLF	8	18
32	Galing	CBLF	8	32
25	Below Bunaghau	CBLF	10	24

5.6 MACKINNON SPECIES FREQUENCY LISTING DATA FOR BUNAKHA HPP

	RECEE ST No 0 -RECEE ST No 3	Locality: Tsimalakha-Tala Dam	Time		Altitude		GPS (Start)		GPS (End)			
	Habitat Type: CBLF-Reverine	Day:2025/04/04	Start	End	Start	End	Northing	Easting	Northing	Easting		
			4.15p m	5.15p m	1869m	1338 m	27.0486500 0°	89.5801500 0°	27.1094050 00°	89.5300283 33°		
SI No	Common Name	Scientific Name	Bird Type / Sex					Evidence				Remarks
			Male	Female	Juvenile	Count	Total	Direct sighting	Call	Feather	Dropping	
1	Red-vented Bulbul	<i>Pycnonotus cafer</i>	1	1	0	0	2	Yes	Nil	Nil	Nil	Observed
2	House Crow	<i>Corvus splendens</i>	2	0	0	0	2	Yes	Nil	Nil	Nil	along the
3	Common Hoopoe	<i>Upupa epops</i>	1	1	0	0	2	Yes	Nil	Nil	Nil	road/
4	Common Stonechat	<i>Saxicola torquata</i>	0	1	0	0	1	Yes	Nil	Nil	Nil	transect
5	Olive-backed Pipit	<i>Anthus hodgsoni</i>	1	1	0	0	2	Yes	Nil	Nil	Nil	do
6	White - capped Water Redstart	<i>Chaimarrornis leucocephalus</i>	0	1	0	0	1	Yes	Nil	Nil	Nil	
7	Mountain Scopes Owl	<i>Otus spilocephalus</i>	0	0	0	1	1	Yes	Yes	Nil	Nil	

Mackinnon Species Frequency Listing Data Form /Wild Life Bird Data Sheet

	RECEE ST No 3 - RECEE ST No 4	Locality: Chukha Dam-Chanachen	Time		Altitude		GPS (Start)		GPS (End)			
	Habitat Type:Reverine- CBLF	Day:2025/04/05	Start	End	Start	End	Northing	Easting	Northing	Easting		
			9.55a m	11.50a m	1869 m	2151 m	27.109405 000°	89.530028 333°	27.119645 000°	89.529526 667°		
SI N o	Common Name	Scientific Name	Bird Type / Sex					Evidence				Remar ks
			Male	Femal e	Juven ile	Coun t	Total	Direct sighting	Call	Feather	Droppi ng	
1	Black drongo	<i>Dicrurus macrocerus</i>	2	0	0	0	2	Yes	Nil	Nil	Nil	Observ ed
2	Black-throated Tit	<i>Aegithalos concinus</i>	1	0	0	0	1	Yes	Nil	Nil	Nil	along the
3	Golden-throated Barbet	<i>Megalaima franklinii</i>	1	1	0	0	2	Yes	Nil	Nil	Nil	road/
4	Common Stonechat	<i>Saxicola torquata</i>	0	1	0	0	1	Yes	Nil	Nil	Nil	transec t
5	Red-vented Bulbul	<i>Pycnonotus cafer</i>	1	0	0	0	1	Yes	Nil	Nil	Nil	do
6	House Crow	<i>Corvus splendens</i>	1	1	0	0	2	Yes	Nil	Nil	Nil	
7	Common Hoopoe	<i>Upupa epops</i>	1	1	0	0	2	Yes	Nil	Nil	Nil	
8	White-capped Water Redstart	<i>Chaimarrornis leucocephalus</i>	1	1	0	0	2	Yes	Nil	Nil	Nil	
9	Grey Wagtail	<i>Motacilla cinerea</i>	0	1	0	1	2	Yes	Nil	Nil	Nil	
10	Mountain Scope Owl	<i>Otus spilocephalus</i>	1	0	0	0	0	Nil	Yes	Nil	Nil	

Mackinnon Species Frequency Listing Data Form /Wild Life_Bird Data Sheet												
	RECEE ST No 4 - RECEE ST No.9	Locality: Chanachen - Chanachen	Time		Altitude		GPS (Start)		GPS (End)			
	Habitat Type:CBLF-CBLF	Day:2025/04/05	Start	End	Start	End	Northing	Easting	Northing	Easting		
			1.10a m	2,00a m	2151 m	2261 m	27.1196450 00°	89.5295266 67°	27.1462300 00°	89.528840 00°		
SI N o	Common Name	Scientific Name	Bird Type / Sex					Evidence				Remar ks
			Male	Fema le	Juven ile	Coun t	Total	Direct sighting	Call	Feather	Droppi ng	
1	Great Barbet	<i>Megalaima virens</i>	2	2	0	0	4	Yes	Nil	Nil	Nil	Observ ed
2	Grey-headed Canary Flycatcher	<i>Culicicapa ceylonensis</i>	2	0	0	1	2	Nil	Yes	Nil	Nil	along the
3	Rusty-bellied Shortwing	<i>Brachypteryx huperythra</i>	1	1	0	0	2	Yes	Nil	Nil	Nil	road/ transec t
4	Lesser Shortwing	<i>Brachypteryx leucophrys</i>	1	0	1	0	2	Yes	Nil	Nil	Nil	

Mackinnon Species Frequency Listing Data Form /Wild Life_Bird Data Sheet

	RECEE ST No 9- RECEE ST No.7	Locality: Chanachen- Chanachen	Time		Altitude		GPS (Start)		GPS (End)			
	Habitat Type :CBLF-CBLF	Day:2025/04/05	Start	End	Start	End	Northing	Easting	Northing	Easting		
			2.16ap m	2.55p m	2261 m	1850 m	27.1462300 00°	89.528840 00°	27.1370100 00°	89.5392433 33°		
SI No	Common Name	Scientific Name	Bird Type / Sex					Evidence				Remarks
			Male	Female	Juvenile	Count	Total	Direct sighting	Call	Feather	Dropping	
1	Kalij Pheasant	<i>Lophura leucomelanos</i>	2	1	0	0	3	Yes	Nil	Nil	Nil	Observed
2	Black Bulbul	<i>Hypsipetes leucocephalus</i>	1	1	0	0	2	Yes	Nil	Nil	Nil	along the
3	Green-backed Tit	<i>Parus monticolus</i>	0	0	0	3	3	Nil	Yes	Nil	Nil	road/
4	Oriental Cuckoo	<i>Cuculus saturatus</i>	0	0	0	1	1	Nil	Yes	Nil	Nil	transect
5	Asian Barred Owlet	<i>Glaucidium cuculoides</i>	1	0	0	0	1	Yes	Nil	Nil	Nil	

Mackinnon Species Frequency Listing Data Form /Wild Life_Bird Data Sheet

	RECEE ST No 15 - RECEE ST No.36	Locality: Galing- Galing	Time		Altitude		GPS (Start)		GPS (End)			
	Habitat Type: CBLF- CBLF	Day:2025/04 /06	Start	End	Start	End	Northing	Easting	Northing	Easting		
			10.30a m	11.00a m	2442 m	2557 m	27.1636366 67°	89.5248050 00°	27.1479583 33°	89.5132000 00°		
SI N o	Common Name	Scientific Name	Bird Type / Sex				Evidence				Remar ks	
			Male	Female	Juveni le	Coun t	Total	Direct sighting	Call	Feather	Droppi ng	
1	Barred Cuckoo Dove	<i>Macropygia unchall</i>	0	0	0	1	1	Nil	Yes	Nil	Nil	Observ ed
2	Oriental Cuckoo	<i>Cuculus saturatus</i>	0	0	0	2	2	Nil	Yes	Nil	Nil	along the
3	Crimson Sunbird	<i>Aethopyga siparaja</i>	0	0	0	1	1	Yes	Nil	Nil	Nil	road/ transec t
4	Rufous Sibia	<i>Heterophasia</i>	1	1	0	0	2	Yes	Nil	Nil	Nil	
5	Rufous-vented Yuhina	<i>Yuhina occipitalis</i>	2	3	1	0	6	Yes	Yes	Nil	Nil	

Mackinnon Species Frequency Listing Data Form /Wild Life_Bird Data Sheet

	RECEE ST No 36 - RECEE ST No.27	Locality: Galing- Galing	Time		Altitude		GPS (Start)		GPS (End)			
	Habitat Type :CBLF- CBLF	Day:2025/04/ 06	Start	End	Start	End	Northing	Easting	Northing	Easting		
			11.45a m	2.37p m	2557 m	1821 m	27.1479583 33°	89.8132000 00°	27.1297733 33°	89.5404400 00°		
SI N o	Common Name	Scientific Name	Bird Type / Sex					Evidence				Remar ks
			Male	Femal e	Juveni le	Coun t	Total	Direct sighting	Call	Feather	Droppi ng	
1	Rufous Sibia	<i>Heterophasia</i>	0	0	0	2	2	Nil	Yes	Nil	Nil	Observ ed
2	Grey-headed Canary Flycatcher	<i>Culicicapa ceylonensis</i>	1	1	0	0	2	Yes	Nil	Nil	Nil	along the
3	White-throated Fantail	<i>Rhipidura albicollis</i>	1	1	0	0	2	Yes	Nil	Nil	Nil	road/ transec t
4	Large Hawk Cuckoo	<i>Hierococcyx sparverioides</i>	1	0	0	0	1	Yes	Nil	Nil	Nil	
5	Great Barbet	<i>Megalaima virens</i>	1	1	0	0	2	Yes	Nil	Nil	Nil	
6	Greater Yellownap	<i>Picus flavinucha</i>	1	0	0	0	1	Yes	Nil	Nil	Nil	

Mackinnon Species Frequency Listing Data Form /Wild Life_Bird Data Sheet

	RECEE ST No 27 - RECEE ST No.36	Locality: Galing- Galing	Time		Altitude		GPS (Start)		GPS (End)			
	Habitat Type :CBLF- CBLF	Day:2025/04 /06	Start	End	Start	End	Northing	Easting	Northing	Easting		
			3.15 m	3.50p m	1821 m	1864 m	27.129773 33°	89.5404400 00°	27.1279366 67°	89.5390266 67°		
SI N o	Common Name	Scientific Name	Bird Type / Sex					Evidence				Remar ks
			Male	Femal e	Juveni le	Coun t	Total	Direct sighting	Call	Feather	Droppi ng	
1	Long-tailed Minivet	<i>Pericrocotus ethologus</i>	3	3	0	0	6	Yes	Nil	Nil	Nil	Observ ed
2	White-throated Laughingthrush	<i>Garrulax albogularis</i>	1	3	0	4	8	Yes	Nil	Nil	Nil	along the
3	Common Hoopoe	<i>Upupa epops</i>	1	1	0	0	2	Yes	Nil	Nil	Nil	road/ transec t
4	Golden-throated Barbet	<i>Megalaima franklinii</i>	0	0	0	2	2	Nil	Yes	Nil	Nil	
5	Kalij Pheasant	<i>Lophura leucomelanos</i>	3	4	0	0	7	Yes	Nil	Nil	Nil	do
6	Green-billed Mlkoha	<i>Phaenicophae us tristis</i>	0	1	0	0	1	Yes	Nil	Nil	Nil	do

Mackinnon Species Frequency Listing Data Form /Wild Life_Bird Data Sheet

	RECEE ST No 33 - RECEE ST No.32	Locality: Tashidang- Wangkha	Time		Altitude		GPS (Start)		GPS (End)			
	Habitat Type : Fir Zone-MC	Day:2025/04/07	Start	End	Start	End	Northing	Easting	Northing	Easting		
			12.45p m	2.50p m	3323 m	3080 m	27.2089800 00°	89.4773650 000°	27.2089800 00°	89.486733 33°		
SI No	Common Name	Scientific Name	Bird Type / Sex					Evidence				Remar ks
			Male	Femal e	Juveni le	Coun t	Total	Direct sighting	Call	Feather	Droppi ng	
1	Spotted Nutcracker	<i>Nucifraga caryocatactes</i>	1	1	0	0	2	Yes	Nil	Nil	Nil	Observ ed
2	Black Bulbul	<i>Hypsipetes leucocephalus</i>	0	0	0	1	1	Nil	Yes	Nil	Nil	along the
3	Rufous Sibia	<i>Heterophasia</i>	2	2	0	0	4	Yes	Nil	Nil	Nil	road/ transec t
4	Kalij Pheasant	<i>Lophura leucomelanos</i>	0	0	0	0	1	Nil	Nil	Yes	Nil	

Mackinnon Species Frequency Listing Data Form /Wild Life_Bird Data Sheet

	RECEE ST No 20 - RECEE ST No.38	Locality: Wangkha- Wangkha	Time		Altitude		GPS (Start)		GPS (End)			
	Habitat Type : Reverine- Shrubland	Day:2025/04/0 8	Start	End	Start	End	Northing	Easting	Northing	Easting		
			12.55p m	1.46p m	2058 m	2298 m	27.1936600 00°	89.4867650 00°	27.2156816 67°	89.5096716 67°		
SI N o	Common Name	Scientific Name	Bird Type / Sex					Evidence				Remar ks
			Male	Femal e	Juveni le	Coun t	Total	Direct sighting	Call	Feather	Droppi ng	
1	Kalij Pheasant	<i>Lophura leucomelanos</i>	1	1	0	0	2	Yes	Nil	Nil	Nil	Observ ed
2	Ashy Drongo	<i>Dicrurus leucophaeus</i>	2	2	0	0	4	Yes	Nil	Nil	Nil	along the
3	Black Bulbul	<i>Hypsipetes leucocephalus</i>	2	3	0	0	5	Yes	Nil	Nil	Nil	road/
4	Hodgson's Redstart	<i>Phoenicurus hodgsoni</i>	1	1	0	0	2	Yes	Nil	Nil	Nil	transec t
5	Rufous Sibia	<i>Heterophasia</i>	1	1	0	0	2	Yes	Nil	Nil	Nil	
6	Greater Yellownape	<i>Picus flavinucha</i>	1	1	0	0	2	Yes	Nil	Nil	Nil	
7	Russet Sparrow	<i>Passer rutilans</i>	6	3	0	0	9	Yes	Nil	Nil	Nil	
8	Grey-headed Canary Flycatcher	<i>Culicicapa ceylonensis</i>	0	0	0	1	1	Yes	Yes	Nil	Nil	
9	Green-tailed Sunbird	<i>Aethopyga nipalensis</i>	1	1	0	0	2	Yes	Nil	Nil	Nil	
10	Green-backed Tit	<i>Parus monticolus</i>	0	3	4	0	7	Yes	Nil	Nil	Nil	do

Mackinnon Species Frequency Listing Data Form /Wild Life_Bird Data Sheet

	RECEE ST No 38 - RECEE ST No.21	Locality: Wangkha-Near Haa Bridge	Time		Altitude		GPS (Start)		GPS (End)		Surveyor : Purna Bdr Rai	
	Habitat Type : Shrubland- Reverine	Day:2025/04/08	Star t	End	Start	End	Northing	Easting	Northing	Easting		
			3.p m	4.pm	2296 m	1964 m	27.2156816 67°	89.5096716 67°	27.2004716 67°	89.5208133 33°		
SI N o	Common Name	Scientific Name	Bird Type / Sex					Evidence				Remar ks
			Mal e	Fema le	Juveni le	Coun t	Total	Direct sighting	Call	Feather	Droppi ng	
1	Rufous Sibia	<i>Heterophasia</i>	0	0	0	2	2	Nil	Yes	Nil	Nil	Observ ed
2	Yellow-billed Blue Magpie	<i>Urocissa flavirostris</i>	2	2	0	0	4	Yes	Nil	Nil	Nil	along the
3	Black-throated Tit	<i>Aegithalos concinus</i>	5	4	3	0	9	Yes	Nil	Nil	Nil	road/ transec t
4	Black Bulbul	<i>Hypsipetes leucocephalus</i>	4	4	0	0	8	Yes	Nil	Nil	Nil	
5	House Crow	<i>Corvus splendens</i>	0	0	0	1	1	Nil	Yes	Nikk	Nil	do

Mackinnon Species Frequency Listing Data Form /Wild Life_Bird Data Sheet

	RECEE ST No 21- RECEE ST No.22	Locality: Near Haa Bridge-Near Haa Bridge	Time		Altitude		GPS (Start)		GPS (End)		Surveyor: Purna Bdr Rai	
	Habitat Type : Shrubland- Reverine	Day:2025/04/09	Start	End	Start	End	Northing	Easting	Northing	Easting		
			4.15p m	4.40p m	1964 m	1920 m	27.200471 667°	89.520813 333°	27.204816 667°	89.518853 333°		
SI No	Common Name	Scientific Name	Bird Type					Evidence				Remarks
			Male	Female	Juvenile	Count	Total	Direct sighting	Call	Feather	Droppi ng	
1	Plumbeous Water Redstart	<i>Rhyacornis fuliginosus</i>	1	1	0	0	2	Yes	Nil	Nil	Nil	Observ ed
2	White -capped Water Redstart	<i>Chaimarrornis leucocephalus</i>	1	1	0	0	2	Yes	Nil	Nil	Nil	along the
3	Black Bulbul	<i>Hypsipetes leucocephalus</i>	2	1	0	0	3	Yes	Nil	Nil	Nil	road/ transec t
4	Brown Dipper	<i>Cinclus pallasii</i>	1	0	0	0	1	Yes	Nil	Nil	Nil	
5	White Wagtail	<i>Motacilla alba</i>	1	1	0	0	2	Yes	Nil	Nil	Nil	do

Mackinnon Species Frequency Listing Data Form /Wild Life_Bird Data Sheet

	RECEE ST No 21- RECEE ST No.22	Locality: Paga Goenpa- Damchu	Time		Altitude		GPS (Start)		GPS (End)		Surveyor: Purna Bdr Rai	
	Habitat Type : C/F-Reverine	Day:2025/04/0 9	Start	End	Start	End	Northing	Easting	Northing	Easting		
			10.35a m	12.13 pm	2798 m	2005 mm	27.285971 667°	89.561858 333°	27.262618 333°	89.5284150 000°		
SI No	Common Name	Scientific Name	Bird Type / Sex					Evidence				Remarks
			Male	Female	Juvenile	Count	Total	Direct sighting	Call	Feather	Droppings	
1	Black-throated Tit	<i>Aegithalos concinnus</i>	1	0	0	1	2	Yes	Nil	Nil	Nil	Observed
2	Oriental Turtle Dove	<i>Streptopelia orientalis</i>	1	1	0	0	2	Yes	Nil	Nil	Nil	along the
3	Buff-barred Warbler	<i>Phylloscopus pulcher</i>	1	0	0	0	1	Yes	Nil	Nil	Nil	road/
4	Verditer Flucatcher	<i>Eumyias thalassina</i>	1	0	0	0	1	Yes	Nil	Nil	Nil	transect
5	Rusty-cheeked Scimitar Babbler	<i>Pomatorhinus erythrogastrus</i>	0	0	0	0	2	Nil	Yes	Nil	Nil	do

Mackinnon Species Frequency Listing Data Form /Wild Life_Bird Data Sheet

	RECEE ST No 25- RECEE ST No.37	Locality: Damchu- Damchu	Time		Altitude		GPS (Start)		GPS (End)		Surveyor : Purna Bdr Rai	
	Habitat Type : Reverine- Shrubland	Day:2025/04/ 09	Start	End	Start	End	Northing	Easting	Northing	Easting		
			12.40p m	1.23p m	2005 m	2011m m	27.2626183 33°	89.5284150 00°	27.2418000 00°	89.5247766 67°		
SI No	Common Name	Scientific Name	Bird Type / Sex					Evidence				Remarks
			Male	Femal e	Juveni le	Count	Total	Direct sighting	Call	Feather	Droppi ng	
1	Rufous Sibia	<i>Heterophasia</i>	0	0	0	2	2	No	Yes	No	No	Observ ed
2	Kalij Pheasant	<i>Lophura leucomelanos</i>	0	0	0	1	1	No	No	Yes	No	along the
3	Black Bulbul	<i>Hypsipetes leucocephalus</i>	2	1	0	0	3	Yes	No	No	No	road/ transec t

Mackinnon Species Frequency Listing Data Form /Wild Life_Bird Data Sheet

	RECEE ST No 37- RECEE ST No.23	Locality: Damchu- Damchu	Time		Altitude		GPS (Start)		GPS (End)		Surveyor: Purna Bdr Rai	
	Habitat Type :Shrubland- Shrubland	Day:2025/04/ 09	Start	End	Start	End	Northing	Easting	Northing	Easting		
			1.58p m	2.00p m	2011 m	2030 m	27.2626183 33°	89.5284150 00°	27.2280133 33°	89.5178733 33°		
SI No	Common Name	Scientific Name	Bird Type / Sex					Evidence				Remarks
			Male	Femal e	Juveni le	Coun t	Total	Direct sighting	Call	Feather	Droppi ng	
1	Black Bulbul	<i>Hypsipetes leucocephalus</i>	2	2	0	0	4	Yes	No	No	No	Observ ed
2	Scarlet Minivet	<i>Pericrocotus flammeus</i>	1	1	0	0	2	Yes	No	No	No	along the
3	Russet Sparrow	<i>Passer rutilans</i>	7	7	0	0	14	Yes	No	No	No	road/ transec t

Mackinnon Species Frequency Listing Data Form /Wild Life_Bird Data Sheet

	RECEE ST No 13- RECEE ST No.18	Locality: Stone quarry-Tanalung	Time		Altitude		GPS (Start)		GPS (End)		Surveyor: Purna Bdr Rai	
	Habitat Type : CBLF-B/P	Day:2025/04/10	Start	End	Start	End	Northing	Easting	Northing	Easting		
			4.32p m	4.33p m	2198 m	2168 m	27.1607783 33°	89.553540 00°	27.1839950 00°	89.5458220 000°		
SI No	Common Name	Scientific Name	Bird Type / Sex					Evidence				Remarks
			Male	Femal e	Juveni le	Coun t	Total	Direct sighting	Call	Feather	Droppi ng	
1	Kalij Pheasant	<i>Lophura leucomelanos</i>	4	3	0	0	7	Yes	No	No	No	Observ ed
2	Hill Partridge	<i>Arborophila torqueola</i>	0	0	0	3	3	No	Yes	No	No	along the
3	Red vented Bulbul	<i>Pycnonotus cafer</i>	3	4	0	0	7	Yes	No	Ni	No	road/ transec t
4	Bay Woodpecker	<i>Blythipicus pyrrhotis</i>	1	0	0	0	1	Yes	No	No	No	
5	Drongo cuckoo	<i>Surniculus lugubris</i>	0	0	0	2	2	No	Yes	No	No	
6	Barred Cuckoo Dove	<i>Mcropygia unchall</i>	0	0	0	1	1	No	Yes	No	No	
7	Oriental Turtle Dove	<i>Streptopelia orientalis</i>	2	1	0	0	3	Yes	No	No	No	
8	Rufous Treepie	<i>Dendrocitta vagabunda</i>	2	2	0	0	4	Yes	No	No	No	do

Mackinnon Species Frequency Listing Data Form /Wild Life_Bird Data Sheet

	RECEE ST No 23- RECEE ST No.24	Locality: Damchu-Stone quarry	Time		Altitude		GPS (Start)		GPS (End)		Surveyor: Purna Bdr Rai	
	Habitat Type : Shrubland-B/P	Day:2025/04/09	Start	End	Start	End	Northing	Easting	Northing	Easting		
			2.36p m	3.20p m	2030 m	2238 m	27.2280133 33°	89.5178733 33°	27.2323866 67°	89.5287866 67°		
SI N o	Common Name	Scientific Name	Bird Type					Evidence				Remar ks
			Male	Femal e	Juveni le	Coun t	Total	Direct sighting	Call	Feather	Droppi ng	
1	Rufous-bellied Woodpecker	<i>Dendrocopos hyperythrus</i>	1	1	0	0	2	Yes	No	No	No	Observ ed
2	Large-billed Crow	<i>Corvus macrorhynchos</i>	0	0	0	1	1	No	Yes	No	No	along the
3	Spotted Nutcracker	<i>Nucifraga caryocatactes</i>	0	0	0	1	1	No	Yes	No	No	road/ transec t
4	Scarlet Minivet	<i>Pericrocotus flammeus</i>	2	3	0	0	5	Yes	No	No	No	
5	White-throated Fantail	<i>Rhipidura albicollis</i>	1	1	0	0	2	Yes	No	No	No	
6	Blue Whistling Thrush	<i>Myophonus caeruleus</i>	1	0	0	0	1	Yes	No	No	No	
7	Verditer Flycatcher	<i>Eumyias thalassina</i>	0	1	1	0	2	Yes	No	No	No	

Mackinnon Species Frequency Listing Data Form /Wild Life_Bird Data Sheet

	RECEE ST No 30- RECEE ST No.35	Locality: Sema Goenpa	Time		Altitude		GPS (Start)		GPS (End)		Surveyor: Purna Bdr Rai	
	Habitat Type : M/c-Meadow	Day:2025/04 /10	Start	End	Start	End	Northing	Easting	Northing	Easting		
			10.10a m	11.00a m	2794 m	2625 m	27.2208866 67°	89.5476200 00°	27.1750950 00°	89.5452700 00°		
SI N o	Common Name	Scientific Name	Bird Type				Evidence				Remar ks	
			Male	Female	Juveni le	Coun t	Total	Direct sighting	Call	Feather	Droppi ng	
1	Blue Whistling Thrush	<i>Myophonus caeruleus</i>	1	0	0	0	1	Yes	No	No	No	Observ ed
2	Kalij Pheasant	<i>Lophura leucomelanos</i>	2	2	0	1	5	Yes	No	Yes	No	along the
3	Rufous Sibia	<i>Heterophasia</i>	0	0	0	2	2	No	Yes	No	No	road/
4	Large-billed Crow	<i>Corvus macrorhynch os</i>	0	0	0	3	3	No	Yes	No	No	transec t

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	RECEE ST No 35- RECEE ST No.16	Locality: Meadow- Tanalung	Time		Altitude		GPS (Start)		GPS (End)		Surveyor: Purna Bdr Rai	
	Habitat Type : CBLF-CBLF	Day:2025/04/ 10	Start	End	Start	End	Northing	Easting	Northing	Easting		
			11.40a m	12.30p m	2625 m	2198 m	27.1750950 00°	89.5452700 00°	27.1607783 33°	89.5535450 00°		
SI N o	Common Name	Scientific Name	Bird Type / Sex					Evidence				Remar ks
			Male	Female	Juveni le	Coun t	Total	Direct sighting	Call	Feather	Droppi ng	
1	Spotted Nutcracker	<i>Nucifraga caryocatactes</i>	1	1	0	0	2	Yes	No	No	No	Observ ed
2	Spotted Forktail	<i>Enicurus maculatus</i>	0	0	0	1	1	Yes	No	No	No	along the
3	Black Bulbul	<i>Hypsipetes leucocephalus</i>	0	0	0	2	2	Yes	No	No	No	road/ transec t
4	Red-vented Bulbul	<i>Pycnonotus cafer</i>	2	0	0	0	2	Yes	No	No	No	

Mackinnon Species Frequency Listing Data Form /Wild Life_Bird Data Sheet

	RECEE ST No 16- RECEE ST No.13	Locality: Tanalung-Stone quarry	Time		Altitude		GPS (Start)		GPS (End)		Surveyor: Purna Bdr Rai	
	Habitat Type : CBLF-CBLF	Day:2025/04/10	Start	End	Start	End	Northing	Easting	Northing	Easting		
			2.30p m	3.30p m	2128 m	2198 m	27.1750950 00°	89.5452700 00°	27.1607783 33°	89.5535450 00°		
SI N o	Common Name	Scientific Name	Bird Type /Sex					Evidence				Remar ks
			Male	Femal e	Juveni le	Coun t	Total	Direct sighting	Call	Feather	Droppi ng	
1	Grey Bushchat	<i>Saxicola ferra</i>	1	0	0	0	1	Yes	No	No	No	Observ ed
2	Black Bulbul	<i>Hypsipetes leucocephalus</i>	1	0	0	0	1	No	Yes	No	No	along the
3	Rufous Sibia	<i>Heterophasia</i>	2	3	0	0	5	Yes	No	No	No	road/ transec t
4	Collared Owlet	<i>Glaucidium brodiei</i>	1	0	0	0	1	Yes	No	No	No	

Mackinnon Species Frequency Listing Data Form /Wild Life_Bird Data Sheet

SI No	RECEE ST No 17- RECEE ST No.11	Locality: Bunakha-Above Bunakha	Time		Altitude		GPS (Start)		GPS (End)		Surveyor: Purna Bdr Rai	
	Habitat Type : CBLF-CBLF	Day:2025/04/11	Start	End	Start	End	Northing	Easting	Northing	Easting		
			10.10a m	2.31p m	1974 m	2336 m	27.1738266 67°	89.5328366 67°	27.1504100 00°	89.5472400 00°		
	Common Name	Scientific Name	Bird Type / Sex					Evidence				Remar ks
			Male	Femal e	Juveni le	Coun t	Total	Direct sighting	Call	Feather	Droppi ng	
1	Rufous Sibia	<i>Heterophasia</i>	2	2	0	0	4	Yes	No	No	No	Observ ed
2	Grey-headed Canary Flycatcher	<i>Culicicapa ceylonensis</i>	0	0	0	1	1	No	Yes	No	No	along the
3	Kalij Pheasant	<i>Lophura leucomelanos</i>	2	2	0	0	4	Yes	No	No	No	road/ transec t
4	Maroon Oriole	<i>Oriolus trailli</i>	0	0	0	1	1	No	Yes	No	No	
5	Scarlet Minivet	<i>Pericrocotus flammeus</i>	2	1	0	3	3	Yes	No	No	No	
6	Large Hawk Cuckoo	<i>Hierococcyx spraverioides</i>	0	0	0	1	1	No	Yes	No	No	
7	Lesser Cuckoo	<i>Cuculus poliocephalus</i>	0	0	0	1	1	No	Yes	No	No	
8	Citrine Wagtail	<i>Motacilla citerola</i>	1	0	0	0	1	Yes	No	No	No	
9	Plumbeous Water Redstart	<i>Rhyacornis fuliginosus</i>	1	1	0	0	2	Yes	No	No	No	
10	Barred Cuckoo Dove	<i>Macropygia unchall</i>	0	0	0	1	1	0	Yes	No	No	

Mackinnon Species Frequency Listing Data Form /Wild Life_Bird Data Sheet

	RECEE ST No 11- RECEE ST No.31	Locality: Bunakha-Above Bunakha	Time		Altitude		GPS (Start)		GPS (End)		Surveyor: Purna Bdr rai	
	Habitat Type : CBLF-CBLF	Day:2025/04/11	Start	End	Start	End	Northing	Easting	Northing	Easting		
			4.21p m	5.00p m	2336 m	1653 m	27.1504100 00°	89.5472400 00°	27.0578933 33°	89.5558133 33°		
SI No	Common Name	Scientific Name	Bird Type / Sex					Evidence				Remarks
			Male	Femal e	Juveni le	Coun t	Total	Direct sighting	Call	Feather	Droppi ng	
1	Blue Whistling Thrush	<i>Myophonus caeruleus</i>	1	0	0	0	1	Yes	No	No	No	Observ ed
2	Blue Rock Thrush	<i>Monticola solitarius</i>	1	0	0	0	1	Yes	No	No	No	along the
3	Verditer Flycatcher	<i>Eumyias thalassina</i>	1	1	0	0	2	Yes	No	No	No	road/ transec t
4	Nepal House Martin	<i>Delichon nipalensis</i>	0	0	0	2	2	Yes	No	No	No	
5	Tickell's Leaf Warbler	<i>Phylloscopus affinis</i>	2	2	0	0	4	Yes	No	No	No	
6	White-throated Laughingthrush	<i>Garrulax albogularis</i>	0	0	0	10	10	Yes	No	No	No	
7	Spotted Laughingthrush	<i>Garrulax ocellatus</i>	1	0	0	0	1	Yes	No	No	No	
8	Straited Yuhina	<i>Yuhina castaniceps</i>	3	3	0	0	6	Yes	No	No	No	
9	Mountain Hawk Eagle	<i>Spizaetus nipalensis</i>	1	0	0	0	1	Yes	No	No	No	
10	Oriental Turtle Dove	<i>Streptopelia orientalis</i>	2	1	0	0	3	Yes	No	No	No	do

Mackinnon Species Frequency Listing Data Form /Wild Life_Bird Data Sheet

	RECEE ST No 19- RECEE ST No.12	Locality: Tanalung-Nearby Tanalung	Time		Altitude		GPS (Start)		GPS (End)		Surveyor: Purna Bdr Rai	
	Habitat Type : CBLF-CBLF	Day:2025/04/12	Start	End	Start	End	Northing	Easting	Northing	Easting		
			10.22a m	10.45a m	2063 m	1974 m	27.183955 000°	89.528225 000°	27.154913 333°	89.536795 000°		
SI N o	Common Name	Scientific Name	Bird Type / Sex					Evidence				Remar ks
			Male	Femal e	Juven ile	Coun t	Total	Direct sighting	Call	Feather	Droppi ng	
1	Maroon Oriole	<i>Oriolus trailli</i>	1	1	0	0	2	Yes	No	No	No	Observ ed
2	Rufous Sibia	<i>Heterophasia</i>	1	0	0	0	1	Yes	No	No	No	along the
3	Blue Whistling Thrush	<i>Myophonus caeruleus</i>	1	0	0	0	1	Yes	No	No	No	road/ transec t
4	Oriental Turtle Dove	<i>Streptopelia orientalis</i>	1	0	0	0	1	No	Yes	No	No	
5	Eurasian Tree Sparrow	<i>Passer rutilans</i>	6	7	0	0	13	Yes	No	No	No	do

Mackinnon Species Frequency Listing Data Form /Wild Life_Bird Data Sheet

	RECEE ST No 10- RECEE ST No.08	Locality: Below Dung ngha-Camp Area	Time		Altitude		GPS (Start)		GPS (End)		Surveyor: Purna Bdr Rai	
	Habitat Type : CBLF-CBLF	Day:2025/04/12	Start	End	Start	End	Northing	Easting	Northing	Easting		
			2.48p m	3.10p m	1970 m	2076 m	27.138356 667°	89.544936 67°	27.145166 667°	89.536510 000°		
SI N o	Common Name	Scientific Name	Bird Type/ Sex					Evidence				Remar ks
			Male	Femal e	Juven ile	Coun t	Total	Direct sighting	Call	Feather	Droppi ng	
1	Rufous Sibia	<i>Heterophasia</i>	1	2	0	0	3	Yes	No	No	No	Observ ed
2	Maroon Oriole	<i>Oriolus trailli</i>	1	1	0	0	2	Yes	No	No	No	along the
3	Large Hawk Cuckoo	<i>Hierococcyx spraverioides</i>	0	0	0	1	1	No	Yes	No	No	road/ transec t do

Mackinnon Species Frequency Listing Data Form /Wild Life_Bird Data Sheet

	RECEE ST No 2- RECEE ST No.5	Locality: Below Tsimasam	Time		Altitude		GPS (Start)		GPS (End)		Surveyor: Purna Bdr Rai	
	Habitat Type : CBLF-CBLF	Day:2025/04/1 3	Start	End	Start	End	Northing	Easting	Northing	Easting		
			1.5p m	1.50p m	1881 m	1969 m	27.0927100 00°	89.5285816 67°	27.1182750 00°	89.5389333 33°		
SI N o	Common Name	Scientific Name	Bird Type/ Sex					Evidence				Remar ks
			Male	Femal e	Juveni le	Coun t	Total	Direct sighting	Call	Feather	Droppi ng	
1	Large Hawk Cuckoo	<i>Hierococcyx sparverioides</i>	0	0	0	2	2	No	Yes	No	No	Observ ed
2	Striated Laughingthrush	<i>Garrulax striatus</i>	0	0	0	2	2	Yes	No	No	No	along the
3	Oriental Cuckoo	<i>Cuculus saturatus</i>	0	0	0	1	1	No	Yes	No	No	road/ transec t

Mackinnon Species Frequency Listing Data Form /Wild Life_Bird Data Sheet

	RECEE ST No 12-RECEE ST No.10	Locality: Nearby Tanalung-Below Dung ngha	Time		Altitude		GPS (Start)		GPS (End)		Surveyor: Purna Bdr Rai	
	Habitat Type : CBLF-CBLF	Day:2025/04/12	Start	End	Start	End	Northing	Easting	Northing	Easting		
			11.30 am	2.00p m	1974 m	1970 m	27.154913 333°	89.536795 000°	27.145166 667°	89.536510 000°		
SI No	Common Name	Scientific Name	Bird Type / Sex					Evidence				Remarks
			Male	Femal e	Juven ile	Coun t	Total	Direct sighting	Call	Feather	Droppi ng	
1	Whiskered Yuhina	<i>Yuhina flavicollis</i>	4	2	0	0	6	Yes	No	No	No	Observ ed
2	Ashy Drongo	<i>Dicrurus leucophaeus</i>	0	1	0	0	1	Yes	No	No	No	along the
3	Golden-throated Barbet	<i>Megalaima franklinii</i>	0	0	0	2	2	No	Yes	No	No	road/ transec t do

Mackinnon Species Frequency Listing Data Form /Wild Life_Bird Data Sheet

	RECEE ST No 8- RECEE ST No.28	Locality: Below Dung ngha-Camp Area	Time		Altitude		GPS (Start)		GPS (End)		Surveyor:Purna Bdr Rai	
	Habitat Type : CBLF-B/p	Day:2025/04/12	Start	End	Start	End	Northing	Easting	Northing	Easting		
			3.56p m	4.30p m	2007 m	2076 m	27.138356 667°	89.544936 667°	27.136948 333°	89.543318 333°		
SI No	Common Name	Scientific Name	Bird Type/ Sex					Evidence			Remar ks	
			Male	Femal e	Juven ile	Coun t	Total	Direct sighting	Call	Feather	Droppi ng	
1	Rufous Sibia	<i>Heterophasia</i>	1	1	0	0	2	Yes	No	No	No	Observ ed
2	Great Barbet	<i>Megalaima virens</i>	1	0	0	0	1	Yes	No	No	No	along the
											road/ transec t	
											do	

Mackinnon Species Frequency Listing Data Form /Wild Life_Bird Data Sheet

	RECEE ST No.5- RECEE ST No.26	Locality: Below Tsimasam-Below Bung ngha	Time		Altitude		GPS (Start)		GPS (End)		Surveyor: Purna Bdr Rai	
	Habitat Type : CBLF-CBLF	Day:2025/04/13	Start	End	Start	End	Northing	Easting	Northing	Easting		
			2.25p m	3.00p m	1969 m	2011 m	27.118275 000°	89.538933 333°	27.118275 000°	89.538933 333°		
SI N o	Common Name	Scientific Name	Bird Type/ Sex					Evidence				Remar ks
			Male	Femal e	Juven ile	Coun t	Total	Direct sighting	Call	Feather	Droppi ng	
1	Whiskered Yuhina	<i>Yuhina flavicollis</i>	6	4	0	0	10	Yes	No	No	No	Observ ed
2	Rufous Sibia	<i>Heterophasia</i>	1	1	0	0	2	Yes	No	No	No	along the
3	Large Cuckooshrike	<i>Coracina macei</i>	0	0	0	1	1	No	Yes	No	No	road/ transec t do

5.6 BIRDS CHECKLISTS WITHIN THE SURVEY PLOTS

SI No	Common name	Scientific name	IUCN Status	FNCA of Bhutan 2023
1	Golden-throated Barbet	<i>Megalaima franklinii</i>	LC	Nil
2	Oriental Cuckoo	<i>Cuculus saturatus</i>	LC	Schedule III
3	Great Barbet	<i>Megalaima virens</i>	LC	Nil
4	Red-faced Liocichla	<i>Liocichla phoenicea</i>	LC	
5	Brownish-flanked Bush Warbler	<i>Cettia pallidipe</i>	LC	
6	Common Green Magpie	<i>Cissa chinensis</i>	LC	
7	Maroon Oriole	<i>Oriolus traillii</i>	LC	
8	White-capped Water Redstart	<i>Chaimarrornis leucocephalus</i>	LC	
9	Chestnut-crowned Laughingthrush	<i>Garrulax erythrocephalus</i>	LC	Schedule III
10	Blyth's Leaf Warbler	<i>Phylloscopus reguloides</i>	LC	
11	Long-tailed Minivet	<i>Pericrocotus ethologus</i>	LC	Nil
12	Striated Laughingthrush	<i>Grammatoptila striatus</i>	LC	
13	Ashy Drongo	<i>Dicurus leucophaeus</i>	LC	
14	Rufous Sibia	<i>Heterophasia capistrata</i>	LC	
15	White-tailed Nuthatch	<i>Sitta himalayensis</i>	LC	
16	Grey-winged Blackbird	<i>Turdus boulboul</i>	LC	
17	Green-tailed Sunbird	<i>Aethopyga nipalensis</i>	LC	
18	Black-throated Tit	<i>Aegithalos concinnus</i>	LC	
19	Black Bulbul	<i>Hypsipetes leucocephalus</i>	LC	
20	Striated Bulbul	<i>Pycnonotus striatus</i>	LC	
21	Whiskered Yuhina	<i>Yuhina flavicollis</i>	LC	
22	Kalij Pheasant	<i>Lophura leucomelanos</i>	LC	Schedule III
23	Hodgson's Redstart	<i>Phoenicurus ochrurus</i>	LC	
24	Grey-backed Shrike	<i>Lanius tephronotus</i>	LC	
25	Mrs Gould's Sunbird	<i>Aethopyga gouldiae</i>	LC	Schedule III
26	Large Hawk Cuckoo	<i>Hierococcyx sparverioides</i>	LC	
27	Short-billed Minivet	<i>Pericrocotus brevirostris</i>	LC	
28	Rufous -vented Yuhina	<i>Yuhina occipitalis</i>	LC	

SI No	Common name	Scientific name	IUCN Status	FNCA of Bhutan 2023
29	Yellow-billed Blue Magpie	<i>Urocissa flavirostris</i>	LC	
30	Yellow-bellied Fantail	<i>Rhipidura hypoxantha</i>	LC	
31	Buff-barred Warbler	<i>Phylloscopus pulcher</i>	LC	
32	Yellow-vented Warbler	<i>Phylloscopus cantator</i>	LC	
33	Stripe-throated Yuhina	<i>Yuhina gularis</i>	LC	
34	Scarlet Minivet	<i>Pericrocotus flammeus</i>	LC	
35	Black-winged Cuckooshrike	<i>Coracina melaschistos</i>	LC	
36	Black-headed shrike Babbler	<i>Pteruthius rufiventer</i>	LC	
37	Indian Cuckoo	<i>Cuculus micropterus</i>	LC	Schedule III
38	Spotted Nutcracker	<i>Pica</i>	LC	
39	Red-billed Chough	<i>Pyrrhocorax</i>	LC	Schedule III
40	Large-billed Crow	<i>Corvus macrorhynchos</i>	LC	Schedule III
41	Rufous-bellied Woodpecker	<i>Dendrocopos hyperythrus</i>	LC	Nil
42	Darjeeling Woodpecker	<i>Dendrocopos darjellensis</i>	LC	
43	Verditer Flycatcher	<i>Eumyias thalassina</i>	LC	
44	Blue Whistling Thrush	<i>Myophonus caeruleus</i>	LC	
45	Green-backed Tit	<i>Parus monticolus</i>	LC	
46	Brown Dipper	<i>Cinclus pallasii</i>	LC	
47	Yellow-browed Warbler	<i>Phylloscopus inornatus</i>	LC	
48	Oriental White-eye	<i>Zosterops palpebrosus</i>	LC	
49	Red-vented Bulbul	<i>Pycnonotus cafer</i>	LC	
50	Streak-breasted Scimitar Babbler	<i>Pomatorhinus ruficollis</i>	LC	
51	Brown Parrotbill	<i>Paradoxornis unicolor</i>	LC	
52	Common Hoopoe	<i>Upupa epops</i>	LC	
53	Yellow-browed Fulvetta	<i>Cettia pallidipe</i>	LC	
54	Common Stonechat	<i>Saxicola torquata</i>	LC	
55	Olive-backed Pipit	<i>Anthus hodgsoni</i>	LC	
56	Hume's Warbler	<i>Phylloscopus humei</i>	LC	
57	White-throated Laughingthrush	<i>Garrulax albogularis</i>	LC	
58	Indian Nuthatch	<i>Sitta castanea</i>	LC	
59	Crimson sunbird	<i>Aethopyga siparaja</i>	LC	
60	Red-tailed Minla	<i>Minla ignotincta</i>	LC	

SI No	Common name	Scientific name	IUCN Status	FNCA of Bhutan 2023
61	Sikkim Treecreeper	<i>Certhia discolor</i>	LC	
62	Nepal Fulvetta	<i>Alcippe nipalensis</i>	LC	
63	Grey-headed Canary Fycatcher	<i>Culicicapa ceylonensis</i>	LC	
64	Eurasian Jay	<i>Garrulus glandarius</i>	LC	
65	Brownish-flanked Bush Warbler	<i>Cettia pallidipes</i>	LC	
66	Pied Bushchat	<i>Saxicola caprata</i>	LC	
67	White-spectacled Warbler	<i>Seicercus affinis</i>	LC	
68	Eurasian Cuckoo	<i>Cuculus canorus</i>	LC	Schedule III
69	Hill Partridge	<i>Arborophila torqueola</i>	LC	Schedule III
70	Grey Bushchat	<i>Saxicola ferreus</i>	LC	Nil
71	Mountain Hawk Eagle	<i>Nisaetus nipalensis</i>	LC	
72	Asian Barred Owlet	<i>Glaucidium cuculoides</i>	LC	Schedule III
73	Oriental Turtle Dove	<i>Streptopelia orientalis</i>	LC	Nil
74	Spotted Laughingthrush	<i>Lanthocincla ocellata</i>	LC	
75	House Crow	<i>Corvus splendens</i>	LC	
76	Plumbeous Water Redstart	<i>Phoenicurus fuliginosus</i>	LC	

Annexure 5.7: Bunakha Terrestrial Survey Photographs



Figure 1: Consultation on biodiversity survey methodology with Gedu Forest officials

International and National Biodiversity team @April 2025



Figure 2: Terrestrial data collection in the field Biodiversity Team on lunch break in the field @ April 2025

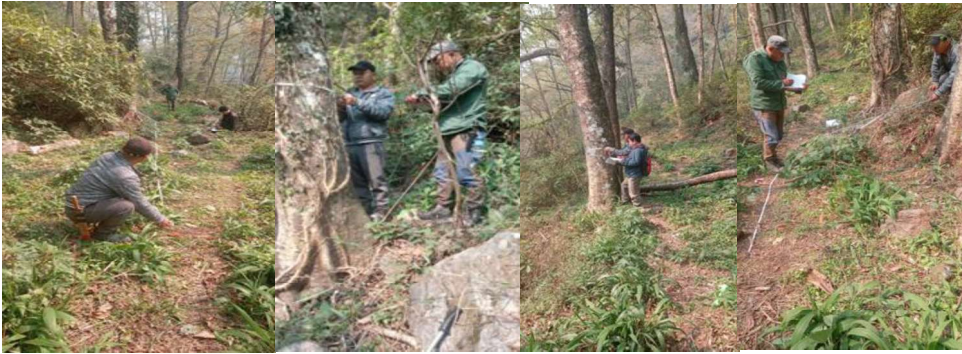


Figure 3: Sample Plot survey at Bunakha HPP

@April 2025



Figure 4: Chukha Dam

@April 2025



Figure 5: Wild Pig droppings Sambar Deer rubbing tree Sambar dung @ April 2025

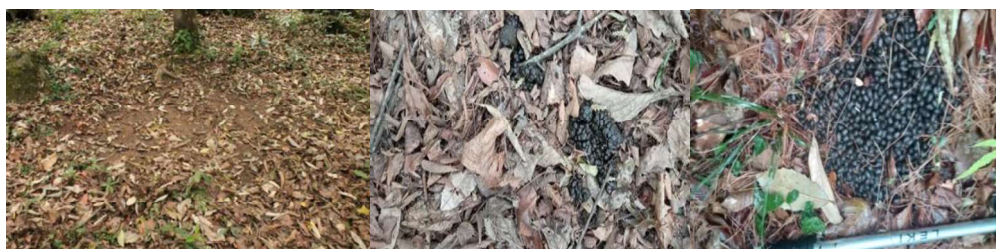


Figure 6: Sambar Deer Bed Barking Deer pellets Goral pellets @April 2025



Figure 7: Fisherman shelter



Figure 8 Assamese macaque along highway

Yellow-throated marten scat @2025



Figure 9: Goodyera vittata (orchid) Paris polyphylla (herb) Dodecadenia grandiflora (tree)



Figure 10: Blue pine forest Broadleaf forest Riparian Forest @April 2025



Figure 11: Mixed Conifer forest

Shrubland

Meadow @ April 2025

Bird Photographs



Figure 12: Bird Watching



Figure 13: Blue Whistling Thrush



Figure14: Grey-winged Blackbird



Figure 15: Oriental Turtle Dove



Figure 16: Grey-backed Shrike



Figure17: White-collared Blackbird

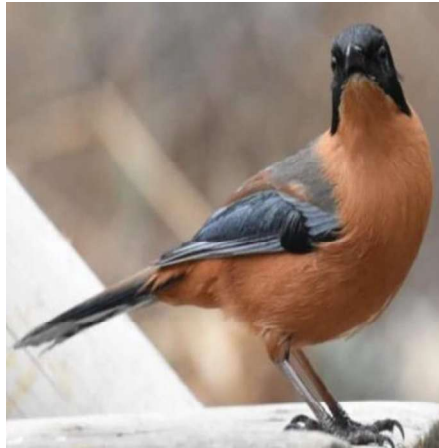


Figure 18: Rufous Sibia



Figure 19: Spotted Laughing thrush



Figure 20: Hodgson's Redstart_male



Figure 21: White-breasted Scimitar Babbler



Figure 22: Green-backed Tit



Figure 23: Black Bulbul



Figure 24: Oriental White-eye



Figure 25: Rufous-bellied Woodpecker



Figure 26: White-throated Laughingthrush



Figure 27: Buff-barred Warbler



Figure 28: Brown Parrotbill

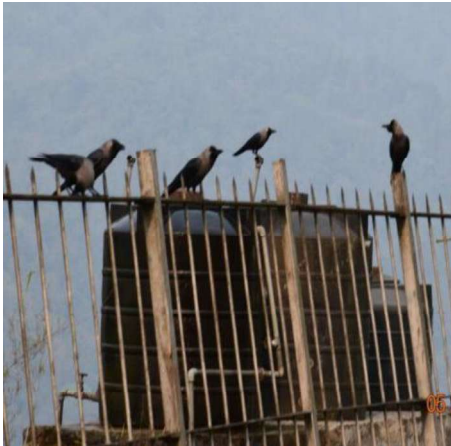


Figure 29: House Crow



Figure 30: Black-headed Shrike Babbler



Figure 31: Common Hoopoe



Figure 32: Ashy Drongo



Figure 33: Brown Dipper



Figure 34: Whiskered Yuhina



Bunakha Hydropower Project

Druk Green Power Corporation Ltd.

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List of Abbreviations

ADB	Asian Development Bank
D/S	Downstream
E	East
El.	Elevation
EPT	Ephemeroptera Plecoptera and Trichoptera
ESIA	Environmental and Social Impact Assessment
FD	Forest division/Forest Department
RGoB	Royal Government of Bhutan
GWh	Gigawatt-hours
HEP	Hydroelectric Project
IUCN	International Union for Conservation of Nature
kV	Kilo volt
L	Litre
LULC	Land Use land Classification
m	Metre
m ³	metre cube
MW	Megawatt
N	North
NTFPs	Non-Timber Forest Products
PA	Protected Area
RCC	Roller Compacted Concrete
S	Second
S	South
ST	Station
TDS	Total Dissolved Solids
U/S	Upstream

W West

LOA Letter of Award

1 Introduction

1.1 Project Background

The Royal Government of Bhutan has applied for financial assistance under a Project Readiness Financing (PRF) facility from the Asian Development Bank (ADB). The application, titled “BHU: Green Power Project Readiness Enhancement,” seeks funding to support the review and update of the Detailed Project Report (DPR) and the Environmental and Social Impact Assessment (ESIA) for the Bunakha Hydropower Project. The services provided under the project will enhance the readiness and preparedness of the project proponent for securing funding and implementing the Bunakha Hydropower Project.

The Bunakha HEP is a proposed 180 MW project located near the villages of Bunagu and Chanachan. This project is planned to be the most upstream component of a series of at least four projects along the Wangchhu River (Figure 1-2). These include the existing 336 MW Chukha HEP, situated 3.5 km downstream from the proposed Bunakha dam site, the existing 1020 MW Tala HEP, located 15 km downstream, and the proposed 570 MW Wangchhu HEP, with an uncertain distance downstream of Bunakha.

All four plants would function together, with Bunakha HEP acting as a large water storage reservoir. It would operate for peak power generation but also ensure dependable dry season water flow, boosting the downstream plants' total annual electricity production by 932 Gigawatt-hours (GWh).

The project is easily accessible from the Phuntsholing-Thimphu highway. Construction would involve a 197-meter-high dam, a 700-hectare reservoir, and a powerhouse built where the dam meets the riverbed.



Figure 1-1 Project Location

Project Features	Description
New transmission line	2 km @ 220 kV to Chukha HEP / 20 km @ 220 kV to Tala HEP
Operating mode	Storage/ Peaking

1.2 Objectives of Survey

The main objective of this survey is to document the terrestrial species of the project area and prepare its base line seasonally.

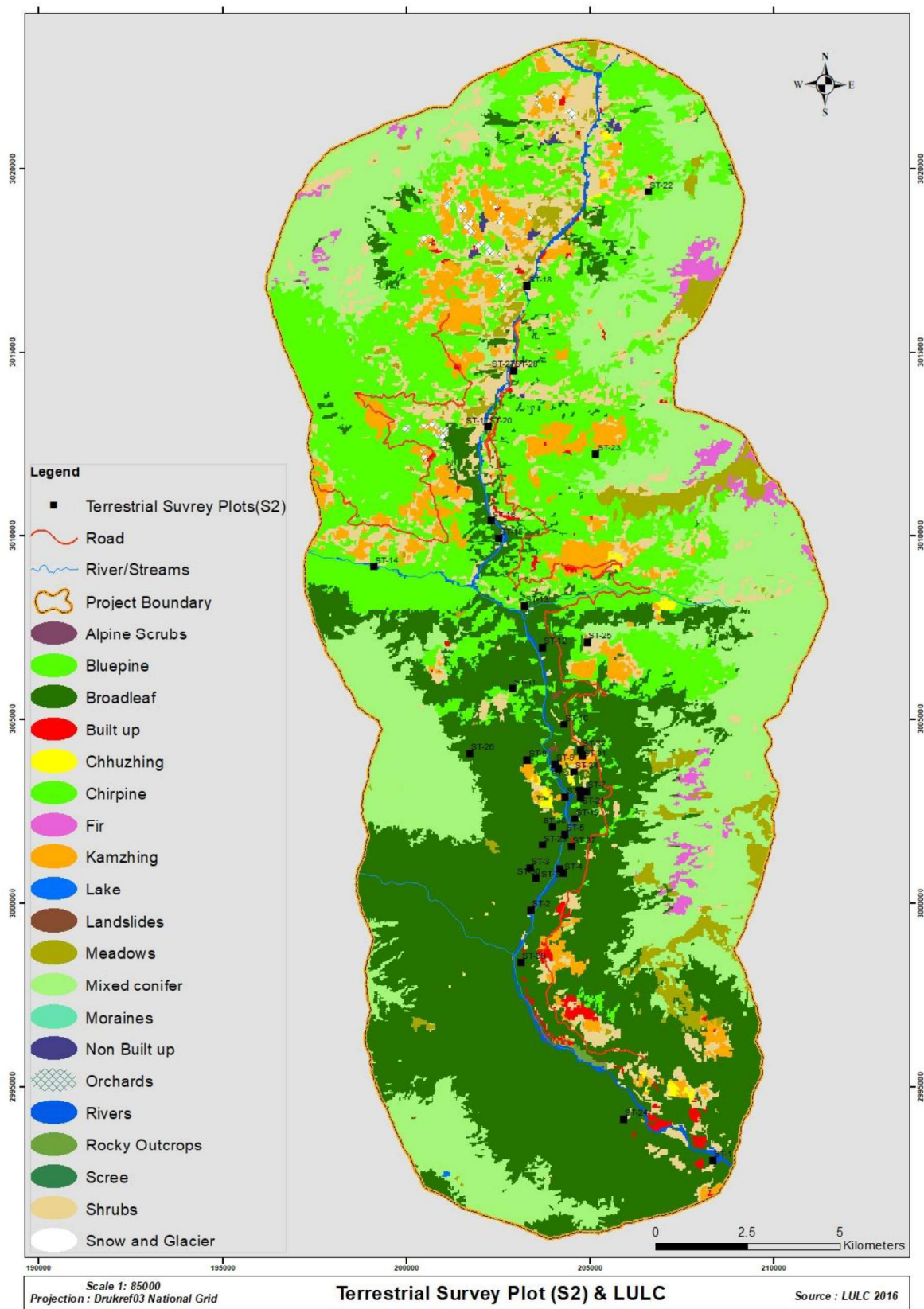


Figure 1-3 Study area showing the sample sites

The terrestrial survey includes a total of 39 sampling points (**Error! Reference source not found.**) across different forest types. Broadleaf forests have the highest representation with 19 plots, followed by Blue Pine (7 plots), Mixed Conifer (3 plots), Shrubs (4 plots), and Meadows (1 plot) (Table 2). Sampling is distributed across all directions - North, South, East, and West - to ensure comprehensive coverage of the study area.

Table 2 Details of Forest Type Representation

Forest Type	Directions				Total
	N	S	W	E	
Broadleaf	2	13	5	7	27
Blue pine	2	2	1	2	7
Mixed conifer	0	0	0	0	0
Shrubs	1	2	0	1	4
Meadows	0	1	0	0	1
Total terrestrial sampling points					39

2 Objectives and Scope of Work

The main objective and scope of this survey is to develop and implement a terrestrial biodiversity baseline study plan and protocol, overseeing proper execution of the baseline study, evaluating the collected data, and ensuring results accurately reflected in reports.

Collect all biological environmental inputs to the ESIA to ensure that the report meets all the TOR requirements (including the ESIA requirements in Appendices A and B) in terms of content, time, and quality as well as documenting project conformance with ADB's Safeguard Policy Statement (2009) and government requirements.

To include biodiversity baseline studies, alternatives analysis, and impact assessment and the development of appropriate biodiversity management plans, covering both upstream and downstream areas, and a Biodiversity Action Plan. Special attention to terrestrial biodiversity, and the Project's conformance with ADB natural and critical habitat requirements.

Provide biodiversity inputs to the environmental flow assessment and cumulative impact assessment.

Document how the project conforms with ADB's safeguard requirements relating to natural and critical habitat.

Provide relevant inputs related to biodiversity aspects to the tender documents. Support the implementing agency to evaluate the bids if applicable.

3 Study Survey Area (geophysical location, area, vegetation) and Methods

3.1 Survey design

3.1.1 Vegetation Sampling

Approaches for vegetation sampling were as follows.

The existing aerial photographs have been utilized to delineate different forest and vegetation types, as well as their status, and transfer this information onto topographic maps for field surveys. Vegetation sampling plots have been identified on the topographic maps for all forest types and statuses within direct impact zones, along with representative sites for indirect impact zones. The quadrant method has been applied for field studies in direct impact zones to record biodiversity, forest status, wood volume, and other non-timber forest products (NTFPs).

The equipment and materials used for the survey were SW map to locate survey plots location and transect routes, suunto compass to read aspect of sample location, suunto clinometer to read the slope percentage, diameter tape to measure tree diameter at breast height, measuring tape to lay out sample plot, knife to blaze tree bark, red paint and brush to mark sample plot number, binocular to assist floral and faunal identification, digital camera/ mobile to capture pictures of flora, fauna, birds, butterflies and herpetofauna, polythene bag to collect plant specimens, old newspaper to press plant specimens, mounting frame to press plant specimens and hand gloves to catch herpetofauna for identification. Related books and manuals were referred to assist the field identification.

Prepare baseline of the terrestrial flora with maps for direct impact zones to show forest types and distribution, plant categories, status of endangered, rare, threatened, vulnerable and protected plant species, plant biodiversity, lichen flora, biomass volume and survey of forest quality sufficient to inform no net loss calculations, etc.

The grids (4kmX4km) have been laid over the Project Area of Influence (AoI) that is 5 km from the project components. 39 sample plots have been selected on alternate grids with focus on the inundation area (one each on right and left banks). The points falling on agricultural/developed areas and inaccessible areas have been adjusted in different grids. The AoI representative samples for different forest types has been selected as per LULC 2016. Seven sample plots beyond project area have been selected randomly to cover AoI, conditional on accessibility.

A sample plot size of 20mx20m has been laid in every identified location with a minor plot of 2mx2m in the center of the main plot. All vegetation with more than 1.3m in height were recorded in tree data form including shrubs. Regeneration of tree species were recorded within the minor plot of 2mx2m including the ground cover (herbs and shrubs) and saplings of tree species. Individual tree species of 10 cm DBH (diameter at breast height) were recorded in the plot. Within the laid out 20 x 20m plots, general detail such as GPS coordinates, altitude, slope, soil and forest types, canopy density, any direct or indirect signs (tracks, scat, hair, rooting and scratch marks) of faunal diversity, degree of biotic disturbances, etc were recorded.

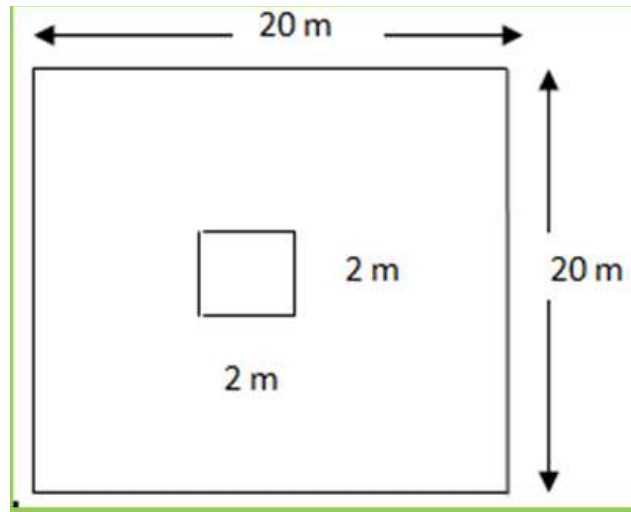


Figure 3-1 Field survey on vegetation in Bunakha HEP project area

Table 3 Geographical coordinates of sampling plots

Stations	Latitude	Longitude
ST-1	27.04790833	89.58021667
ST-2	27.10928500	89.53004000
ST-3	27.11960667	89.52974000
ST-4	27.11828833	89.53891333
ST-5	27.12793500	89.53927833
ST-6	27.13703167	89.53931833
St-7	27.13853667	89.54508500
ST-8	27.14623000	89.52884000
ST-9	27.14508833	89.53645500
ST-10	27.15485833	89.53890000
ST-11	27.16369000	89.52481500
ST-12	27.17381667	89.53293167
ST-13	27.18421167	89.52785167
ST-14	27.19362333	89.48658667
ST-15	27.20056000	89.52083833
ST-16	27.20484833	89.51876667
ST-17	27.22798500	89.51780500
ST-18	27.26256833	89.52837333
ST-19	27.13185167	89.54199000
ST-20	27.22798500	89.51780500
ST-21	27.13694167	89.54355667
ST-22	27.28603167	89.56164000
ST-23	27.22141667	89.54740833
ST-24	27.05793500	89.55574500
ST-25	27.17511500	89.54521500
ST-26	27.14783667	89.51308500
ST-27	27.24179000	89.52469500
ST-28	27.2417900	89.52469500
ST-29	27.12525167	89.53311500

Stations	Latitude	Longitude
ST-30	27.11715167	89.53148833
ST-31	27.14723833	89.54400167
ST-32	27.14866833	89.54363667
ST-33	27.14422333	89.53751500
ST-34	27.14332500	89.54165667
ST-35	27.13878500	89.54324167
ST-36	27.12976333	89.53595833
ST-37	27.12483333	89.54114833
ST-38	27.11933500	89.53805500
ST-39	27.09649500	89.52731000

3.1.2 Mammal Survey

3.1.2.1 Focus/target species

Megaherbivore: Elephant

Large carnivore: Tiger, Snow leopard, Dhole

Herbivore: Red panda, Chinese pangolin, Musk deer,

Herpetofauna:

Aquatic species: Otters, fishing cat, turtles

3.1.2.2 Mammal Survey Methodology

The assessment began with the collection and review of available secondary literature and terrestrial fauna maps to identify typical and critical wildlife habitats. The mammal survey was carried in the vegetation survey plot described in 3.1.1 and transect of 500m in both directions of the plot. Field surveys in the direct impact zones were focused on mammals through direct habitat observation, analysis of pug marks and fecal droppings, and gathering information from local communities. A baseline of terrestrial fauna was prepared with mapped data for both direct and indirect impact zones to support subsequent assessment studies. Sign surveys were conducted along trails and riverbanks, with impression pad recordings and call-hearing surveys from vantage points. The presence of crop-raiding animals was documented, along with records from the Division Forest Office (DFO) on human-wildlife conflicts and road kill incidents. Direct observation surveys were employed where distance sampling is challenging, particularly along trails and difficult terrains. The survey time started from morning and continued till evening. There was no fixed time for any species in any plot as it depends on the time reached on the plot from camp and then proceeded to the next plot for mammal, bird species and vegetation survey.

Mammal transect survey were carried in the sampled biodiversity monitoring grids of 4x4 km in the protected area (PAs) and Forest divisions (FDs). Within each 4x4 km grid, trail transects of 3-5 km depending on the accessibility of the area were walked covering major habitat types within the grid. Mammal sightings and signs including tracks, scats, dung/droppings, scratch marks, etc., encountered on the trail transect were recorded. If the area found inaccessible, 3-5 shorter trail transects of each at least 1 km were searched for mammal and their signs. GPS location at every 500m distance covered were recorded

in the datasheet even if there were no animal or sign observed. In case of direct sighting, species, GPS location details, number of animals seen and sex and age of the animal were recorded. For encounter of animal signs, recorded species, sign type, GPS location details and habitat type of the areas as per the datasheet were recorded. In case of animal trails, each trail set was considered as one sign (not each pugmark as one sign). If an animal continues to walk along a trail for a long distance in the same direction, then this was considered as one sign. If no sign seen on the track for over 50m then encountering a fresh track set was considered as a new sign. Photographic records with proper scale reference and GPS location were taken if there is difficulty in sign identification.

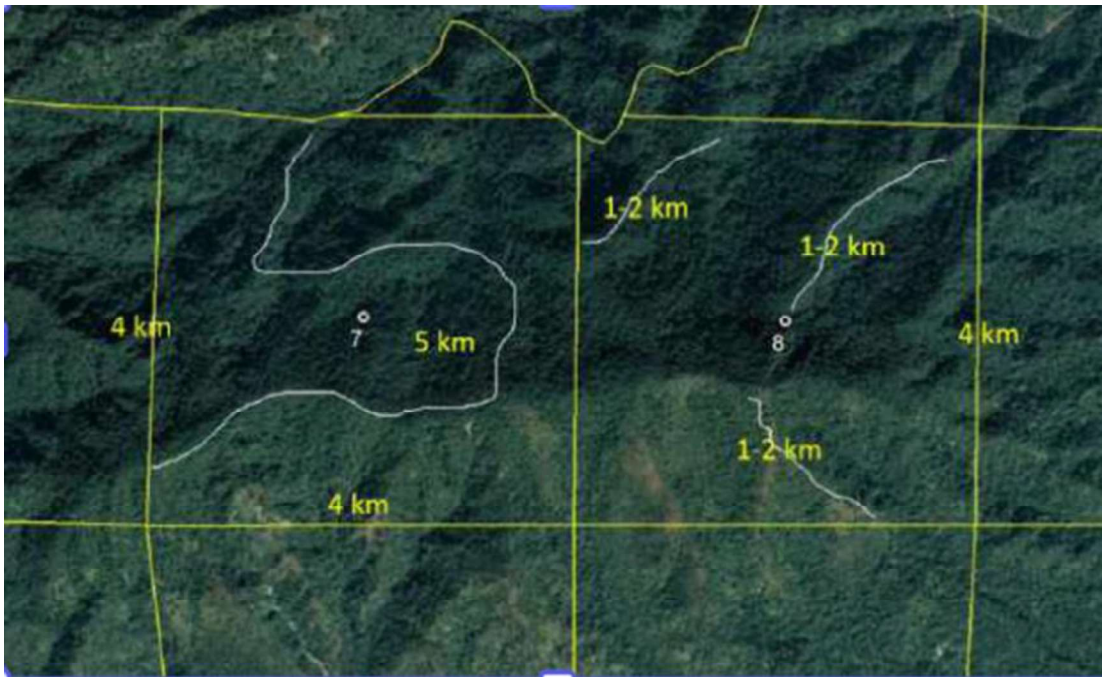


Figure 3-2 Survey grid (4x4 km) with 5 km transect

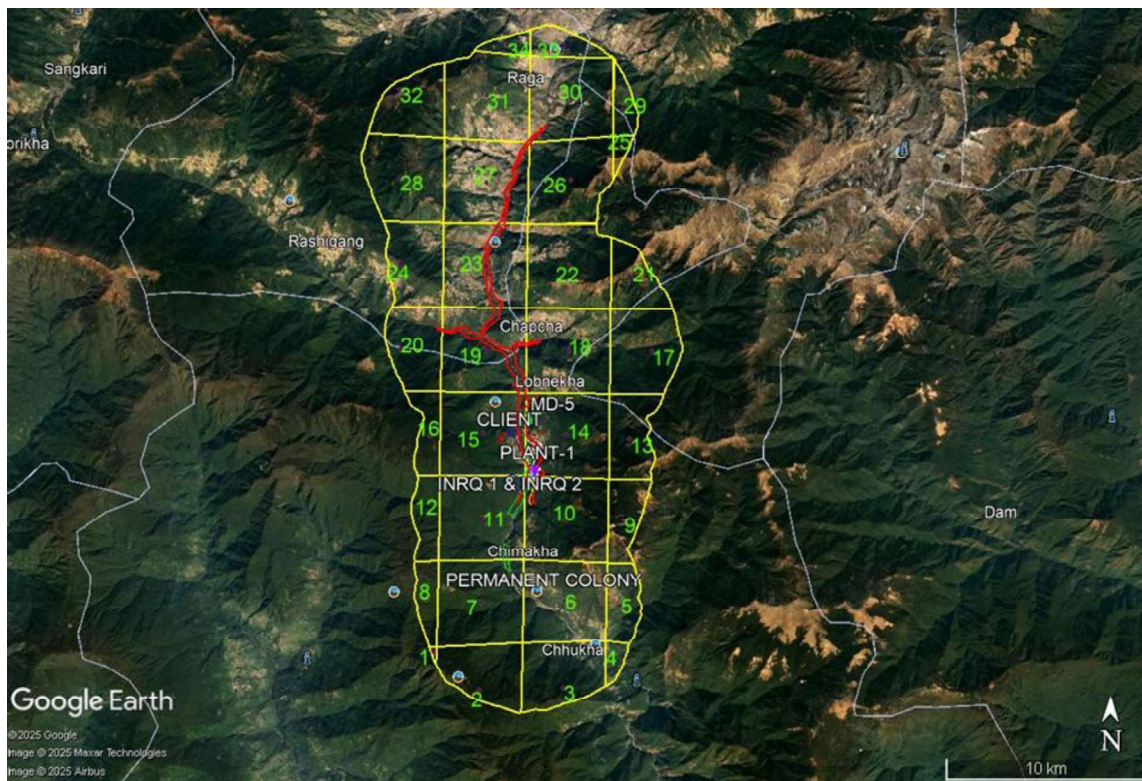


Figure 3-3 Survey grid (4x4 km) with 5 km transect

**As per the Protocol for Red Panda Survey in Bhutan (2020), the methods illustrated in Figure 3-4 was applied only at sampling points located above 2,000 meters above sea level.*

**A trail transect survey of 5 km was conducted within each 4 × 4 km grid for all species across all sampling plots.*

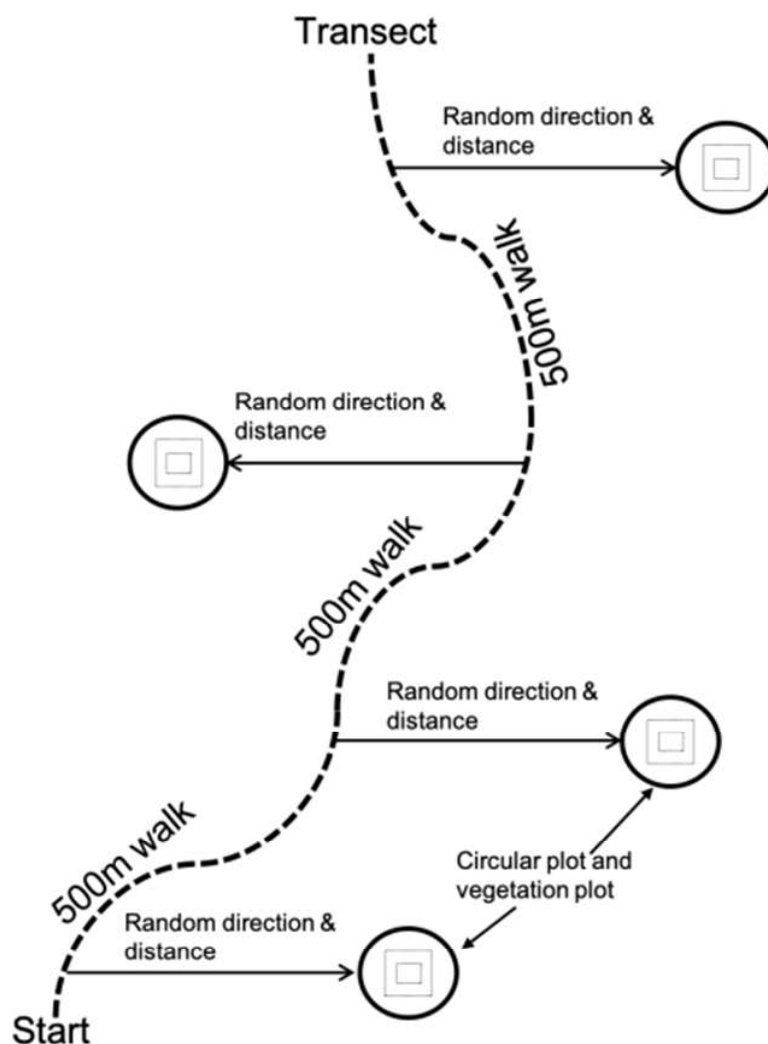


Figure 3-4 Diagrammatic representation of trail transect survey for Red Panda Survey

3.1.3 Bird Survey

The assessment began with the collection and review of secondary literature and avifauna maps to identify typical and critical bird habitats. Field surveys in the direct impact zones were focused on birds through direct observation. The bird survey used MacKinnon bird listing as advised by DGPC environment team, survey in the vegetation plot and 500m in both directions of the plot. One transect was taken for each plot which starts from road head to the survey plot. 34 transects were recorded for 34 survey plots and arranged based on survey plot location. In transect, species sign, call or observation were recorded. The list of species for each transect were prepared and compared. A baseline of avifauna was prepared with mapped data for subsequent assessment studies. Call recordings were taken, particularly for pheasants and any migratory birds arrived for breeding.

Different methods were used for different bird species. For common species, trail transect or any survey method adequately gathers data on common species. MacKinnon Listings were followed for this purpose. For rare species, trail transect combined with special search effort (combing or flushing) in their habitat enabled to gather enough data on rare species. For instance, Wood Snipe which is rare as well as cryptic

species were given special search or acoustic survey methods. Colonial species: Counting huge colonial species is difficult; therefore, colonies were counted. For example, Nepal House Martin colonies between Chendebji and Mangde Zam. For nocturnal species, species which are active during the dusk were adequately surveyed using night vision binoculars, and listening to the bird calls.

Observations were made using binoculars along trails, ridges, riverbanks, and rock faces, with particular attention to nesting birds. Surveys were extended up to El. 2100 m in elevation (above the Full Reservoir Level of El. 2008 m) and were also covered access roads, muck disposal sites, and quarry locations.

3.1.4 Butterfly and Moths

The butterfly survey was carried out along the transects and in and around the sample plots. The insects were captured by net, taken photographs and released the insects or taken photographs while landing on the branches of undergrowth and flowers. The butterfly was counted and recorded, identified at sites or by referring books. The habitat of the butterfly in the project areas was also recorded.

3.1.5 Herpetofauna

A systematic herpetofauna survey was conducted from 30 August to 10 September 2025 to establish a comprehensive ecological baseline for the project area. The selection of survey locations was strategically guided by preliminary terrestrial habitat assessments performed in May 2025. This two-phase approach ensured the optimal identification of potential microhabitats suitable for herpetofauna, including riparian zones, forested areas, human settlement area, and rocky outcrops.

To ensure robust and comparable data, the study employed a range of standardized survey methods. For each species encountered during the survey, the parameters such as coordinates of location, date, and associated habitat characteristics were recorded in the datasheet. In addition to these field methods, a qualitative data collection approach was used by conducting face-to-face with local villagers and roadside workers to gather anecdotal evidence and confirm the presence of herpetofauna diversity in the project area.

The data collection techniques employed adhered to established protocols commonly utilized in herpetology. The methodology was multifaceted and designed to gather a comprehensive set of observations.

The core of the survey relied on direct observation and systematic microhabitat surveys. This involved actively searching for herpetofauna in various environments, including under logs and rocks, within leaf litter, and in aquatic or semi-aquatic habitats.

To supplement the field work, a citizen science and social knowledge integration approach was utilized. This included conducting interviews with local residents, foresters, and experienced herpetologists to gather valuable anecdotal information regarding historical species presence, distribution, and local ecological knowledge. Additionally, a preliminary species checklist was compiled by reviewing published articles, scientific papers, and credible social media platforms,

such as dedicated Facebook groups page, where reliable herpetofauna sightings and identification are shared.

3.5.1 Visual Encounter Surveys

The direct observation technique employed the Visual Encounter Survey (VES) method along pre-determined transects at designated survey stations. This standardized approach ensured systematic and repeatable data collection across the study area.

Surveys were conducted during both diurnal and nocturnal periods to account for the activity patterns of different herpetofauna species. Each period utilized distinct traversal approaches to optimize detection. Within the established transects, data on terrestrial, arboreal, and aquatic species were systematically documented in their respective ecological niches. Nocturnal observations were facilitated using high-voltage headlamps to locate and identify species in low-light conditions.

3.1.5.2 Systematic Microhabitat Search Method

A systematic approach involving targeted exploration of microhabitats was employed across the 39 designated survey stations. This method, coupled with direct observational techniques and visual encounters, proved highly effective for revealing elusive species that seek shelter within their natural environments.

Specifically, searches were conducted in microhabitats such as the bark of dead trees, decomposing wood, and leaf litter. These focused searches were performed once along the predetermined transects within each survey station, ensuring comprehensive coverage and standardized data collection.

3.2 Data Management (field data collection, data storage/database, data analysis against survey components)

Field data has been collected by the trained field technician in direct supervision of the technical national expert. The data has been collected in the designated format provided in printed form. The data has been entered into a spreadsheet. Once the data entry was done, the list of species, frequency, and density has been estimated as per the information collected. Density of bird was estimated by using the length surveyed with the average width to estimate area and then dividing with number in hectare. Diversity as number of species per unit area and important value index was calculated based on the dominance.

4 Results

4.1 Vegetation with conservation significance

The survey was carried out from 30 August to 10 September, 2025 during monsoon. The forest cover of Chukha District is 88.52% of the total land area of the district (National land Commission, 2020). The elevation varies from 200m to 3500 m above sea level. The forest types in Chukha district ranges from low sub-tropical forest to high altitude Rhododendron Forest. Depending on the floristic characteristics, the forest types classified are Rhododendron and Fir forests (>3100 masl), Cool broadleaved forest (2000-2900 masl), Warm broadleaved forest (2000-3000 masl) and subtropical broadleaved forest (150-1000 masl) (Gedu Forest Division, 2021). The major forest cover is Broadleaf Forest (73.11%), followed by Mixed conifer forest (12.30%), Bluepine forest (2.67%) and Fir Forest (1.18%) (Gedu Forest Division, 2021). The habitat types in the study area are broadleaved forest (cool broadleaved forest, warm broadleaved forest and shrub land), Blue Pine Forest, Mixed Conifer Forest and meadow. The habitat types in the project areas are broadleaved forest (cool broadleaved forest, warm broadleaved forest and riparian forest), Blue Pine Forest and Mixed Conifer Forest. This is similar to the national forest types which is broadleaved forest (cool-28% & warm 25%) followed by fir forests (16%) and sub-tropical forest (13%%) (NBSAP 2025).

A total of 21 invasive plant species with 16 plant species natives to Bhutan and five plant species aliens to Bhutan have been identified in the project area. The list of invasive plant species is provided in **Error! Reference source not found..**

Table 4 List of invasive plant species in the project area

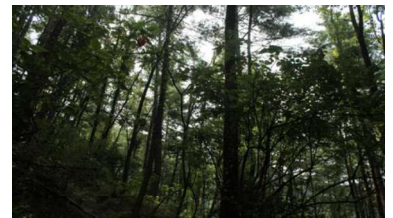
SN	Family	Scientific name	Remarks
1	Asteraceae	<i>Adenostemma lavenia</i>	Native to Bhutan
2	Amaranthaceae	<i>Alternanthera sessilis</i>	Native to Bhutan
3	Asteraceae	<i>Artemisia vulgaris</i>	Alien to Bhutan
4	Asteraceae	<i>Bidens pilosa</i>	Alien to Bhutan
5	Cyperaceae	<i>Carex spp</i>	Native to Bhutan
6	Asteraceae	<i>Crassocephalum crepidioides</i>	Alien to Bhutan
7	Commelinaceae	<i>Cyanotis vaga</i>	Native to Bhutan
8	Cyperaceae	<i>Cyperus rotundus</i>	Alien to Bhutan
9	Caryophyllaceae	<i>Drymaria cordata</i>	Native to Bhutan
10	Asteraceae	<i>Erigeron spp</i>	Native to Bhutan
11	Rubiaceae	<i>Galium aparine</i>	Native to Bhutan
12	Urticaceae	<i>Lecanthus peduncularis</i>	Native to Bhutan
13	Poaceae	<i>Oplismenus hirtellus</i>	Native to Bhutan
14	Oxalidaceae	<i>Oxalis corniculata</i>	Alien to Bhutan
15	Urticaceae	<i>Pilea bracteosa</i>	Native to Bhutan
16	Urticaceae	<i>Pouzolzia hirta</i>	Native to Bhutan
17	Dennstaedtiaceae	<i>Pteridium aquilinum</i>	Native to Bhutan
18	Asteraceae	<i>Sigesbeckia orientalis</i>	Native to Bhutan
19	Solanaceae	<i>Solanum viarum</i>	Native to Bhutan
20	Apiaceae	<i>Torilis japonica</i>	Native to Bhutan
21	Urticaceae	<i>Urtica dioica</i>	Native to Bhutan



Broadleaf forest



Riparian forest



Blue Pine Forest



Mixed Conifer Forest



Shrub land



Meadow

Total forty-three species of trees, forty-two species of shrubs, forty-two species of herbs and 12 species of epiphytes were recorded in the plots surveyed (Annex 5.2). There are reported 5390 species of seed plants in Bhutan and more than 200 plant species are used in Bhutanese traditional medicine (NBSAP 2025). Of these *Acer campbellii* (Himalayan maple), *Betula alnoides* (Himalayan birch), *Carpinus viminea* (Himalayan hornbeam), *Pinus wallichiana* (Blue pine) and *Acer oblongum* (Evergreen maple) are listed in schedule II of Forest and Nature Conservation Act, 2023 (FNCA). The Department of Forest and Park Services shall allow cultivation, collection or trade of this species listed in the schedule II of FNCA as per the procedure prescribed in the Rules.

Alnus nepalensis (Himalayan Alder), *Rhododendron arboreum* (Rhodo), *Lyonia ovalifolia* (Fetterbush), *Rhododendron griffithianum*, *Quercus oxyodon* (Sharp-toothed oak), *Quercus lamellosa* (Ban oak), *Quercus glauca* (Japanese blue oak), *Quercus lanata* (Ban oak), *Lithocarpus fenestratus* (Stone oak), *Persea spp* (Wild avocado), *Picea spinulosa* (Spruce), *Quercus semicarpifolia* (Brown oak), *Quercus griffithii* (Oak), *Tetracentron sinense* (Qing pi tree) and *Rhododendron triflorum* are listed in schedule II of Forest and Nature Conservation Act, 2023 (FNCA). The Department of Forest and Park Services shall allow cultivation, collection or trade of these species listed in the schedule II of FNCA as per the procedure prescribed in the Rules.

Paris polyphylla commonly known as Himalayan Paris) is a valuable medicinal plant and listed under schedule III of Forest and Nature Conservation Act, 2023(FNCA). The Department of Forest and Park Services shall allow cultivation, collection or trade of this species listed in the schedule III of FNCA as per the procedure prescribed in the Rules. The IUCN status of *Paris polyphylla* is vulnerable. Bhutan has legalized *Paris polyphylla* in 2015 to ensure sustainable and restricted harvesting (Bhutan Trust Fund 2017). *Paris polyphylla* has been found in the sample plot of forest representation but not in the project area. So, it was not disturbed from its natural habitat.

Piper pedicellatum is commonly known as long pipla in Bhutan and categorized as vulnerable under IUCN status. It is collected for medicinal purpose. *Piper pedicellatum* has been found within the project area. Its rescue from the project area is not required since it is found in the country's broadleaved forests.

Tetracentron sinense (Qing pi tree) commonly known as leaf spur is listed in Appendix III of CITES. The international trade in this plant is regulated.

A total of 34 vegetation species has been listed in IBAT of which six species are critically endangered, eleven species are endangered and remaining 16 species are vulnerable (Table 5).

Table 5 Vegetation IBAT species and CH-triggering species

SN	Scientific name	Common name	IUCN Category	IUCN Population trend	Absence/ Presence (based on IBAT & literature review)	Alt.range (m) (from-to)	Distribution (Locations or in district)	CH-triggering
1	<i>Trillium tschonoskii</i>	Keun-yeon-yeong-cho	EN	De	P	1800-2100	Eastern slope of Dochula, Punakha	
2	<i>Bulbophyllum leopardinum</i> var. <i>tuberculatum</i>		CR	un	P	1400-2000	Haa	√
3	<i>Cheirostylis sherriffii</i>		CR	un	P	Above 2000	Central & southern regions of Bhutan	
4	<i>Oreorchis sanguinea</i>		CR	un	P	1200-2200	Samdrup Jongkhar & central regions of Bhutan	
5	<i>Bambusa clavata</i>		VU	De	P	400-600	Samdrup Jongkhar & Phuentsholing	
6	<i>Drepanostachyum annulatum</i>		VU	un	P	up to 3400	Chukha	√
7	<i>Carex nigra</i> subsp. <i>drakyulensis</i>		EN	un	P	2450-2900	Bumtnag	
8	<i>Oryza malampuzhaensis</i>		VU	De	A			
9	<i>Paris polyphylla</i>	Love Apple	VU	De	P	1800-3300	Samdrup Jongkhar, Trashigang, Pema Gatsel & Chukha	√
10	<i>Trillium govanianum</i>	Himalayan Trillium	EN	De	P	2500-4000	Border himalayan range of Bhutan	
11	<i>Dactylorhiza hatagirea</i>	Salampanja	EN	De	P	2800-4200	Himalayan regions of Bhutan	
12	<i>Fritillaria cirrhosa</i>	Yellow Himalayan Fritillary	VU	De	P	3200-5000	Himalayan regions of Bhutan	

SN	Scientific name	Common name	IUCN Category	IUCN Population trend	Absence/ Presence (based on IBAT & literature review)	Alt.range (m) (from-to)	Distribution (Locations or in district)	CH-triggering
13	<i>Nardostachys jatamansi</i>	Indian Nard	CR	De	P	3000-5000	Himalayan regions of Bhutan	
14	<i>Podophyllum hexandrum</i>	Himalayan Mayapple	EN	De	P	2000-4500	Himalayan alpine zone of Bhutan	
15	<i>Mesua ferrea</i>	Churuli	VU	De	P	300-1500	Trpical & subtropical regions of Bhutan	✓
16	<i>Ceropegia bhutanica</i>		EN	un	P	>2000	Eastern himalayas within Bhutan	
17	<i>Corallodiscus cooperi</i>		VU	De	P	1900-2200	Dodena, Thimphu	✓
18	<i>Isodon atroruber</i>		EN	un	P	2117-2550	Thimphu & Lhuentse	
19	<i>Buddleja bhutanica</i>		VU	un	P	1700	Bhutan	
20	<i>Meconopsis superba</i>		EN	St	P	3500-4494	JDNP & JKSNR, Bumthang, Gasa, Haa & Punakha	✓
21	<i>Hoya bhutanica</i>		EN	un	P	150-1800	Gelephu, Mongar & Lhuentse	
22	<i>Pedicularis griniformis</i>		VU	un	P	3000-3900	Eastern Himalayan regions of Bhutan to Bhutan	
23	<i>Saxifraga vacillans</i>		VU	un	P	upto 1500	Thimphu, Punakha, Wangdue Phodrang, Trashigang, Lhuentse & Mongar	✓
24	<i>Meconopsis bhutanica</i>		CR	De	P	4351-4494	JDNP	
25	<i>Astragalus paroensis</i>		CR	un	P	2000-6000	Bhutan	
26	<i>Strobilanthes accrescens subsp. accrescens</i>		EN	un	P	1800-3000	Haa, Paro, Thimphu, Bumthang	✓
27	<i>Beilschmiedia clarkei</i>		VU	un	P		Bhutan	

SN	Scientific name	Common name	IUCN Category	IUCN Population trend	Absence/ Presence (based on IBAT & literature review)	Alt.range (m) (from-to)	Distribution (Locations or in district)	CH-triggering
28	<i>Cinnamomum impressinervium</i>	Sung soar koong	VU	un	P	600-1800	Warm broadleaved forest regins of Bhutan	✓
29	<i>Litsea albescens</i>		VU	un	P	200-1700	Subtropical forests of Bhutan	✓
30	<i>Litsea nitida</i>		VU	un	P	100-2400	Southern part of Bhutan	✓
31	<i>Litsea panamanja</i>		VU	un	P		Bhutan	
32	<i>Litsea assamica</i>		EN	un	P	600-2500	Subtropical & temperate regions of Bhutan	✓
33	<i>Impatiens infundibularis</i>	The Kurseong Balsam	VU	De	A		No record	
34	<i>Ophiocordyceps sinensis</i>	Chinese Caterpillar Fungus	VU	De	P	3400-4800	Northern remote parts of Bhutan	
De = Decreasing, st= Stable, Un= Unknown; A= Absent, P Present, blue font to show potential distribution in project area.								

Following six species has been proposed for qualifying in Critical habitat assessment:

Corallodiscus cooperi, *Drepanostachyum annulatum*, *Strobilanthes accrescens subsp. Accrescens*, *Carex speciosa subsp. Pinetorum*, *Cephalaeschna triadica*, and *Pedicularis amplicollis*.

Abundance and density of trees among the plots ranges from 1 to 23 species with density of trees ranging from 2500-57500 individuals/sq.km.). Similarly, shrubs range from 2 to 14 species and density ranges from 5000-35000 individuals/sq.km. In herbs, the abundance ranges from 1 to 10 in 4 sq.m and density ranges from 250000-2500000 individuals /sq.km) (Table 6).

Table 6 showing the number of plots showing number of trees, shrub and herb species in survey.

No of tree species	No of plots	No of hrub species	No of plots	No. of herb species	No of plots
0	1	2	2	0	1
1	1	3	6	1	3
6	2	4	6	2	3
7	3	5	5	3	7
8	3	6	5	4	18
9	2	7	7	5	4
10	5	8	2	6	2
11	6	9	3	10	1
12	6	11	2		
13	3	14	1		
14	2				
16	1				
18	1				
19	1				
21	1				

4.1.1 Invasive Species

A total of 21 invasive plant species with 16 plant species natives to Bhutan and five plant species aliens to Bhutan have been identified in the project area.

The list of invasive plant species is provided in Table 7.

Table 7 List of invasive plant species in the project area

SN	Family	Scientific name	Remarks
1	Asteraceae	<i>Adenostemma lavenia</i>	Native to Bhutan
2	Amaranthaceae	<i>Alternanthera sessilis</i>	Native to Bhutan

SN	Family	Scientific name	Remarks
3	Asteraceae	<i>Artemisia vulgaris</i>	Alien to Bhutan
4	Asteraceae	<i>Bidens pilosa</i>	Alien to Bhutan
5	Cyperaceae	<i>Carex spp</i>	Native to Bhutan
6	Asteraceae	<i>Crassocephalum crepidioides</i>	Alien to Bhutan
7	Commelinaceae	<i>Cyanotis vaga</i>	Native to Bhutan
8	Cyperaceae	<i>Cyperus rotundus</i>	Alien to Bhutan
9	Caryophyllaceae	<i>Drymaria cordata</i>	Native to Bhutan
10	Asteraceae	<i>Erigeron spp</i>	Native to Bhutan
11	Rubiaceae	<i>Galium aparine</i>	Native to Bhutan
12	Urticaceae	<i>Lecanthus peduncularis</i>	Native to Bhutan
13	Poaceae	<i>Oplismenus hirtellus</i>	Native to Bhutan
14	Oxalidaceae	<i>Oxalis corniculata</i>	Alien to Bhutan
15	Urticaceae	<i>Pilea bracteosa</i>	Native to Bhutan
16	Urticaceae	<i>Pouzolzia hirta</i>	Native to Bhutan
17	Dennstaedtiaceae	<i>Pteridium aquilinum</i>	Native to Bhutan
18	Asteraceae	<i>Sigesbeckia orientalis</i>	Native to Bhutan
19	Solanaceae	<i>Solanum viarum</i>	Native to Bhutan
20	Apiaceae	<i>Torilis japonica</i>	Native to Bhutan
21	Urticaceae	<i>Urtica dioica</i>	Native to Bhutan

4.2 Mammals with conservation significance

Nine species of mammals were recorded in the survey (fig 4-2 and table 4) of which *Rusa unicolor* (Sambar Deer) is listed in schedule II of Forest and Nature Conservation Act, 2023 (FNCA) is protected and may not be killed, injured, destroyed, captured, collected, possessed, bred, raised, or traded except for scientific research, population management, defense against attack or imminent threat on human life or livestock and damage to crop or other private property. The Sambar Deer is classified as **Vulnerable** on the IUCN Red List and faces high risk of extinction in the wild. The Sambar Deer is listed on **CITES Appendix II** and not currently threatened with extinction. There are 129 species of mammal as per NBC 2019 (cited in NBSAP 2025).

Nemorhaedus goral (Himalayan Goral) is listed in schedule II of Forest and Nature Conservation Act, 2023 (FNCA) is protected and may not be killed, injured, destroyed, captured, collected, possessed, bred, raised, or traded except for scientific research, population management, defense against attack or imminent threat on human life or livestock and damage to crop or other private property. The Himalayan goral is currently listed as **Near Threatened** on the IUCN Red List and reflects significant population decline due to habitat loss and hunting for meat. The Himalayan goral is listed on CITES Appendix I and threatened with extinction and trade in their specimens is permitted in exceptional circumstances.

Macaca assamensis (Assamese macaque) is listed in **schedule III** of Forest and Nature Conservation Act, 2023 (FNCA) is protected and may not be killed, injured, destroyed, captured, collected, possessed, bred, raised, or traded except for scientific research, population management, defense against attack or imminent threat on human life or livestock and damage to crop or other private property. The Assamese macaque is listed as **Near Threatened** on the IUCN Red List and the primary threats to the species are habitat loss, degradation, and hunting. The Assamese macaque is listed on **CITES Appendix II** and it is not currently threatened with extinction but it may become so if the trade is not regulated.

Semnopithecus schistaceus (Gray Langur) is listed in schedule II of Forest and Nature Conservation Act, 2023 (FNCA) is protected and may not be killed, injured, destroyed, captured, collected, possessed, bred, raised, or traded except for scientific research, population management, defense against attack or imminent threat on human life or livestock and damage to crop or other private property. The Gray Langur is classified as **Least Concern** on IUCN Red List and the species is not currently considered threatened with extinction. The Gray Langur is listed on **CITES Appendix I** and the species are threatened with extinction and international trade in specimens of these species is prohibited except for exceptional cases.

Muntiacus muntjak (Barking Deer), *Sus scrofa* (Wild pig) and *Martes flavigula* (Himalayan Yellow Throated Marten) are listed in schedule III of Forest and Nature Conservation Act, 2023(FNCA) is protected and may not be killed, injured, destroyed, captured, collected, possessed, bred, raised, or traded except for scientific research, population management, defense against attack or imminent threat on human life or livestock and damage to crop or other private property. The Barking Deer known as Indian muntjac is classified as **Least Concern** on IUCN Red List and the species is not currently considered threatened with extinction. The barking deer is listed on **CITES Appendix II** and it is not currently threatened with extinction but it may become so if the trade is not regulated. The Wild pig

known as wild boar is classified as **Least Concern** on IUCN Red List due to its wide range, high numbers, and its adaptability to various habitats. The Wild pig is listed on **CITES Appendix II** in Bhutan and species are not threatened with extinction but trade must be controlled to avoid utilization incompatible with their survival. The Himalayan yellow- throated Marten is classified as **Least Concern** on IUCN Red List due to its wide distribution across Asia, relatively stable population and presence in numerous protected areas. The Himalayan yellow- throated Marten is listed on **CITES Appendix III** and India has requested other CITES member countries to assist in regulating or monitoring trade of this species (Fig 4-2).

Ursus thibetanus (Asiatic Black Bear) is listed in schedule II of Forest and Nature Conservation Act, 2023 (FNCA) is protected and may not be killed, injured, destroyed, captured, collected, possessed, bred, raised, or traded except for scientific research, population management, defense against attack or imminent threat on human life or livestock and damage to crop or other private property. The Asiatic Black Bear is currently listed as **Vulnerable** on the IUCN Red List due to decline in its population from threats such as habitat loss and degradation, poaching, illegal trade and human-bear conflict. The Asiatic Black Bear is listed on **CITES Appendix I** and prohibits international commercial trade. It is also illegal to hunt or trade the species in many countries including Bhutan. The Asiatic Black Bear had killed a 4-months old calf at night on 6th May 2025 near the Thimphu - Phuentsholing highway at Bunakha.

Prionailurus bengalensis (Leopard Cat) is listed in schedule II of Forest and Nature Conservation Act, 2023 (FNCA) is protected and may not be killed, injured, destroyed, captured, collected, possessed, bred, raised, or traded except for scientific research, population management, defense against attack or imminent threat on human life or livestock and damage to crop or other private property. The Leopard Cat is classified as **Least Concern** on IUCN Red List. It is widely distributed in many parts of its range, but face threats from habitat loss and hunting. Leopard Cat is listed in **CITES Appendix II** and regulates international trade to ensure it is not an unsustainable level and need for higher level of protection.

Ailurus fulgens (Red Panda) is listed in schedule II of Forest and Nature Conservation Act, 2023 (FNCA) is protected and may not be killed, injured, destroyed, captured, collected, possessed, bred, raised, or traded except for scientific research, population management, defense against attack or imminent threat on human life or livestock and damage to crop or other private property. Red Panda is classified as **Endangered** in IUCN Red List. Major threats are habitat loss, fragmentation and degradation. Red Panda is listed in **CITES Appendix I**, which restricts international trade and protected by law in all its range countries. According to the local people and the former Range officer, Tshimasham, the Red Panda was attacked by stray dogs and came around the people for protection and rescued by Chanachen to Geling Goenpa farm road widening labours and handed over to Range office, Tshimasham. In 2023 The rescued Red Panda was in good health condition and was released in the same environmental condition about 2 Km away from the place where it was rescued.

Panthera pardus (Tiger) is listed in **schedule I** of Forest and Nature Conservation Act, 2023 (FNCA) is protected and shall not be killed, injured, or destroyed except in defense against attack, imminent threat to human and captured, collected, possessed, bred, raised or traded except for scientific research or population management including conservation breeding as recommended by the Scientific Authority. Tiger is **Endangered** in the IUCN Red list. and major threats are habitat loss and fragmentation, poaching, retaliatory killing and prey depletion. All tiger subspecies are listed in **CITES Appendix I and**

prohibits all commercial international trade of the animals, their parts, and derivatives. According to the Tshogpa and the local communities of Chanachan village, Tiger had killed one bull in the forest above Chanachan village and one calf near the village. This could not be verified during the terrestrial biodiversity survey in August-September 2025.

Wild animals observed and signs documented during the second season(monsoon) survey

	
Grey Langur	Asiatic Black Bear fruit residue
	
Himalayan Goral pellet	

	
Barking Deer hoof print	Sambar Deer dung
	
Wild Pig dropping	Leopard Cat scat

Figure 4- 2: Observation and signs of wildlife recorded in second survey in Bunakha HEP

Nine mammal species have been recorded in the second season survey (Table 8) and species from IBAT (Table 9).

Table 8 The summary of the mammals recorded in first season survey

S N	Scientific name	Common Name	National legislation FNCA	CITES listing	IUCN Red list	IBAT status	Remarks
1	<i>Muntiacus muntjak</i>	Barking Deer	III	II	LC	Not in IBAT	not currently threatened with extinction
2	<i>Rusa unicolor</i>	Sambar	II	II	VU	VU	Population declines due to habitat loss and hunting for meat.
3	<i>Sus scrofa</i>	Wild Pig	III	II	LC	Not in IBAT	May become threatened if the trade is not regulated.
4	<i>Semnopithecus schistaceus</i>	Grey Langur	II	I	LC	Not in IBAT	Threatened with extinction and international trade prohibited
5	<i>Macaca assamensis</i>	Assamese Macaque	III	II	NT	Not in IBAT	Not threatened with extinction but trade must be controlled to avoid utilization incompatible with their survival.
6	<i>Nemorhaedus goral</i>	Himalayan Goral	FNCA II	I	NT	Not in IBAT	Threatened with extinction and trade in their specimens is permitted in exceptional circumstances.
7	<i>Ursus thibetanus</i>	Asiatic Black Bear	FNCA II	I	VU	Not in IBAT	Population decline from threats such as habitat loss and degradation, poaching, illegal trade and human-bear conflict.
8	<i>Prionailurus bengalensis</i>	Leopard Cat	FNCA II	II	LC	Not in IBAT	Threatened from habitat loss and hunting, and need higher level of protection.
9	<i>Funambulus pennatii</i>	Five striped Palm Squirrel	DE	DE	LC	Not in IBAT	Threatened from habitat loss, degradation from logging and human settlements, hunting for consumption and the pet trade.

Table 9 IBAT species mammal recommended for CHA assessment based on altitude and found in 20 Km radius from the dam but only three of these have been qualified in initial screening for CHA.

S N	scientific_name	common_name	category	Movement pattern	Alt.range (m) (From-to)	Distribution (location points or in district)	Presence in 20 km radius	Remarks	Qualify for CH-assessment
1	<i>Ailurus fulgens</i>	Red Panda	EN	Alti. Migrant	2400-3700 (Red Panda population survey (2022-2023, DoFPS)	19 of 20 districts	y		y
2	<i>Platanista gangetica</i>	Ganges River Dolphin	EN	Migrant	Below 250	Ganges-Brahmaputra-Meghna River systems extending to Bhutan	y		
3	<i>Aonyx cinereus</i>	Asian Small-clawed Otter	VU	Not a Migrant	160-1000	Manas, Punatsangchhu, Mangdechhu, Wangchhu, Trashigang and Phrumsengla National Park,	y		
4	<i>Arctictis binturong</i>	Binturong	VU	Not a Migrant	up to 1500	Bhutan bordering Buxa Tiger reserve, India	y		
5	<i>Canis lupus ssp. chanco</i>	Himalayan Wolf	VU	Not a Migrant	3400-5200	WCP, JDNP, JKSNR	y		
6	<i>Neofelis nebulosa</i>	Clouded Leopard	VU	Not a Migrant	243-3893	Southern regions, Gedu, RMNP, JSWNP, WCP, PWS, JDNP, PNP, BWS	y		

S N	scientific_name	common_name	category	Movement pattern	Alt.range (m) (From-to)	Distribution (location points or in district)	Presence in 20 km radius	Remarks	Qualify for CH-assessment
7	<i>Panthera tigris</i>	Tiger	EN	Not a Migrant	100-4400; Paro FD-1 (Common to Thimpu, 1F), Thimpu FD-3 (2F, 1M), Gedu FD (Chhukha district)-2 (1 M, 1 UN)	RMNP, JSWNP, PWS , Bumthang and Zhemgang forest Divisions; DoFPS 2023 BN (tiger survey 2021-22)	n	but Y sec.lit.	y
8	<i>Capricornis sumatraensis</i>	Mainland Serow	VU		200-3000	RMNP, PWS, Jhomosangkha wildlife sanctuary and Bumthang	y		
9	<i>Cuon alpinus</i>	Dhole	EN		1468-4980	widely distributed throughout Bhutan & JDNP, all 20 districts and in all PAs and BCs	y		y
10	<i>Moschus leucogaster</i>	Himalayan Muskdeer	EN		2500-4500	JDNP	y		
11	<i>Myotis sicarius</i>	Mandelli's Mouse-eared Myotis	VU			Tropical & subtropical moist montane forests in Bhutan	y		
12	<i>Panthera pardus</i>	Leopard	VU		97-3000	wide regions in Bhutan, RMNP, Gedu	y		
13	<i>Rusa unicolor</i>	Sambar	VU		2356-3655	Himalayan foot hills of Bhutan	n	y in plot	
14	<i>Ursus thibetanus</i>	Asiatic Black Bear	VU		1200-3750	Widely distributed throughout Bhutan	n	y in social survey	
Total Mammal species shown in IBAT is 30. 1 spp absent in Bhutan, CHA 29 spp to assess is proposed (CR 1, EN species 12, Vu 16) 15 species reduced as not found in 20 Km Radius in Bhutan CHA 14 spp to assess finally for Bunakha HEP.									

S N	scientific_name	common_name	category	Movement pattern	Alt.range (m) (From-to)	Distribution (location points or in district)	Presence in 20 km radius	Remarks	Qualify for CH-assessment
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Of the 39 plots surveyed, 8 plots are lying outside the project impact area. Thus, of the 31 plots, no wildlife recorded from 11 plots and only 15 plots had the wildlife recorded. Among the 15 plots, the vulnerable sambar is recorded in 9 plots (Table 10).

Table 10 Plots where wildlife (mammal) recorded in Bunakha HEP project impact area

Plots IDs	Location of the plot	Altitude (m)	Wildlife /sign recorded
1	Tala dam upper end reservoir	1394.1	Wild Pig, Assamese macaque, Grey Langur, Himalayan Goral
2	Chukha dam (below dam)	1809.9	Grey Langur
3	Chanachan (above old road)	2133.3	Sambar Deer
4	Bunagu Chanachan junction	1961.4	-
5	Chanachen (above bridge)	1983.8	-
6	Below Chanachan (upstream right bank)	1889.8	Sambar Deer
7	Bunagu (above highway)	2088.8	Wild Pig, Sambar Deer, Barking Deer
8	Chanachan (near village)	2243.7	Sambar Deer
9	Bunagu (below highway)	1983.1	Barking Deer
10	Bunakha (below highway)	1974.6	Barking Deer, Wild Pig
11	Geling Goenpa (below farm road)	2476.7	-
12	Near Tanalum (below highway)	1975.1	Barking Deer, Five striped Palm Squirrel
13	New Tanalum Bridge (along tributary left bank)	2007.3	Himalayan Goral
14	Tanalum (above new bridge)	2024.9	Grey Langur, Wild Pig, Himalayan Goral, Barking Deer, Sambar Deer, Leopard Cat
15	Wangchhu River (near Haachhu bridge)	1956.4	Barking Deer, Himalayan Goral
16	Wangchhu River (Near Haachhu Confluence)	1959	Himalayan Goral, Asiatic Black Bear
17	Watsa (Below highway)	2049.1	Assames Macaque
18	Damchu (Below highway riverine)	1975.07	-
19	Bunagu (below highway)	1975.7	-

Plots IDs	Location of the plot	Altitude (m)	Wildlife /sign recorded
20	Chanachan (Near bridge)	2049.1	-
21	Bunagu (below highway)	1956.6	Wild Pig, Barking Deer
22	Paga Goenpa (below Goenpa)	2793	Barking Deer, Sambar Deer, Wild Pig
23	Shema Goenpa (below Goenpa)	2858.5	Barking Deer, Grey Langur
24	Wangkha (Above highway)	1646	Sambar Deer, Wild Pig
25	Lobneykha Primary School (above school)	2625.2	-
26	Nayakha (above farm road)	2509.3	Wild Pig
27	Damchu (above highway)	2042.9	Sambar Deer
28	Wanakha (below highway)	2308.4	-
29	Chanachan -New PC (above farm road)	2117.9	-
30	Dam area-New PC MD	2093.5	Sambar Deer
31	Bunakha-New PC client office above Lhakhang	2164.3	Barking Deer, Wild Pig
32	Bunakha- New PC Client temporary camp 2	2194.2	Asiatic Black Bear
33	Bunagu-New PC client temporary camp 1	1963.6	Barking Deer, Wild Pig
34	Bunakha-above Lhakhang	2023.3	Wild Pig, Sambar Deer
35	Bunagu- New PC CCF cluster	2035.1	-
36	Chanachan- New PC Plant	2004.7	-
37	Bunakha- New PC MD3 HM	1952.4	-
38	Chanachan -New PC Magazine	1841.7	-
39	Below Tsimasham -New PC-MD 4	1892.6	-

4.3 Bird status and conservation significance

69 species of birds in second season (monsoon) were recorded in the survey plots and along the transect. 17 additional bird species were recorded which were not listed in first season of bird survey. During the survey, both migratory and domestic bird species were discovered. A tiny percentage of the listed species are deemed fragile, while the rest species are categorized as least concern, according to the IUCN Red List Status. In Bhutan, so far 736 species of bird have been reported (NBSAP 2025). The survey of birds was along with the vegetation and other biodiversity elements in August-September 2025 for second season (post monsoon). The quantitative survey on birds were recorded in plots and Reece transects. In each plot approx.1 km length in and around the plots observing about 25m on either side in addition to 20mx20m plots surveyed for vegetation. In this 0.05 sq.km. area, maximum of 8 species of birds were recorded and minimum of 2 species of birds (table 8). Similarly, maximum of density of 160 individuals per square kilo meter was found in two plots and minimum of 40 individuals per square kilometers were recorded in three plots (table 11).

Table 11 showing the diversity of birds in survey plots

SN	No of species of birds	Number of plots in the diversity class	Density of birds/sq.km.
1	2	3	40
2	3	7	60
3	4	11	80
4	5	9	100
5	6	6	120
6	7	1	140
7	8	2	160
	Total	39	

Bird species of national conservation significance are Oriental Cuckoo (*Cuculus saturates*), Blyth's Leaf Warbler (*Phylloscopus reguloides*), Kalij Pheasant (*Lophura leucomelanos*), Large Hawk Cuckoo (*Hierococcyx sparveroides*), Indian Cuckoo (*Cuculus Micropterus*), Red-billed Chough (*Pyrrhocorax pyrrhocorax*), Large-billed Crow (*Corvus macrorhynchos*), *Cuculus canorus* Hill Partridge (Eurasian Cuckoo), Hill Partridge (*Arborophila torqueola*), Asian Barred Owlet (*Glaucidium cuculoides*) are listed in schedule III of Forest and Nature Conservation Act, 2023 (FNCA) and protected and may not be killed, injured, destroyed, captured, collected, possessed, bred, raised, or traded except for scientific research, population management, defense against attack or imminent threat on human life or livestock and damage to crop or other private property and are currently listed as Least Concern on the IUCN Red List, not currently considered to be threatened with extinction and the population is considered stable and wide spread.

IBAT has provided 32 species of birds for Bunakha HEP. In a radius of 50 km from Bunakha dam, 25 species were found (Fig 4-2, table 12). Of the 32 species extracted from IBAT, 21 species are considered for CHA (present in Bhutan, font not highlighted ones).

Table 12 List of birds with IBAT and preliminary screening for CHA

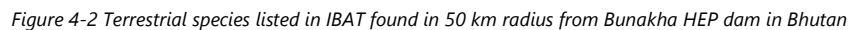
SN	Scientific name	Common name	Category	Movement pattern	is_restricted_range	Absence/ Presence (based on literature & surveys)	Alt.range (m) (from-to)	Distribution (location points or in district)
1	<i>Sitta formosa</i>	Beautiful Nuthatch	VU	Altit. Migrant	FALSE	P	950-2300(>300m in winter)	Phuentsholing in Chukha, Trongsa, Lingmethang in Mongar, Dewathang in Samdrup Jongkhar & Tsirang
2	<i>Aquila heliaca</i>	Eastern Imperial Eagle	VU	Full Migrant	FALSE	P	0-1600	Lower elevations in Bhutan
3	<i>Aquila nipalensis</i>	Steppe Eagle	EN	Full Migrant	FALSE	P	300-2200	Phobjikha in wangdue, RMNP, Trongsa
4	<i>Aythya baeri</i>	Baer's Pochard	CR	Full Migrant	FALSE	P	150-2817	Narphung - Samdrup Jongkhar, Shechamthang-Wakleytar & Rimchu-Gasa
5	<i>Aythya ferina</i>	Common Pochard	VU	Full Migrant	FALSE	P	150-2817	Punatsangchhu river
6	<i>Calidris falcinellus</i>	Broad-billed Sandpiper	VU	Full Migrant	FALSE	P	1600-3600	Bhutan wintering grounds in plains
7	<i>Calidris ferruginea</i>	Curlew Sandpiper	VU	Full Migrant	FALSE	P	0-4500	Whole Bhutan
8	<i>Clanga</i>	Greater Spotted Eagle	VU	Full Migrant	FALSE	P	0-1700	Lowland and foothills in Bhutan
9	<i>Emberiza aureola</i>	Yellow-breasted Bunting	CR	Full Migrant	FALSE	P	1600-3600	Central & southern foothills, Zhemgang
10	<i>Gallinago nemoricola</i>	Wood Snipe	VU	Full Migrant	FALSE	P	1800-4200	Phobjikha, Thimphu
11	<i>Grus antigone</i>	Sarus Crane	VU	Full Migrant	FALSE	A		

SN	Scientific name	Common name	Category	Movement pattern	is_restricted_range	Absence/ Presence (based on literature & surveys)	Alt.range (m) (from-to)	Distribution (location points or in district)
12	<i>Haliaeetus leucoryphus</i>	Pallas's Fish-eagle	EN	Full Migrant	FALSE	P	0-1400	Punatsangchhu, Mangdechhu, Kurichhu & Drangmechhu rivers
13	<i>Houbaropsis bengalensis</i>	Bengal Florican	CR	Full Migrant	FALSE	P	1000-1500	No record of distribution in Bhutan
14	<i>Pluvialis squatarola</i>	Grey Plover	VU	Full Migrant	FALSE	P	700-3600	Haa, Paro, Thimphu, Bumthang
15	<i>Saxicola insignis</i>	White-throated Bushchat	VU	Full Migrant	FALSE	P	400-1400	Punatsangchhu & Mangdechhu river basins
16	<i>Schoenicola striatus</i>	Bristled Grassbird	VU	Full Migrant	FALSE	P	400-1400	Central, eastern & southern foothills of Bhutan
17	<i>Turdus feae</i>	Grey-sided Thrush	VU	Full Migrant	FALSE	P	600-3050	Thimphu valley, Chelela pass, Punakha-wangdue valley & Phobjikha valley
18	<i>Gyps bengalensis</i>	White-rumped Vulture	CR	Nomadic	FALSE	P	560-1530	No detail of location in Bhutan
19	<i>Aceros nipalensis</i>	Rufous-necked Hornbill	VU	Not a Migrant	FALSE	P	150-2200	Trongsa, Zhemgang (JSWNP, RMNP)
20	<i>Ardea insignis</i>	White-bellied Heron	CR	Not a Migrant	FALSE	P	100-1500	Punatsangchhu & Mangdechhu river basins
21	<i>Buceros bicornis</i>	Great Hornbill	VU	Not a Migrant	FALSE	P	400-1400	RMNP, JSWNP, PNP, BWS, Jomotshangkha wildlife sanctuary
22	<i>Chrysomma altilore</i>	Jerdon's Babbler	VU	Not a Migrant	TRUE	A		
23	<i>Clanga hastata</i>	Indian Spotted Eagle	VU	Not a Migrant	FALSE	P	0-1000	Lowlands & foothills of Bhutan
24	<i>Gyps tenuirostris</i>	Slender-billed Vulture	CR	Not a Migrant	FALSE	A		
25	<i>Laticilla cinerascens</i>	Swamp Grass-babbler	EN	Not a Migrant	FALSE	A		

SN	Scientific name	Common name	Category	Movement pattern	is_restricted_range	Absence/ Presence (based on literature & surveys)	Alt.range (m) (from-to)	Distribution (location points or in district)
26	<i>Mulleripicus pulverulentus</i>	Great Slaty Woodpecker	VU	Not a Migrant	FALSE	P	0-2000	PWS, Sarpang
27	<i>Paradoxornis flavirostris</i>	Black-breasted Parrotbill	VU	Not a Migrant	TRUE	A		
28	<i>Perdicula manipurensis</i>	Manipur Bush-quail	CR	Not a Migrant	FALSE	A		
29	<i>Ploceus megarhynchus</i>	Finn's Weaver	EN	Not a Migrant	FALSE	A		
30	<i>Sarcogyps calvus</i>	Red-headed Vulture	CR	Not a Migrant	FALSE	P	0-3000	Bhutan-uncommon & sparsely distributed
31	<i>Sterna acuticauda</i>	Black-bellied Tern	EN	Not a Migrant	FALSE	P	0-700	Lower river valleys of Bhutan
32	<i>Sterna aurantia</i>	River Tern	VU	Not a Migrant	FALSE	P	0-600	Punatsangchhu & Mangdechhu basin

Following 12 species of birds have been qualified from the initial screening of Critical habitat assessment: White-bellied heron, White-rumped vulture, Rufous-fronted tit, Dark-rumped swift, Sikkim tree creeper, Rusty-flanked treecreeper, Ward's trogon, Firetailed myzornis, Black-throated Prinia, Satyr tragopan, Himalayan Forest thrush, and Pied Shrike-babbler.

No detail of location / No record of distribution in Bhutan



4.4 Butterfly and moth

Nine butterfly species in two families (five species in Nymphalidae and four species in Papilionidae) were recorded in the second season (monsoon) survey (table 13).

Table 13 Butterfly species recorded in the second season (monsoon)

SN	Family	Scientific name	Common Name	National Legislation FNCA	CITES Listing	IUCN Red List
1	Nymphalidae	<i>Parantica sita</i>	Chestnut Tiger	-	Not listed	No global conservation status
2	Nymphalidae	<i>Junonia orithya</i>	Blue Pansy	-	-	LC
3	Nymphalidae	<i>Acraea issoria</i>	Yellow Coster	-	Not listed	NE
4	Nymphalidae	<i>Parantica swinhoi</i>	Swinhoe's Chocolate Tiger	-	Not listed	Not listed
5	Nymphalidae	<i>Neptis miah</i>	Small Yellow Sailer	-	Not listed	Not been assessed
6	Papilionidae	<i>Byasa polyzyntes</i>	Common windmill	-	Not listed	NE
7	Papilionidae	<i>Graphium sarpedon</i>	Common Bluebottle	-	Not listed	LC
8	Papilionidae	<i>Papilio hopponis</i>	Hoppo Peacock	-	Not listed	-
9	Papilionidae	<i>Papilio bianor</i>	Chinese Peacock Swallowtail	-	Not listed	NE

Two species of insect have been qualified for critical habitat assessment, they are *Cephalaeschna triadica* and *Coelliccia svihleri*.

4.5 Herpetofauna (reptiles and amphibians)

The total of 28 herpetofauna species was recorded within the project area (Figure 4-4). Of these, 25 species were reptiles, while three were amphibians. The reptile count included 17 snake species belonging to four families, and seven lizard species belonging to three families. *Indotestudo elongata* is the only turtle species recorded in the project area. The three amphibian species recorded were one species from toad and two species from frog family. A comprehensive list of the identified species recorded in project area is provided in Table 14.

Table 14 Number of herpetofauna species recorded in different family groups		
Herpetofauna Group	Family Name	Number of Recorded Species
Frogs &Toads	Bufonidae	1
	Dicroglossidae	2
Frogs & Toads Total		3
Lizards	Agamidae	2
	Gekkonidae	2
	Scincidae	3
Lizards Total		7
Snakes	Colubridae	12
	Elapidae	2
	Pythonidae	1
	Viperidae	2
Snakes Total		17
Turtle & Tortoise	Testudinidae	1
Turtle & Tortoise Total		1
Grand Total		28

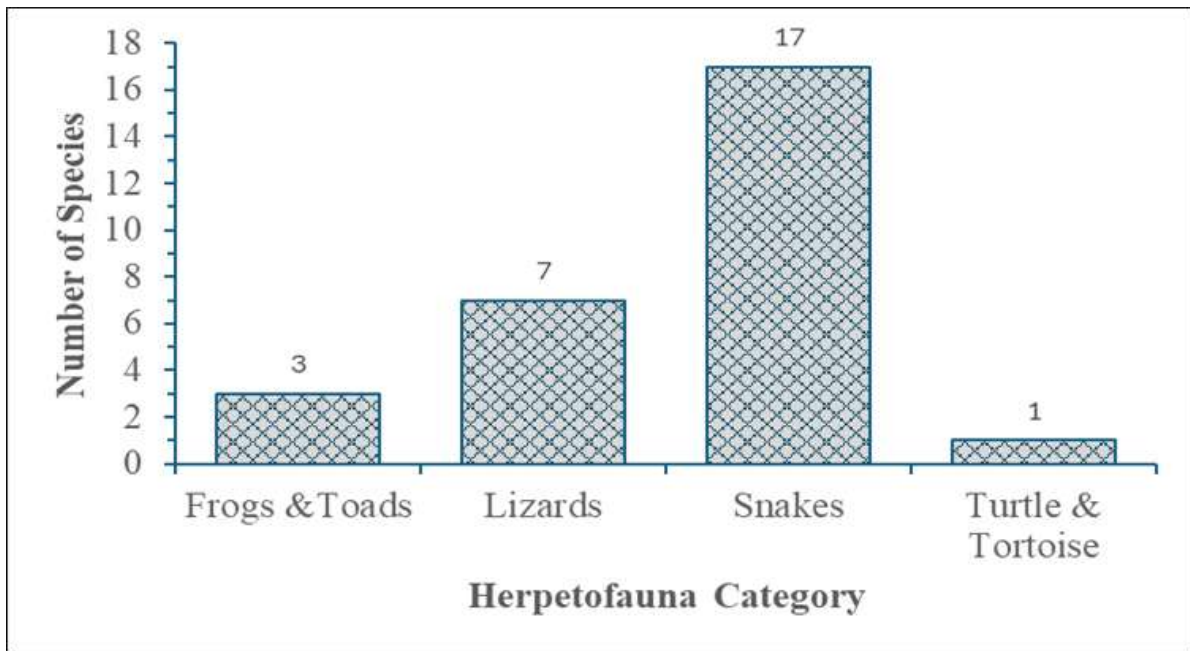


Figure 4-3 Number of species recorded under different herpetofauna in the project area.

25 IBAT listed threatened herpetofauna was found in 75 km radius of which four are absent in Bhutan. Of the 21 species, 16 species are found in 50 radii from the Bunakha dam. Four Amphibian species and 21 Reptiles species totaling 25 species of herpetofauna are listed in IBAT. One amphibian & three reptilians are absent in Bhutan, thus 21 species of herpetofauna is to be assessed for CHA (

Table 155). Nagaland's toad has been identified for critical habitat assessment in initial screening.

As of 2019, 158 species of herpetofauna have been reported in Bhutan (NBC, 2019 cited in NBSAP 2025).

Table 15 List of Amphibians and Reptiles (Herpetofauna) shown in IBAT records and summary of species proposed for CHA

S N	Scientific name	common name	Categor y	Populatio n trend	Movement pattern	is_restricte d_range	Absenc e/ Presenc e	Alt. range (m) (from- to)	Distribution (location points or in district)
AMPHIBIA									
1	<i>Amolops monticola</i>	Mountain Cascade Frog	EN	D	Not a Migrant	FALSE	Present	0-1600	Lower altitudes in Bhutan
2	<i>Minervarya chilapata</i>	Chilapata Rainpool Frog	VU	D	Not a Migrant	TRUE	Present		Border regions with India
3	<i>Tylototriton himalayanus</i>	Himalayan Salamander	VU	D	Not a Migrant	FALSE	Present	1255-2679	Toebrongchhu zam (Punakha) & Lam Pelri Botanical Park
4	<i>Uperodon assamensis</i>	Assamese Balloon Frog	VU		Not a Migrant	TRUE	Absent		
REPTILIA									
5	<i>Batagur dhongoka</i>	Three-striped Roofed Turtle	CR	D		FALSE	Absent		
6	<i>Crocodylus palustris</i>	Mugger	VU	S		FALSE	Absent		
7	<i>Cuora amboinensis</i>	Southeast Asian Box Turtle	EN	D		FALSE	Present	253-390	Norbuling lake (RMNP, Sarpang) & Somrong (Zhemgang)
8	<i>Cuora mouhotii</i>	Keeled Box Turtle	EN	D		FALSE	Present	0-370	Gulabi top (Zhemgang)

S N	Scientific name	common name	Categor y	Populatio n trend	Movement pattern	is_restricte d_range	Absenc e/ Presenc e	Alt. range (m) (from- to)	Distribution (location points or in district)
9	<i>Elaphe taeniura</i>	Cave Racer	VU	D		FALSE	Present		
10	<i>Geoclemys hamiltonii</i>	Spotted Pond Turtle	EN	D		FALSE	Present		
11	<i>Hardella thurjii</i>	Crowned River Turtle	EN	D		FALSE	Absent		
12	<i>Indotestudo elongata</i>	Elongated Tortoise	CR	D		FALSE	Present		
13	<i>Lissemys punctata</i>	Indian Flapshell Turtle	VU	D		FALSE	Present		
14	<i>Melanochelys tricarinata</i>	Tricarinate Hill Turtle	EN	D		FALSE	Present		
15	<i>Morenia petersi</i>	Indian Eyed Turtle	EN	D		FALSE	Present		
16	<i>Nilssonina gangetica</i>	Indian Softshell Turtle	EN	D		FALSE	Present		
17	<i>Nilssonina hurum</i>	Indian Peacock Softshell Turtle	EN	D		FALSE	Present		
18	<i>Nilssonina nigricans</i>	Black Softshell Turtle	CR	D		FALSE	Present		
19	<i>Oligodon juglandifer</i>	Walnut Kukri Snake	VU	Un		FALSE	Present		
20	<i>Ophiophagus hannah</i>	King Cobra	VU	D		FALSE	Present		
21	<i>Pangshura sylhetensis</i>	Assam Roofed Turtle	CR	D		FALSE	Present		
22	<i>Pangshura tecta</i>	Indian Roofed Turtle	VU	D		FALSE	Present		
23	<i>Python bivittatus</i>	Burmese Python	VU	D		FALSE	Present		
24	<i>Varanus flavescens</i>	Yellow Monitor	EN	D		FALSE	Present		
25	<i>Xenochrophis cerasogaster</i>	Painted Keelback	VU	D		FALSE	Present		
Note: Un=Unknown, D=Decreasing and S=stable									

4.5.1 Status of the herpetofauna in the project area

Extensive research and documentation have provided critical insights into the herpetofauna of Bhutan, revealing significant species diversity and distribution patterns. Notable studies include Wangyal (2014), who conducted an inventory in Jigme Singye Wangchuck National Park and documented 42 herpetofauna species, three of which were classified as threatened. Similarly, in Central Bhutan, Tshewang and Letro (2018) comprehensively recorded 33 reptile and nine amphibian species, contributing new findings to the field.

Despite these advances, knowledge gaps persist in certain areas. For example, the Sarpang District, a protected area, lacks a formal checklist or report. This gap, highlighted by Wangyal (2012), underscores the urgent need for increased monitoring, conservation initiatives, and further research in the region (Das et al., 2016; Das & Palden, 2000).

Global initiatives, such as the Global Amphibian Assessment (GAA), have evaluated the extinction risk of over 5,700 amphibian species. The GAA's findings emphasize the importance of sustained, long-term research to maintain data integrity and inform effective conservation strategies (wild. Synchronicity Earth IUCN SSC Amphibian Specialist Group, 2023). In a regional context, India has seen a near doubling of amphibian species between 2006 and 2022, highlighting the need for proactive conservation measures and disease monitoring due to a significant lack of assessment data.

Recent studies have begun to address some of the identified gaps. A preliminary assessment of Bhutan's reptilian fauna by Tenzin et al. (2022) revealed a scincid lizard species and a checklist of 34 species for the Sarpang District. This study also highlighted how proximity to national highway systems and farm roads influences herpetofauna distribution. Earlier work by Wangyal (2012) also documented ten snake and two lizard species in the Sarpang District, advancing our understanding of the area's herpetofauna (Phuntsho et al., 2022).

The field of herpetology in Bhutan has also been significantly enhanced by citizen science. A study by Wangyal (2020) unveiled 48 previously undocumented species, showcasing the potential of this approach to expand knowledge of poorly studied fauna. This collaborative effort, along with the discovery of Anderson's Bubble-nest Frog (*Raorchestes andersoni*) in Bhutan (Wangyal & Jamtsho, 2023), underscores the ongoing importance of research in this less-explored field. While a baseline herpetofauna inventory for the present study location is currently lacking, this report represents a crucial initial step, building upon the limited but foundational information available.

4.6 Combined Findings of Season 1 and Season 2 Biodiversity Surveys

Terrestrial biodiversity surveys for the Bunakha Hydropower Project were conducted during two distinct seasons: Season 1 (pre-monsoon/dry season) and Season 2 (monsoon/post-monsoon). This approach allowed for the capture of seasonal variability in species composition, habitat use, and detectability. The combined findings from both seasons provide a comprehensive and representative baseline of terrestrial biodiversity within the Project Area of Influence (AoI), in line with the requirements of the ADB Safeguard Policy Statement (2009) and IFC Performance Standard 6.

4.6.1 Overall Biodiversity Pattern

The integrated results of both surveys confirm that the project area supports natural habitats with moderate to high biodiversity value, dominated by broadleaf forest ecosystems, interspersed with blue pine forests, mixed conifer forests, shrublands, meadow patches, and riparian corridors along the Wangchhu River and its tributaries. Broadleaf forests consistently exhibited the highest species richness and ecological importance across both seasons. Seasonal comparison indicates that while overall habitat types and species assemblages remained largely consistent, species detectability and activity patterns varied significantly between seasons, underscoring the importance of the two-season survey approach.

4.6.2 Flora

Across both seasons, a total of 43 tree species, 42 shrub species, 42 herb species, and 12 epiphyte species were recorded within the surveyed plots. The monsoon season (Season 2) enhanced the detection of herbs, epiphytes, regeneration, and moisture-dependent species, while the dry season (Season 1) provided clearer observations of forest structure, canopy composition, and mature tree species. Several plant species of national and international conservation significance were identified across the combined surveys, including species listed under Schedule II and III of the Forest and Nature Conservation Act (FNCA), 2023, as well as IUCN Vulnerable and Endangered taxa. Although some conservation-significant species (e.g., *Paris polyphylla*) were recorded within representative forest plots, they were largely found outside the immediate project footprint, thereby reducing direct impact risk at the baseline stage.

4.6.3 Mammals

The combined surveys recorded nine mammal species through direct sightings, signs, and secondary evidence. Species of conservation importance include Red Panda (*Ailurus fulgens* – Endangered), Asiatic Black Bear (*Ursus thibetanus* – Vulnerable), and Sambar

Deer (*Rusa unicolor* – Vulnerable), all of which are protected under national legislation. Seasonal variation was evident in mammal detectability. Season 2 (monsoon) surveys recorded a higher frequency of indirect signs (tracks, dung, feeding evidence), particularly for ungulates and omnivores, while Season 1 surveys provided clearer information on movement corridors and habitat use due to reduced ground cover. Evidence of human–wildlife interaction, including crop damage and livestock depredation, was documented across both seasons, indicating ongoing ecological connectivity between forest habitats and human settlements.

4.6.4 Avifauna

Bird surveys conducted during both seasons recorded a high diversity of resident and migratory species, with Season 2 adding several species not detected during Season 1, reflecting seasonal movements and breeding activity. Riparian zones and mature broadleaf forests consistently supported the highest bird diversity and density. The combined dataset confirms the presence or potential occurrence of several IBAT-listed and nationally protected bird species, including species of global conservation concern such as the White-bellied Heron and White-rumped Vulture within the wider river basin context. Although direct nesting or roosting sites were not identified within the immediate project footprint, suitable habitats exist within the Aol.

4.6.5 Herpetofauna

Herpetofauna surveys across both seasons recorded a total of 28 species, comprising reptiles, amphibians, and one turtle species. The monsoon season significantly improved detection of amphibians and moisture-dependent reptiles, particularly in riparian and forest-edge microhabitats. The combined findings confirm that the project area provides suitable habitat for several IBAT-listed herpetofauna species, some of which are sensitive to changes in hydrology, water quality, and riparian habitat structure. These findings are particularly relevant for downstream impact assessment and environmental flow considerations.

4.6.6 Butterflies and Other Invertebrates

Butterfly surveys across both seasons recorded a limited but representative assemblage of species typical of forest edges, riparian zones, and disturbed habitats. Species richness was higher during the monsoon season, consistent with known seasonal activity patterns. The surveys are considered adequate for ESIA baseline purposes, although not exhaustive.

4.6.7 Critical Habitat Assessment (CHA) Screening Table – Merged (First & Second Season)

This table presents only those species retained for Critical Habitat screening based on IFC PS6 criteria. A complete list of mammal and bird species recorded during the biodiversity surveys is provided in Annexures 5.3-5.6.

Taxonomic Group	Species	IUCN Status	National / CITES Status	IBAT Trigger	Field Evidence (Both Seasons)	Habitat in Aol	IFC PS6 Criterion	Screening Outcome	Remarks
Mammal	<i>Ailurus fulgens</i> (Red Panda)	EN	FNCA Sch. II CITES I	Yes	Secondary evidence: rescue record; suitable habitat	Cool broadleaf & mixed conifer forest	Criterion 1	Retain for CHA	High-priority species
Mammal	<i>Ursus thibetanus</i> (Asiatic Black Bear)	VU	FNCA Sch. II CITES I	Yes	Signs and conflict reports	Broadleaf & riparian forest	Criterion 2	Retain	Supporting species
Mammal	<i>Rusa unicolor</i> (Sambar Deer)	VU	FNCA Sch. II CITES II	Yes	Dung and tracks in multiple plots	Broadleaf forest & edges	Criterion 2	Retain	Habitat indicator
Bird	<i>Ardea insignis</i> (White-bellied Heron)	CR	FNCA CITES I	Yes	No direct sighting; basin-level records	Large river systems & riparian zones	Criterion 1	Retain for CHA	Flagship species
Flora	<i>Drepanostachyum annulatum</i>	VU	FNCA	Yes	Recorded within the project influence	Broadleaf forest understory	Criterion 2	Retain for CHA	Potential habitat loss
Herpetofauna	<i>Amolops monticola</i>	EN	National protection	Yes	Detected in riparian habitats	Fast-flowing streams	Criterion 1	Retain for CHA	Sensitive to flow alteration
Insect	<i>Cephalaeschna triadica</i>	VU	—	Yes	IBAT trigger species	Riparian habitat	Criterion 2	Retain	Indicator species

4.7 Conclusion

A systematic herpetofauna survey was conducted at strategically chosen survey stations, identified during preliminary terrestrial studies from 28 August to 10 September 2025. The survey used standard herpetological protocols, including direct observation and systematic microhabitat surveys, to document the area's diverse herpetofauna. The findings revealed a total of 24 herpetofauna species, consisting of 22 reptile species and 2 amphibian species, confirming the rich biodiversity of the project area.

However, the survey faced several limitations. The restricted timeframe and its execution during the herpetofauna off-season may have impacted species visibility and activity levels, potentially leading to an underestimation of total species richness. Furthermore, the absence of specialized tools and equipment hindered efficient data collection, and the diverse and cryptic nature of many species presented challenges for accurate field identification.

Based on these findings, future surveys should implement several key improvements. We recommend conducting studies during the peak activity season to ensure a more comprehensive species count. Obtaining appropriate tools and equipment will enhance data collection efficiency, and collaborating with experienced herpetologists will improve the accuracy of species identification. Adopting these recommendations will significantly improve the reliability and completeness of future herpetofauna surveys in this area.

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5 Annexures

5.1 FLORAL SPECIES BY STATION AND HABITAT

1.1 Vegetation Assessment Protocol for Trees

Data sheet (Tree Vegetation > 1.3m)

Dzongkhag: Chukha

Locality: Tala dam

Transect name: Above Tala Dam

Plot no: 1

North: 27.047908333

East: 89.580216667

Plot type(square): Trees (20 x 20 m)

Altitude: 1394.1

Aspect: North

Slope%: 25

Canopy cover: open, partial shade, closed

Forest type: Broadleaf

SN	Family	Scientific name	Common name	DBH(cm)	Height(m)
1	Canabaceae	<i>Celtis tetranda</i>	Nilgiri elm	51	15
2	Canabaceae	<i>Celtis tetranda</i>	Nilgiri elm	41	10
3	Canabaceae	<i>Celtis tetranda</i>	Nilgiri elm	44	10
4	Canabaceae	<i>Celtis tetranda</i>	Nilgiri elm	44	11
5	Canabaceae	<i>Celtis tetranda</i>	Nilgiri elm	49	13
6	Lauraceae	<i>Actinodaphne obovata</i>		51	13
7	Lauraceae	<i>Actinodaphne obovata</i>		44	10
8	Araliaceae	<i>Brassiopsis hainla</i>	Seto chuletro	53	8
9	Araliaceae	<i>Brassiopsis hainla</i>	Seto chuletro	51	5
10	Araliaceae	<i>Brassiopsis hainla</i>	Seto chuletro	51	5

1.2 Vegetation Assessment Protocol for Shrubs

Data Sheet (Shrub Vegetation)

Plot type (Square): Shrubs (20x20)

SN	Family	Scientific name	Common name	DBH(cm)	Height(m)
1	Thymelaeaceae	<i>Edgeworthia gardneri</i>	Indian paper tree	1.5	5
2	Araliaceae	<i>Brassiopsis hainla</i>	Seto chuletro tree	3	1
3	Lauraceae	<i>Persea spp</i>	wild avocado	3	2
4	Myrtaceae	<i>Syzygium cumini</i>	Java plum	2	3

5	Araliaceae	<i>Eleutherococcus cissifolium</i>	Siberian Ginseng	1	1
6	Primulaceae	<i>Maesa chisia</i>	Chisia wild berry	3	2
7	Primulaceae	<i>Ardisia macrocarpa</i>	Himalayan coralberry	0.5	3
8	Elaeagnaceae	<i>Elaeagnus parvifolia</i>	Oleaster	1	2
1.3	Epiphytic				
SN	Family	Scientific name	Common name	Number	
1	Orchidaceae	<i>Dendrobium chrysanthum</i>			
1.4	Vegetation assessment protocol for herbs				
	Data Sheet (herb Vegetation)		Plot type (Square): herbs (2mx2m)		
SN	Family name	Scientific name	Common name	Cover% or number	
1	Caryophyllaceae	<i>Drymaria cordata</i>			25
2	Urticaceae	<i>Girardinia diversifolia</i>	Himalayan nettle		25
3	Urticaceae	<i>Pouzolzia hirta</i>	Oyik		25
4	Piperaceae	<i>Piper pedicellatum</i>	Long pipla		25
1.5	Other plants by Recce				
SN	Family name	Scientific name	Common name	Type of plant	
1	Acanthaceae	<i>Thunbergia coccinea</i>		Climbing shrub	
2	Gesneriaceae	<i>Rhynchoglossum obliquum</i>		Herb	
3	Ericaceae	<i>Agapetes variegata</i>		Shrub	
	Data sheet (Herbs)				
	Plot type(square): Herb (2x 2m)				
sl	Family name	Scientific name	Common name	Cover% or number	
1	Compositae	<i>Dichrocephala benthamii</i>		25	
2	Poaceae	<i>Oplismenus hirtellus</i>	Basket grass	25	
3	Urticaceae	<i>Girardinia diversifolia</i>		25	
4	Urticaceae	<i>Urtica dioica</i>		25	

1.1 Vegetation Assessment Protocol for Trees

Data sheet (Tree Vegetation > 1.3m)

Plot type(square): Trees (20 x 20 m)

Dzongkhag: Chukha

Altitude: 1809.9 m

Locality: Dam area

Aspect: SouthEast

Transect name: Below Dam

Slope%: 15

Plot no: 2

Forset canopy%:partial shade

North: 27.109285

Habitat type: CBLF

East:

89.53004

SN	Family	Scientific name	Common name	DBH(cm)	Height(m)
1	Betulaceae	<i>Alnus nepalensis</i>	Himalayan Alder	116	16
2	Betulaceae	<i>Betula alnoides</i>	Himalayan birch	113	15
3	Betulaceae	<i>Alnus nepalensis</i>	Himalayan Alder	83	10
4	Betulaceae	<i>Alnus nepalensis</i>	Himalayan Alder	83	10
5	Salicaceae	<i>Populus ciliata</i>	Himalayan poplar	41	15
6	Araliaceae	<i>Brassiopsis hainla</i>	Seto chuletro tree	53	7
7	Betulaceae	<i>Betula alnoides</i>	Himalayan birch	88	9
8	Betulaceae	<i>Alnus nepalensis</i>	Himalayan Alder	129	18
9	Betulaceae	<i>Alnus nepalensis</i>	Himalayan Alder	132	15
10	Betulaceae	<i>Alnus nepalensis</i>	Himalayan Alder	109	12
11	Betulaceae	<i>Alnus nepalensis</i>	Himalayan Alder	171	20
12	Betulaceae	<i>Alnus nepalensis</i>	Himalayan Alder	136	19

1.2 Vegetation Assessment Protocol for Shrubs

Data Sheet (Shrub Vegetation)

Plot type (Square): Shrubs(20x20)

SN	Family	Scientific name	Common name	Ht(m)	number
1	Urticaceae	<i>Debregeasia longifolia</i>	Orange wild rhea	4	1
2	Theaceae	<i>Eurya acuminata</i>	Tapering leaf eurya	6	1
3	Ericaceae	<i>Lyonia ovalifolia</i>	Fetterbush	5	1
4	Sapindaceae	<i>Acer oblongum</i>	Evergreen maple	3	2

5	Polygonaceae	<i>Aconogonum molle</i>	Soft knotweed	4	15
6	Acanthaceae	<i>Strobilanthes capitata</i>		1	50

1.4 Data sheet (Herbs) Plot type(square): Herb (2x 2m)

SN	Family name	Scientific name	Common name	Cover% or number
1	Compositae	<i>Dichrocephala benthamii</i>		25
2	Poaceae	<i>Oplismenus hirtellus</i>	Basket grass	25
3	Urticaceae	<i>Girardinia diversifolia</i>		25
4	Urticaceae	<i>Urtica dioica</i>		25

1.5 Other Plants by RECEE

SN	Family name	Scientific name	Common name	Type of plant
1	Compositae	<i>Gynura nepalensis</i>		Shrub
2	Gramineae	<i>Arundo donax</i>		grass
3	Myrsinaceae	<i>Maesa macrophylla</i>		Shrub

1.1 Vegetation Assessment Protocol for Trees

Data sheet (Tree Vegetation > 1.3m) Plot type(square): Trees (20 x 20 m)
Dzongkhag: Chukha Altitude: 2133.3
Locality: Chanachen Aspect: South
Transect name: Above old road Slope%: 15
Plot no: 3 Forset canopy%: Partial shade
North: 27.119606667 Habitat type: CBLF
East: 89.52974

SN	Family	Scientific name	Common name	DBH(cm)	Height(m)
1	Symplocaceae	<i>Symplocos ramosissima</i>	Sapphire berry	67	9
2	Fagaceae	<i>Quercus oxyodon</i>	Sharp-toothed oak	64	10
3	Anacardiaceae	<i>Rhus spp</i>	Tanners	56	10
4	Anacardiaceae	<i>Rhus spp</i>	Tanners	41	5
5	Symplocaceae	<i>Symplocos ramosissima</i>	Sapphire berry	41	7

6	Lauraceae	<i>Dodecadenia grandiflora</i>	Tailiya	125	15
7	Lauraceae	<i>Dodecadenia grandiflora</i>	Tailiya	104	17
8	Symplocaceae	<i>Symplocos ramosissima</i>	Sapphire berry	46	10
9	Symplocaceae	<i>Symplocos sumuntia</i>	Shan fan	129	17
10	Symplocaceae	<i>Quercus oxyodon</i>	Sharp-toothed oak	129	15
11	Symplocaceae	<i>Populus ciliata</i>	Himalayan poplar	194	15
12	Symplocaceae	<i>Quercus lanata</i>	Ban oak	232	20
13	Symplocaceae	<i>Quercus oxyodon</i>	Sharp-toothed oak	33	10
14	Symplocaceae	<i>Quercus oxyodon</i>	Sharp-toothed oak	118	18
15	Symplocaceae	<i>Eurya acuminata</i>	Tapering eurya	73	16
16	Symplocaceae	<i>Prunus carmesina</i>	Wild himalayan cherry	183	25
17	Symplocaceae	<i>Symplocos ramosissima</i>	Sapphire berry	63	10
18	Symplocaceae	<i>Symplocos racemosa</i>	Lodh tree	51	7
19	Symplocaceae	<i>Quercus oxyodon</i>	Sharp-toothed oak	190	21

1.2 Vegetation Assessment Protocol for Shrubs

Data sheet(Shrub Vegetation)

Plot Type(square): Shrub(20x20m)

SN	Family	Scientific name	Common name	DBH(cm)	Height(m)
1	Thymelaeaceae	<i>Daphne bholua</i>	Australian cheesewood	1	3
2	Primulaceae	<i>Ardisia macrocarpa</i>	Himalayan coralberry	0.2	7
3	Symplocaceae	<i>Symplocos racemosa</i>	Lodh tree	2	20
4	Lauraceae	<i>Cinnamomum glanduliferum</i>	Cinnamon	0.3	1
5	Adoxaceae	<i>Viburnum erubescens</i>	reddish viburnum	3	1
6	Oleaceae	<i>Ligustrum confusum</i>	Indian privet	0.2	1

7	Poaceae	<i>Chimonobambusa callosa</i>		2	50
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1.4 Data sheet (Herbs)

Plot type(square): Herb (2x 2m)

SN	Family name	Scientific name	Common name	Cover% or number
1	Urticaceae	<i>Pilea spp</i>		25
2	Poaceae	<i>Oplismenus hirtellus</i>		50
3	Dryopteridaceae	<i>Polystichum spp</i>		25

1.1 Vegetation Assessment Protocol for Trees

Data sheet (Tree Vegetation > 1.3m)

Plot type(square): Trees (20 x 20 m)

Dzongkhag:

Chukha

Altitude: 1961.4

Locality: Bunagu

Aspect: West

Transect name: Chanachen junction

Slope%: 10

Plot no: 4

Forsst canop partial shade

North:

27.118288333

Habitat type: CBLF

East: 89.538913333

SN	Family name	Scientific name	Common name	DBH(cm)	Height(m)
1	Symplocaceae	<i>Symplocos ramosissima</i>		45	7
2	Ericaceae	<i>Rhododendron arboreum</i>		52	8
3	Fagaceae	<i>Quercus lanata</i>		353	15
4	Schoepfiaceae	<i>Schoepfia jasminodora</i>		100	10
5	Symplocaceae	<i>Symplocos ramosissima</i>		145	17
6	Symplocaceae	<i>Symplocos ramosissima</i>		68	11
7	Magnoliaceae	<i>Michelia doltsapa</i>		161	15
8	Fagaceae	<i>Quercus glauca</i>		27	10

1..2 Vegetation Assessment Protocol for Shrubs

SN	Family	Scientific name	Common name	DBH(cm)	Height(m)
1	Symplocaceae	<i>Symplocos ramosissima</i>		1	17
2	Theaceae	<i>Eurya acuminata</i>		1	20
3	Lauraceae	<i>Cinnamomum spp</i>		1	3
4	Poaceae	<i>Yushania spp</i>		1	50
5	Moraceae	<i>Morus spp</i>		0.2	3

Data sheet (Herbs) Plot type(square): Herb (2x 2m)`

SN	Family name	Scientific name	Common name	Cover% or number
1	Compositae	<i>Anaphalis nepalensis</i>		
2	Compositae	<i>Bidens pilosa</i>		

1.1 Vegetation Assessment Protocol for Trees

Data sheet (Tree Vegetation > 1.3m) Plot type(square): Trees (20 x 20 m)

Dzongkhag:

Chukha

Altitude: 1883.8

Locality:

Chanchen

Aspect: SE

Transect name:above bridge

Slope%: 20%

Plot no: 5

Forset canopy%: partial shade

North:

27.127935

Habitat type: CBLF

East:

89.539278333

SN	Family	Scientific name	Common name	DBH(cm)	Height(m)
1	Betulaceae	<i>Carpinus viminea</i>	Himalayan hornbeam	138	16
2	Betulaceae	<i>Carpinus viminea</i>	Himalayan hornbeam	35	12
3	Betulaceae	<i>Carpinus viminea</i>	Himalayan hornbeam	55	10
4	Betulaceae	<i>Carpinus viminea</i>	Himalayan hornbeam	56	13

5	Betulaceae	<i>Carpinus viminea</i>	Himalayan hornbeam	74	13
6	Betulaceae	<i>Carpinus viminea</i>	Himalayan hornbeam	93	15
7	Fagaceae	<i>Quercus griffithii</i>	Oak	170	15
8	Fagaceae	<i>Quercus lanata</i>	Ban oak	170	15
9	Fagaceae	<i>Quercus lanata</i>	Ban oak	255	17
10	Pinaceae	<i>Pinus walllichiana</i>	Blue pine	310	45
11	Ericaceae	<i>Rhododendron arboreum</i>	Rhodo	25	5
12	Ericaceae	<i>Rhododendron arboreum</i>	Rhodo	39	9
13	Salicaceae	<i>Populus ciliata</i>	Himalayan poplar	147	15
14	Fagaceae	<i>Quercus lanata</i>	Ban oak	117	9

1..2 Vegetation Assessment Protocol for Shrubs

Plot Type(square):

Data sheet(Shrub Vegetation)

Shrub(20x20m)

SN	Family	Scientific name	Common name	DBH(cm)	Height(m)
1	Theaceae	<i>Eurya acuminata</i>	Tapering leaf eurya	1	25
2	Myrsinaceae	<i>Ardisia macrocarpa</i>	Himalayan coralberry	0.3	5
3	Leguminosae	<i>Desmodium spp</i>		0.5	20

Epiphyte

SN	Family name	Scientific name	Common name	number
1	Orchidaceae	<i>Eria coronaria</i>		2
2	Orchidaceae	<i>Bulbophyllum retusiusculum</i>		7
3	Ericaceae	<i>Vaccinium vacciniaceum</i>		1
4	Ericaceae	<i>Agapetes serpens</i>		1

1.1 Vegetation Assessment Protocol for Trees

Data sheet (Tree Vegetation > 1.3m)

Dzongkhag: Chukha

Locality: Chanachen

Transect name: Below village

Plot no: 6

North: 27.137031667

East: 89.539318333

Plot type(square): Trees (20 x 20 m)

Altitude: 1889.8

Aspect: South

Slope%: 15

Forest canopy%: Partia shade

Habitat type: CBLF

S N	Family	Scientific name	Common name	DBH(cm)	Heigh t(m)
1	Lauraceae	<i>Dodecadenia grandiflora</i>	Tailiya	86	15
2	Lauraceae	<i>Dodecadenia grandiflora</i>	Tailiya	61	7
3	Salicaceae	<i>Populus ciliata</i>	Himalayan poplar	212	17
4	Lauraceae	<i>Dodecadenia grandiflora</i>	Tailiya	85	12
5	Lauraceae	<i>Dodecadenia grandiflora</i>	Tailiya	68	7
6	Betulaceae	<i>Alnus nepalensis</i>	Himalayan Alder	358	27
7	Symplocaceae	<i>Symplocos sumuntia</i>	Shan fan	40	5
8	Betulaceae	<i>Betula alnoides</i>	Himalayan birch	190	21
9	Lauraceae	<i>Dodecadenia grandiflora</i>	Tailiya	65	10
10	Betulaceae	<i>Alnus nepalensis</i>	Himalayan Alder	120	15
11	Betulaceae	<i>Carpinus viminea</i>	Himalayan hornbeam	90	15

1.2 Vegetation Assessment Protocol for Shrubs

Data sheet(Shrub Vegetation)

Plot Type(square): Shrub(20x20m)

SN	Family	Scientific name	Common name	ht(m)	Number
1	Buxaceae	<i>Sarcococca saligna</i>	Christmas box	0.5	30
2	Berberidaceae	<i>Berberis spp</i>	Barberry	2	8
3	Myrsinaceae	<i>Ardisia macrocarpa</i>	Himalayan coralberry	0.5	15

4	Thymelaeaceae	<i>Daphne bholua</i>	Australian cheesewood	1	11
5	Berberidaceae	<i>Mahonia napalensis</i>	Nepal barberry	1	2
6	Acanthaceae	<i>Strobilanthes spp</i>		1	50

Data sheet (Herbs)

Plot type(square): Herb (2x 2m)

SN	Family name	Scientific name	Common name	Cover% or number
1	Poaceae	<i>Oplismenus hirtellus</i>	Basket grass	25
2	Solanaceae	<i>Solanum viarum</i>	Tropical soda apple	25
3	Compositae	<i>Dichrocephala benthamii</i>		
4	Amaranthaceae	<i>Alternanthera sessilis</i>		

Regeneration

SN	Family name	Scientific name	Common name	Number
1	Myrsinaceae	<i>Ardisia macrocarpa</i>		10

1.1 Other Plants by RECEE

SN	Family name	Scientific name	Common name	Type of plant
1	Pontederiaceae	<i>Monochoria vaginalis</i>		Herb
2	Saururaceae	<i>Houttuynia cordata</i>		Herb
3	Hamamelidaceae	<i>Corylopsis himalayana</i>		Shrub
4	Gramineae	<i>Setaria palmifolia</i>		Herb

1.1 Vegetation Assessment Protocol for Trees

Data sheet (Tree Vegetation > 1.3m)
Dzongkhag: Chukha

Plot type(square): Trees (20 x 20 m)
Altitude: 2088.8 m

Locality:

Bunagu

Transect name: above road

Plot no: 7

North: 27.138536667

East: 89.545085

Aspect: South

Slope%: 5

Forest canopy cover%: Partial shade

Habitat type: CBLF

SN	Family	Scientific name	Common name	DBH(cm)	Height(m)
1	Symplocaceae	<i>Symplocos sumuntia</i>	Shan fan	94	10
2	Betulaceae	<i>Corylus ferox</i>		90	10
3	Ericaceae	<i>Lyonia ovalifolia</i>		246	15
4	Symplocaceae	<i>Symplocos sumuntia</i>	Shan fan	76	12
5	Ericaceae	<i>Pieris formosa</i>		30	7
6	Ericaceae	<i>Pieris formosa</i>		31	7
7	Fagaceae	<i>Quercus glauca</i>		90	12
8	Ericaceae	<i>Rhododendron griffithianum</i>		78	9
9	Lauraceae	<i>Cinnamomum glanduliferum</i>	Cinnamon	480	15
10	Symplocaceae	<i>Symplocos ramosissima</i>	Sapphire berry	45	7
11	Fagaceae	<i>Quercus griffithii</i>	Oak	360	17
12	Symplocaceae	<i>Symplocos ramosissima</i>	Sapphire berry	48	5
13	Symplocaceae	<i>Symplocos ramosissima</i>	Sapphire berry	30	4
14	Ericaceae	<i>Lyonia ovalifolia</i>		30	5
15	Ericaceae	<i>Rhododendron griffithianum</i>		145	10
16	Betulaceae	<i>Corylus ferox</i>		38	9

1.2 Vegetation Assessment Protocol for Shrubs

Data sheet(Shrub Vegetation)

Plot Type(square): Shrub(20x20m)

SN	Family	Scientific name	Common name	DBH(cm)	Height(m)
1	Myrsinaceae	<i>Ardisia macrocarpa</i>	Himalayan coralberry	1	50

2	Thymelaeaceae	<i>Daphne bholua</i>	Australian cheesewood	1	6
3	Berberidaceae	<i>Berberis aristata</i>		1	5
4	Symplocaceae	<i>Symplocos ramosissima</i>		2	7
5	Symplocaceae	<i>Symplocos sumuntia</i>		2	4
6	Oleaceae	<i>Ligustrum confusum</i>	Chinese privet	1	2
7	Berberidaceae	<i>Mahonia nepalensis</i>		0.3	1

Data sheet (Herbs)

Plot type(square): Herb (2x 2m)

SN	Family name	Scientific name	Common name	Cover% or number
1	Gramineae	<i>Oplismenus histellus</i>		100

1.1 Vegetation Assessment Protocol for Trees

Data sheet (Tree Vegetation > 1.3m)

Plot type(square): Trees (20 x 20 m)

Dzongkhag: Chukha

Locality: Chanachen

Transect name: Near village

Plot no: 8

North: 27.14623

East: 89.52884

Altitude: 2243.7 m

Aspect: SE

Slope%:25

Forest canopy%:CBLF

Habitat type: CBLF

SN	Family	Scientific name	Common name	DBH(cm)	Height(m)
1	Betulaceae	<i>Corylus ferox</i>	Hazel tree	53	10
2	Betulaceae	<i>Alnus nepalensis</i>	Himalayan Alder	73	13
3	Lauraceae	<i>Dodecadenia grandiflora</i>	Tailiya	71	9
4	Betulaceae	<i>Alnus nepalensis</i>	Himalayan Alder	108	20
5	Betulaceae	<i>Alnus nepalensis</i>	Himalayan Alder	70	15
6	Betulaceae	<i>Alnus nepalensis</i>	Himalayan Alder	71	15
7	Betulaceae	<i>Alnus nepalensis</i>	Himalayan Alder	216	17

8	Symplocaceae	<i>Symplocos ramosissima</i>	Sapphire berry	29	7
9	Symplocaceae	<i>Symplocos ramosissima</i>	Sapphire berry	30	7
10	Symplocaceae	<i>Symplocos ramosissima</i>	Sapphire berry	40	9
11	Betulaceae	<i>Alnus nepalensis</i>	Himalayan Alder	141	20
12	Betulaceae	<i>Betula alnoides</i>	Himalayan birch	59	12
13	Salicaceae	<i>Populus ciliata</i>	Himalayan poplar	220	25
14	Betulaceae	<i>Alnus nepalensis</i>	Himalayan Alder	170	25

1.2 Vegetation Assessment Protocol for Shrubs

Data sheet(Shrub Vegetation)

Plot Type(square): Shrub(20x20m)

SN	Family	Scientific name	Common name	DBH(cm)	Height(m)
1	Adoxaceae	<i>Viburnum erubescens</i>	reddish viburnum	2	8
2	Theaceae	<i>Eurya acuminata</i>	Tapering leaf eurya	2	2
3	Symplocaceae	<i>Symplocos ramosissima</i>	Sapphire berry	2	30
4	Thymelaeaceae	<i>Daphne bholua</i>	Australian cheesewood	1	3
5	Myrsinaceae	<i>Ardisia macrocarpa</i>	Himalayan coralberry	0.3	2
6	Berberidaceae	<i>Berberis spp</i>	Barberry	0.1	2

1.3 Data sheet (Herbs)

Plot type(square): Herb (2x 2m)

SN	Family name	Scientific name	Common name	Cover% or number
1	Gramineae	<i>Oplismenus hirtellus</i>		25
2	Urticaceae	<i>Urtica dioica</i>		25
3	Urticaceae	<i>Lecanthus peduncularis</i>		25
4	Urticaceae	<i>Pilea bracteosa</i>		25

1.4 Other Plants by RECEE

SN	Family name	Scientific name	Common name	Type of plant
1	Hydrangeaceae	<i>Hydrangea anomala</i>		Climbing Shrub
2	Meliaceae	<i>Toona ciliata</i>		Tree

3	Umbelliferae	<i>Hydrocotyle himalaica</i>		Herb
4	Rosaceae	<i>Sibbaldia parviflora</i>		Herb

1.1 Vegetation Assessment Protocol for Trees

Data sheet (Tree Vegetation > 1.3m)

Plot type(square): Trees (20 x 20 m)

Dzongkhag: Chukha

Altitude: 1983.1 m

Locality:

Bunagu

Aspect: SW

Transect name: Near Hotel

Slope%: 35

Plot no: 9

Forest canopy%: Pattial shade

North: 27.145088333

Habitat type: CBLF

East:

89.536455

SN	Family	Scientific name	Common name	DBH(cm)	Height(m)
1	Fagaceae	<i>Quercus lanata</i>	Ban oak	140	15
2	Fagaceae	<i>Quercus lanata</i>	Ban oak	118	12
3	Fagaceae	<i>Quercus lanata</i>	Ban oak	36	7
4	Fagaceae	<i>Quercus lanata</i>	Ban oak	225	17
5	Fagaceae	<i>Quercus lanata</i>	Ban oak	28	5
6	Fagaceae	<i>Quercus lanata</i>	Ban oak	160	15
7	Fagaceae	<i>Quercus griffithii</i>	Oak	136	15
8	Fagaceae	<i>Quercus griffithii</i>	Oak	37	6
9	Fagaceae	<i>Quercus griffithii</i>	Oak	47	7
10	Fagaceae	<i>Quercus griffithii</i>	Oak	145	10
11	Fagaceae	<i>Quercus griffithii</i>	Oak	51	7

1.2 Vegetation Assessment Protocol for Shrubs

Data sheet(Shrub Vegetation)

Plot Type(square): Shrub(20x20m)

SN	Family	Scientific name	Common name	DBH(cm)	Height(m)
1	Elaeagnaceae	<i>Elaeagnus parvifolia</i>	Silver thorn	1	2
2	Berberidaceae	<i>Berberis aristata</i>		1	5
3	Theaceae	<i>Eurya acuminata</i>		2	13
4	Poaceae	<i>Yushania spp</i>		2	20

1.3 Data sheet (Herbs)

Plot type(square): Herb (2x 2m)

SN	Family name	Scientific name	Common name	Cover% or number
1	Gramineae	<i>Oplismenus histellus</i>		55
2	Compositae	<i>Ainsliaea aptera</i>		20
3	Compositae	<i>Adenostemma lavenia</i>		25

1.1 Vegetation Assessment Protocol for Trees

Data sheet (Tree Vegetation > 1.3m)

Plot type(square): Trees (20 x 20 m)

Dzongkhag:

Chukha

Locality: Near Bunakha

Transect name: Below road

Plot no: 10

North: 27.154858333

East: 89.5389

Altitude: 1974.6

Aspect: SW

Slope%: 15

Forest canopy cover%: partial shade

Habitat type:

CBLF

SN	Family	Scientific name	Common name	DBH(cm)	Height(m)
1	Betulaceae	<i>Carpinus viminea</i>		50	15
2	Torricelliaceae	<i>Torricellia tiliifolia</i>		55	6
3	Torricelliaceae	<i>Torricellia tiliifolia</i>		63	5

4	Salicaceae	<i>Populus ciliata</i>	Himalayan poplar	106	20
5	Salicaceae	<i>Populus ciliata</i>	Himalayan poplar	120	20
6	Salicaceae	<i>Populus ciliata</i>	Himalayan poplar	123	20
7	Salicaceae	<i>Populus ciliata</i>	Himalayan poplar	183	22
8	Salicaceae	<i>Populus ciliata</i>	Himalayan poplar	127	20
9	Salicaceae	<i>Populus ciliata</i>	Himalayan poplar	73	15
10	Fagaceae	<i>Quercus lanata</i>	Ban oak	55	9
11	Fagaceae	<i>Quercus lanata</i>	Ban oak	35	7
12	Fagaceae	<i>Quercus lanata</i>	Ban oak	69	10

1.2 Vegetation Assessment Protocol for Shrubs

Data sheet(Shrub Vegetation)

Plot Type(square): Shrub(20x20m)

sl	Family	Scientific name	Common name	DBH(cm)	Height(m)
1	Myrsinaceae	<i>Ardisia macrocarpa</i>	Himalayan coralberry	0.5	6
2	Thymelaeaceae	<i>Daphne bholua</i>	Australian cheesewood	1	5
3	Theaceae	<i>Eurya acuminata</i>	Tapering leaf eurya	2	20

1.3 Data sheet (Herbs)

Plot type(square): Herb (2x 2m)

SN	Family name	Scientific name	Common name	Cover% or number
1	Urticaceae	<i>Girardinia diversifolia</i>		50
2	Zingiberaceae	<i>Hedychium spicatum</i>		50

1.1 Vegetation Assessment Protocol for Trees

Data sheet (Tree Vegetation > 1.3m)

Plot type(square): Trees (20 x 20 m)

Dzongkhag: Chukha

Locality: Geeling Goenpa

Transect name: Below road

Plot no: 11

North: 27.16369

East: 89.524815

Altitude: 2476.7

Aspect: SouthEast

Slope%: 25

Forest canopy cover%: partial shade

Habitat type: CBLD

SN	Family	Scientific name	Common name	DBH(cm)	Height(m)
1	Pinaceae	<i>Pinus wallichiana</i>	Blue pine	64	15
2	Pinaceae	<i>Pinus wallichiana</i>	Blue pine	99	20
3	Betulaceae	<i>Alnus nepalensis</i>	Himalayan Alder	90	15
4	Betulaceae	<i>Alnus nepalensis</i>	Himalayan Alder	80	10
5	Ericaceae	<i>Rhododendron arboreum</i>	Rhodo	35	7
6	Fagaceae	<i>Lithocarpus fenestratus</i>	Stone oak	90	13
7	Fagaceae	<i>Lithocarpus fenestratus</i>	Stone oak	73	12
8	Fagaceae	<i>Lithocarpus fenestratus</i>	Stone oak	90	13
9	Betulaceae	<i>Carpinus viminea</i>	Himalayan hornbeam	89	15
10	Symplocaceae	<i>Symplocos sumuntia</i>	Shan fan	35	9
11	Betulaceae	<i>Alnus nepalensis</i>	Himalayan Alder	83	15
12	Ericaceae	<i>Rhododendron arboreum</i>	Rhodo	59	10
13	Betulaceae	<i>Carpinus viminea</i>	Himalayan hornbeam	50	9
14	Pinaceae	<i>Pinus wallichiana</i>	Blue pine	124	20
15	Betulaceae	<i>Carpinus viminea</i>	Himalayan hornbeam	52	9
16	Pinaceae	<i>Pinus wallichiana</i>	Blue pine	160	22
17	Betulaceae	<i>Alnus nepalensis</i>	Himalayan Alder	89	15
18	Ericaceae	<i>Rhododendron arboreum</i>	Rhodo	38	5

19	Ericaceae	<i>Rhododendron arboreum</i>	Rhodo	37	5
20	Ericaceae	<i>Rhododendron arboreum</i>	Rhodo	39	5
21	Pinaceae	<i>Pinus wallichiana</i>	Blue pine	83	15
22	Ericaceae	<i>Pieris formosa</i>		28	5
23	Fagaceae	<i>Lithocarpus fenestratus</i>	Stone oak	58	10

1.2 Vegetation Assessment Protocol for Shrubs

Data sheet(Shrub Vegetation)

Plot Type(square): Shrub(20x20m)

SN	Family	Scientific name	Common name	DBH(cm)	Height(m)
1	Symplocaceae	<i>Symplocos sumantia</i>	Shan fan	1	6
2	Theaceae	<i>Eurya acuminata</i>	Tapering eurya	2	7
34	Ericaceae	<i>Pieris formosa</i>		0.5	4
5	Berberidaceae	<i>Berberis spp</i>		1	4
6	Symplocaceae	<i>Symplocos ramosissima</i>	Sapphire berry	5	3
7	Rosaceae	<i>Rubus acuminatus</i>		5	3
8	Lauraceae	<i>Dodecadenia grandiflora</i>	Tailiya	1	2
9	Smilacaceae	<i>Smilax spp</i>		0.5	10
10	Poaceae	<i>Yushiania spp</i>		3	50
11	Rutaceae	<i>Zanthoxylum armatum</i>	Rattan pepper	2	1

Data sheet (Herbs)

1.3 Plot type(square): Herb (2x 2m)

SN	Family name	Scientific name	Common name	Cover% or number
1	Orchidaceae	<i>Goodyera dongchenii</i>		45
2	Gramineae	<i>Oplismenus histellus</i>		35
3	Convallariaceae	<i>Ophiopogon intermedius</i>		20

1.4 Other Plants by RECEE

SN	Family name	Scientific name	Common name	Type of plant
1	Rosaceae	<i>Prunus napaulensis</i>		Tree

2	Phytolaccaceae	<i>Phytolacca acinosa</i>		Herb
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1.1 Vegetation Assessment Protocol for Trees

Data sheet (Tree Vegetation > 1.3m)

Plot type(square): Trees (20 x 20 m)

Dzongkhag: Chukha

Altitude: 1975.1

Aspect:

Locality: Tanalum area

SW

Slope%:

Transect name: below road

25

Plot no: 12

Forest canopy cover:%:partial shade

North: 27.173816667

Habitat type: CBLF

SN	Family	Scientific name	Common name	DBH(cm)	Height(m)
1	Fagaceae	<i>Quercus lanata</i>	Ban oak	151	15
2	Fagaceae	<i>Quercus lanata</i>	Ban oak	148	15
3	Fagaceae	<i>Quercus lanata</i>	Ban oak	112	15
4	Fagaceae	<i>Quercus lanata</i>	Ban oak	130	15
5	Fagaceae	<i>Quercus lanata</i>	Ban oak	46	7
6	Fagaceae	<i>Quercus lanata</i>	Ban oak	167	20
7	Fagaceae	<i>Quercus lanata</i>	Ban oak	49	8
8	Fagaceae	<i>Quercus lanata</i>	Ban oak	28	8
9	Fagaceae	<i>Quercus lanata</i>	Ban oak	250	17
10	Fagaceae	<i>Quercus lanata</i>	Ban oak	239	15
11	Fagaceae	<i>Quercus lanata</i>	Ban oak	110	12
12	Fagaceae	<i>Quercus lanata</i>	Ban oak	115	12
13	Pinaceae	<i>Pinus wallichiana</i>	Bluepine	34	6
14	Toricelliaceae	<i>Toricellia tiliifolia</i>		69	7

1.2 Vegetation Assessment Protocol for Shrubs

Data sheet(Shrub Vegetation)

Plot Type(square): Shrub(20x20m)

SN	Family	Scientific name	Common name	DBH(cm)	Height(m)
1	Theaceae	<i>Eurya acuminata</i>	Tapering eurya	2	25
2	Ericaceae	<i>Lyonia ovalifolia</i>		2	3
3	Fagaceae	<i>Quercus lanata</i>	Ban oak	1	4

1.3 Data sheet (Herbs)

Plot type(square): Herb (2x 2m)

SN	Family name	Scientific name	Common name	Cover% or number
1	Compositae	<i>Bidens pilosa</i>		25
2	Rubiaceae	<i>Galium aparine</i>		25
3	Compositae	<i>Ainsliaea aptera</i>		25
4	Compositae	<i>Adenostemma lavenia</i>		25

1.1 Plot type(square): Trees (20 x 20 m)

Altitude:
Dzongkhag: Chukha 2007.3
Aspect:
Locality: Tanalum South
Transect name: above new bridge Slope%: 45
Plot no: 13 Forest canopy cover%: Partial shade
North: 27.184211667 Habitat type: CBLF
East: 89.527851667

SN	Family name	Scientific name	Common name	DBH(cm)	Height(m)
1	Fagaceae	<i>Quercus lanata</i>	Ban oak	60	10
2	Fagaceae	<i>Quercus lanata</i>	Ban oak	68	10
3	Fagaceae	<i>Quercus lanata</i>	Ban oak	77	10
4	Fagaceae	<i>Quercus lanata</i>	Ban oak	23	4
5	Fagaceae	<i>Quercus lanata</i>	Ban oak	78	9

6	Fagaceae	<i>Quercus lanata</i>	Ban oak	86	9
7	Fagaceae	<i>Quercus lanata</i>	Ban oak	86	11
8	Fagaceae	<i>Quercus lanata</i>	Ban oak	99	11
9	Fagaceae	<i>Quercus lanata</i>	Ban oak	93	11
10	Fagaceae	<i>Quercus lanata</i>	Ban oak	72	10

1.2 Vegetation Assessment Protocol for Shrubs

Data sheet(Shrub Vegetation)

Plot Type(square): Shrub(20x20m)

SN	Family	Scientific name	Common name	DBH(cm)	Height(m)
1	Ericaceae	<i>Lyonia ovalifolia</i>		1	20
2	Fagaceae	<i>Quercus lanata</i>		1	15
3	Pinaceae	<i>Pinus wallichiana</i>		1	3
4	Fabaceae	<i>indigofera tinctoria</i>		0.5	3

1.3 Data sheet (Herbs)

Plot type(square): Herb (2x
2m)

SN	Family name	Scientific name	Common name	Cover% or number
1	Labiatae	<i>Leucas ciliata</i>		10
2	Rubiaceae	<i>Galium aparine</i>		15
3	Valerianaceae	<i>Valeriana jatamansi</i>		10
4	Compositae	<i>Ainsliaea aptera</i>		25
5	Poaceae	<i>oplismenus hirtellus</i>		40

1.4 Regeneration

SN	Family name	Scientific name	Common name	Number
1	Fagaceae	<i>Quercus lanata</i>		20

1.1 Vegetation Assessment Protocol for Trees

Data sheet (Tree Vegetation >
1.3m)

Plot type(square): Trees (20 x
20 m)

Dzongkhag: Paro
Locality: Bjishigang
Transect name: River
Plot no: 14
North: 2024.900 m
East: 2024.900 m

Altitude:
2024.900 m
Aspect:
Slope%:
Forest canopy cover%:
Habitat type: CBLF

sl	Family	Scientific name	Common name	DBH(cm)	Height(m)
1	Pinaceae	<i>Pinus wallichiana</i>	Blue pine	60	9
2	Pinaceae	<i>Pinus wallichiana</i>	Blue pine	58	8
3	Pinaceae	<i>Pinus wallichiana</i>	Blue pine	61	9
4	Pinaceae	<i>Pinus wallichiana</i>	Blue pine	58	7
5	Pinaceae	<i>Pinus wallichiana</i>	Blue pine	59	7
6	Betulaceae	<i>Carpinus viminea</i>		173	8
7	Lauraceae	<i>Dodecadenia grandiflora</i>	Tailiya	127	13
8	Betulaceae	<i>Carpinus viminea</i>		95	11
9	Cornaceae	<i>Benthamedia capitata</i>		48	8
10	Fagaceae	<i>Quercus griffithii</i>		103	13
11	Betulaceae	<i>Carpinus viminea</i>		98	12
12	Betulaceae	<i>Carpinus viminea</i>		92	12

1.2 Vegetation Assessment Protocol for Shrubs

Data sheet(Shrub Vegetation)

Plot Type(square): Shrub(20x20m)

SN	Family	Scientific name	Common name	Ht(m)	Number
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1	Pinaceae	<i>Pinus wallichiana</i>	Blue pine	1	9
2	Betulaceae	<i>Carpinus viminea</i>		1	60
3	Elaeagnaceae	<i>Elaeagnus parvifolia</i>	Silverthorn	2	30
4	Adoxaceae	<i>Viburnum cylindricum</i>		1	3
5	Berberidaceae	<i>Berberis aristata</i>		1	3

1.3 Epiphyte

SN	Family name	Scientific name	Common name	Number
1	Polypodiaceae	<i>Drynaria propinqua</i>		4
2	Polypodiaceae	<i>Pyrrosia spp</i>		2
3	Piperaceae	<i>Peperomia tetraphylla</i>		2

1.4 Data sheet (Herbs)

Plot type(square): Herb (2x 2m)

SN	Family name	Scientific name	Common name	Cover% or number
1	Oxalidaceae	<i>Oxalis corniculata</i>		25
2	Cannabaceae	<i>Cannabis sativa</i>		25
3	Compositae	<i>Sigesbeckia orientalis</i>		25
4	Asclepiadaceae	<i>Vincetoxicum hirundinaria</i>		25

1.5 Regeneration

SN	Family name	Scientific name	Common name	Number
1	Pinaceae	<i>Pinus wallichiana</i>	Blue pine	10
2	Betulaceae	<i>Carpinus viminea</i>		20

1.6 Other Plants by RECEE

SN	Family name	Scientific name	Common name	Type of plant
1	Compositae	<i>Dichrocephala benthamii</i>		herb
2	Berberidaceae	<i>Mahonia nepalensis</i>		Shrub

3	Compositae	<i>Inula cappa</i>		Shrub
4	Compositae	<i>Conyza stricta</i>		herb
5	Compositae	<i>Conyza bonariensis</i>		herb
6	Compositae	<i>Cirsium spp</i>		Shrub
7	Araceae	<i>Arisaema jacquemontii</i>		Herb
8	Cucurbitaceae	<i>Thladiantha cordifolia</i>		climber
9	Asteraceae	<i>eupatorium adenophorum</i>		herb
10	Compositae	<i>Tricholepis furcata</i>		Herb

1.1 Vegetation Assessment Protocol for Trees

Data sheet (Tree Vegetation > 1.3m)

Plot type(square): Trees (20 x 20 m)

Dzongkhag: Paro

Locality: way to Haa

Transect name: Near bridge

Plot no: 15

North: 27.20056

Altitude: 1956.4

Aspect: East

Slope%: 35

Forest canopy cover%: Partial shade

Habitat type: CBLF

SN	Family name	Scientific name	Common name	DBH(cm)	Height(m)
1	Lauraceae	<i>Dodecadenia grandiflora</i>	Tailiya	167	13
2	Lauraceae	<i>Dodecadenia grandiflora</i>	Tailiya	68	7
3	Lauraceae	<i>Dodecadenia grandiflora</i>	Tailiya	67	7
4	Fagaceae	<i>Quercus griffithii</i>	Oak	201	18
5	Fagaceae	<i>Quercus griffithii</i>	Oak	145	15
6	Fagaceae	<i>Quercus griffithii</i>	Oak	210	20
7	Fagaceae	<i>Quercus griffithii</i>	Oak	240	20
8	Betulaceae	<i>Carpinus viminea</i>		26	5
9	Betulaceae	<i>Carpinus viminea</i>		28	15
10	Fagaceae	<i>Quercus griffithii</i>	Oak	279	18
11	Fagaceae	<i>Quercus griffithii</i>	Oak	198	16

1.2 Vegetation Assessment Protocol for Shrubs

Data sheet(Shrub Vegetation)

Plot Type(square): Shrub(20x20m)

SN	Family	Scientific name	Common name	DBH(cm)	Height(m)
1	Oleaceae	<i>Ligustrum compactum</i>		2	3
2	Betulaceae	<i>Carpinus viminea</i>		1	3
3	Smilicaceae	<i>Smilax spp</i>		0.5	5
4	Berberidaceae	<i>Berberis aristata</i>		0.5	3
5	Poaceae	<i>Yushania spp</i>		2	15
6	Theaceae	<i>Eurya acuminata</i>		2	30
7	Berberidaceae	<i>Mahonia nepalensis</i>		0.7	2
8	Elaeagnaceae	<i>Elaeagnus parvifolia</i>	Silverthorn	3	4
9	Anacardiaceae	<i>Rhus spp</i>		0.5	2

1.3 Data sheet (Herbs)

Plot type(square): Herb (2x 2m)

SN	Family name	Scientific name	Common name	Cover% or number
1	Acanthaceae	<i>Dicliptera bupleuroides</i>		
2	Gramineae	<i>Oplismenus histellus</i>		

1.4 Regeneration

SN	Family name	Scientific name	Common name	Number
1	Fagaceae	<i>Quercus griffithii</i>		5

1.1 Vegetation Assessment Protocol for Trees

Data sheet (Tree Vegetation > 1.3m)

Plot type(square): Trees (20 x 20 m)

Dzongkhag: Paro

Altitude: 1959

Locality: Near Confluence

Aspect: East

Transect name: bridge

Slope%: 5

Forest canopy cover%: partial

Plot no: 16

shade

North: 27.204848333
East: 89.518766667

Habitat type: CBLF

SN	Family name	Scientific name	Common name	DBH(cm)	Height(m)
1	Cornaceae	<i>Benthamedia capitata</i>	Dogwood	30	7
2	Fagaceae	<i>Quercus griffithii</i>	Oak	290	18
3	Fagaceae	<i>Quercus griffithii</i>	Oak	220	17
4	Fagaceae	<i>Quercus griffithii</i>	Oak	138	15
5	Fagaceae	<i>Quercus griffithii</i>	Oak	235	15
6	Fagaceae	<i>Quercus griffithii</i>	Oak	105	15
7	Fagaceae	<i>Quercus griffithii</i>	Oak	125	15
8	Betulaceae	<i>Carpinus viminea</i>		25	5
9	Pinaceae	<i>Pinus wallichiana</i>	Bluepine	70	15
10	Pinaceae	<i>Pinus wallichiana</i>	Bluepine	55	10
11	Pinaceae	<i>Pinus wallichiana</i>	Bluepine	54	10
12	Pinaceae	<i>Pinus wallichiana</i>	Bluepine	43	9
13	Pinaceae	<i>Pinus wallichiana</i>	Bluepine	55	10

- 1.2 Vegetation Assessment Protocol for Shrubs
Data sheet(Shrub Vegetation)
Plot Type(square): Shrub(20x20m)

SN	Family	Scientific name	Common name	DBH(cm)	Height(m)
1	Elaeagnaceae	<i>Elaeagnus parvifolia</i>	silverthorn	3-Jan	19
2	Theaceae	<i>Eurya acuminata</i>		2	10
3	Lauraceae	<i>Cinnamomum glanduliferum</i>	Cinnamon	2	1
4	Berberidaceae	<i>Berberis aristata</i>		2	4
5	Pinaceae	<i>Pinus wallichiana</i>	Bluepine	2	6

- 1.3 Data sheet (Herbs)

**Plot type(square): Herb (2x
2m)**

SN	Family name	Scientific name	Common name	Cover% or number
1	Leguminosae	<i>Desmodium podocarpum</i>		25
2	Athyriaceae	<i>Diplazium esculentum</i>		25
3	Cyperaceae	<i>Cyperus rotundus</i>		50

1.5 Other plants by Recee

SN	Family name	Scientific name	Common name	Type of plant
1	Compositae	<i>Gynura nepalensis</i>		Shrub
2	Oleaceae	<i>Fraxinus floribunda</i>		Tree
3	Orchidaceae	<i>Cephalanthera longifolia</i>		Orchid

1.1 Vegetation Assessment Protocol for Tree

Data sheet(Shrub Vegetation)

Plot Type(square): Shrub(20x20m)

Dzongkhag: Chukha Altitude: 2049.1

Locality: Watsa Aspect: w

Transect name:

below Slope%: 35

Forest canopy cover:

Plot no: 17 Open

North: 27.227985 Habitat type: CBLF

East: 89.517805

SN	Family name	Scientific name	Common name	DBH(cm)	Height(m)
1	Fagaceae	<i>Quercus griffithii</i>	Oak	187	8

1.2 Vegetation Assessment Protocol for Shrubs

Data sheet(Shrub Vegetation)

Plot Type(square): Shrub(20x20m)

SN	Family name	Scientific name	Common name	Ht(M)	number
1	Rosacea	<i>Rosa sericea</i>		2	20
2	Berberidaceae	<i>Berberis spp</i>		2	20
3	Oleaceae	<i>Ligustrum compactum</i>		1	3
4	Rutaceae	<i>Zanthoxylum armatum</i>		1	3

1.3 Data sheet (Herbs)

Plot type(square): Herb (2x 2m)

SN	Family name	Scientific name	Common name	Cover% or number
1	Asparagaceae	<i>Asparagus racemosus</i>		
2	Rubiaceae	<i>Galium aparine</i>		
3	Gramineae	<i>Imperata cylindrica</i>		

1.4 Other Plants by RECEE

SN	Family name	Scientific name	Common name	Type of plant
1	Leguminosae	<i>Lespedeza juncea</i>		shrub
2	Elaeagnaceae	<i>Elaeagnus parvifolia</i>		shrub
3	Coriariaceae	<i>Coriaria nepalensis</i>		shrub
4	Vitaceae	<i>Vitis spp</i>		Climbing shrub
5	Compositae	<i>Gynura nepalensis</i>		Shrub

1.1 Vegetation Assessment Protocol for Trees

Data sheet(Tree vegetation >1.3m)

Plot type (square): Trees (20x20)

Altitude:

Dzongkhag: Chukha

1975.7

Locality: Damchu

Aspect: 35%

Transect name: Below road

Slope%: Northwest

Plot no: 18

North: 27.262568333

East: 89.528373333

Canopy cover: partial shade

Habitat type: CBLF

SN	Family	Scientific name	Common name	DBH(cm)	Height(m)
1	Pinaceae	<i>Pinus wallichiana</i>		124	20
2	Salicaceae	<i>Salix wallichiana</i>		65	5
3	Salicaceae	<i>Salix wallichiana</i>		45	3
4	Salicaceae	<i>Salix wallichiana</i>		58	4
5	Adoxaceae	<i>Viburnum cylindricum</i>		20	6
6	Salicaceae	<i>Salix wallichiana</i>		62	4
7	Salicaceae	<i>Salix wallichiana</i>		48	3
8	Salicaceae	<i>Salix wallichiana</i>		41	7
9	Aceraceae	<i>Acer campbellii</i>		36	4
10	Aceraceae	<i>Acer campbellii</i>		34	4
11	Aceraceae	<i>Acer campbellii</i>		107	9
12	Aceraceae	<i>Acer campbellii</i>		8	5

1.2 Vegetation Assessment Protocol for Shrubs

Data sheet(Shrub Vegetation)

Plot Type(square): Shrub(20x20m)

3SN	Family name	Scientific name	Common name	DBH(cm)	Height(m)
1	Rutaceae	<i>Zanthoxylum armatum</i>		0.7	2
2	Caprifoliaceae	<i>Lonicera quinquelocularis</i>		3	7
3	Oleaceae	<i>Ligustrum compactum</i>		1	3
4	Pinaceae	<i>Pinus wallichiana</i>		3	3
5	Coriariaceae	<i>Coriaria nepalensis</i>		3	
6	Rosaceae	<i>Rosa brunonii</i>		3	4
7	Aceraceae	<i>Acer oblongum</i>		1	1

8	Rosaceae	<i>Rosa sericea</i>		1	3
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1.3 Epiphyte

SN	Family name	Scientific name	Common name	number
1	Loranthaceae	<i>Scurrula elata</i>		3

1.4 Data sheet (Herbs)

Plot type(square): Herb (2x 2m)

SN	Family name	Scientific name	Common name	Cover% or number
1	Plumbaginaceae	<i>Ceratostigma griffithii</i>		25
2	Asparagaceae	<i>Asparagus racemosus</i>		25
3	Compositae	<i>Tanacetum nubigenum</i>		25
4	Asteraceae	<i>artemisia vulgaris</i>		25

1.1 Vegetation Assessment Protocol for Trees

Data sheet (Tree Vegetation > 1.3m)

Plot type(square): Trees (20 x 20 m)

Altitude: 1975.7

Dzongkhag: Chukha

m

Locality: Bunagu

Aspect: NE

Transect name: Below road

Slope%: 35

Plot no: 19

Canopy cover: partial shade

North: 27.131851667

abitat type: CBLF

East: 89.54199

SN	Family name	Scientific name	Common name	DBH(cm)	Height(m)
1	Fagaceae	<i>Quercus glauca</i>		87	15
2	Fagaceae	<i>Quercus glauca</i>		98	15
3	Fagaceae	<i>Quercus glauca</i>		355	20
4	Fagaceae	<i>Quercus glauca</i>		67	11

5	Fagaceae	<i>Quercus glauca</i>		95	20
6	Fagaceae	<i>Quercus glauca</i>		65	15
7	Betulaceae	<i>Carpinus vimenea</i>		27	9

1.2 Vegetation Assessment Protocol for Shrubs

Data sheet(Shrub Vegetation)

Plot Type(square): Shrub(20x20m)

SN	Family	Scientific name	Common name	ht(m)	Number
1	Myrsinaceae	<i>Ardisia macrocarpa</i>		0.5	10
2	Symplocaceae	<i>Symplocos ramosissima</i>		0.5	15
3	Thymelaeaceae	<i>Daphne bholua</i>		1	4
4	Gramineae	<i>Yushania spp</i>		2	20

1.3 Data sheet (Herbs)

Plot type(square): Herb (2x 2m)

SN	Family name	Scientific name	Common name	Cover% or number
1	Zingiberaceae	<i>Hedychium spicatum</i>		10
2	Compositae	<i>Dichrocephala benthamii</i>		10
3	Violaceae	<i>Viola spp</i>		10
4	Convallariaceae	<i>Ophiopogon intermedius</i>		20
5	Urticaceae	<i>Lecanthus peduncularis</i>		30
6	Gramineae	<i>Oplismenus histellus</i>		20
1.4	Regeneration			
SN	Family name	Scientific name	Common name	number
1	Myrsinaceae	<i>Ardisia macrocarpa</i>		10

1.1 Data sheet (Tree Vegetation > 1.3m)

Plot type(square): Trees (20 x 20 m)

Dzongkhag: Chukha

Locality: Chanachen

Transect name: Near bridge

Plot no: 20

North: 27.227985

East: 89.517805

Altitude: 2049.1

Aspect: W

Slope%: 5

Canopy cover:partial shade

Habitat type: CBLF

SN	Family name	Scientific name	Common name	DBH(cm)	Height(m)
1	Fagaceae	<i>Quercus griffithii</i>	Oak	103	10
2	Fagaceae	<i>Quercus glauca</i>	Japanese Blue oak	64	9
3	Fagaceae	<i>Quercus glauca</i>	Japanese Blue oak	198	20
4	Fagaceae	<i>Quercus glauca</i>	Japanese Blue oak	66	15
5	Betulaceae	<i>Betula alnoides</i>	Himalayan birch	281	20
6	Betulaceae	<i>Carpinus viminea</i>	Himalayan hornbeam	79	15
7	Betulaceae	<i>Betula alnoides</i>	Himalayan birch	250	23
8	Betulaceae	<i>Betula alnoides</i>	Himalayan birch	220	20
9	Pinaceae	<i>Pinus wallichiana</i>	Bluepine	270	35
10	Betulaceae	<i>Betula alnoides</i>	Himalayan birch	218	18
11	Pinaceae	<i>Pinus wallichiana</i>	Bluepine	282	30

1.2 Vegetation Assessment Protocol for Shrubs

Data sheet(Shrub Vegetation)

Plot Type(square): Shrub(20x20m)

SN	Family	Scientific name	Common name	DBH(cm)	Height(m)
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Lauraceae	<i>Dodecadenia grandiflora</i>	Tailiya	2	4
Lauraceae	<i>Persea spp</i>	Wild avacado	3	1
Gramineae	<i>Yushania spp</i>	Bamboo	2	100
Myrsinaceae	<i>Ardisia macrocarpa</i>	Himalayan coralberry	2	30
Thymelaeaceae	<i>Daphne bholua</i>	Australian cheesewood	0.5	10
Symplocaceae	<i>Symplocos ramosissima</i>	Lodh tree	4	7
Theaceae	<i>Eurya acuminata</i>	Tapering leaf eurya	1	6

1.3 Plot type(square): Herb (2x 2m)

SN	Family name	Scientific name	Common name	Cover% or number
1	Gramineae	<i>Optismenus histellus</i>		25
2	Convallariaceae	<i>Tupistra wattii</i>		25
3	Convallariaceae	<i>Ophiopogon intermedius</i>		25
4	Amaranthaceae	<i>Alternanthera sessilis</i>		25

1.1 Vegetation Assessment Protocol for Trees

Data sheet (Tree Vegetation > 1.3m)

Plot type(square): Trees (20 x 20 m)

Dzongkhag:

Chukha Altitude: 1956.6m

Locality:

Bunagu Aspect: NE

Transect name:

Below road Slope%: 10

Plot no: 21 Canopy cover: partial shade

North:

27.136941667

Habitat type: CBLF

SN	Family name	Scientific name	Common name	DBH(cm)	Height(m)
1	Pinaceae	<i>Pinus wallichiana</i>	Bluepine	150	20
2	Fagaceae	<i>Quercus griffithii</i>	Oak	120	15
3	Ericaceae	<i>Rhododendron arboreum</i>		70	7
4	Ericaceae	<i>Lyonia ovalifolia</i>		70	7
5	Pinaceae	<i>Pinus wallichiana</i>	Bluepine	134	15
6	Ericaceae	<i>Lyonia ovalifolia</i>		54	7
7	Ericaceae	<i>Rhododendron arboreum</i>		52	6
8	Fagaceae	<i>Quercus lanata</i>		35	6
9	Pinaceae	<i>Pinus wallichiana</i>	Bluepine	146	20
10	Fagaceae	<i>Quercus lanata</i>	Ban oak	48	6
11	Fagaceae	<i>Quercus lanata</i>	Ban oak	84	7
12	Pinaceae	<i>Pinus wallichiana</i>	Bluepine	121	20
13	Fagaceae	<i>Quercus lanata</i>	Ban oak	114	7
14	Ericaceae	<i>Rhododendron arboreum</i>	Rhodo	103	7
15	Ericaceae	<i>Lyonia ovalifolia</i>		105	8
16	Ericaceae	<i>Lyonia ovalifolia</i>		28	5
17	Fagaceae	<i>Quercus lanata</i>	Ban oak	68	10
18	Schoepfiaceae	<i>Schoepfia jasminodora</i>		70	7

1.2 Vegetation Assessment Protocol for Shrubs

Data sheet(Shrub Vegetation)

Plot Type(square): Shrub(20x20m)

SN	Family	Scientific name	Common name	Ht	Number
1	Ericaceae	<i>Rhododendron maddenii</i>		2	20
2	Ericaceae	<i>Rhododendron arboreum</i>		1	5
3	Betulaceae	<i>Carpinus viminea</i>		1	5
4	Ericaceae	<i>Vaccinium vacciniaceum</i>		0.5	10

Epiphyte

SN	Family	Scientific name	Common name	Number
1	Orchidaceae	<i>Phalaenopsis taenialis</i>		10
2	Orchidaceae	<i>Bulbophyllum reptans</i>		1
3	Orchidaceae	<i>Bulbophyllum retusiusculum</i>		5

1.4 Data sheet (Herbs)

Plot type(square): Herb (2x 2m)

SN	Family name	Scientific name	Common name	Cover% or number
1	Cyperaceae	Carax spp		100

1.5 Regeneration

SN	Family name	Scientific name	Common name	Number
1	Pinaceae	Pinus wallichiana	Blue pine	6

1.6 Other Plants by RECEE

SN	Family name	Scientific name	Common name	Type of plant
1	Compositae	<i>Gynura nepalensis</i>		Shrub
2	Compositae	<i>Adenostemma lavenia</i>		herb
3	Rosaceae	<i>Agrimonia pilosa</i>		herb
4	Salicaceae	<i>Populus rotundifolia</i>		Tree

1.1 Vegetation Assessment Protocol for Trees

Data sheet (Tree Vegetation > 1.3m)

Plot type(square): Trees (20 x 20 m)

Dzongkhag: Chukha Altitude: 2793

Locality: Paga goenpa Aspect: west

Transect name: Below

goenpa Slope%: 5

Plot no: 22 Canopy cover: partial shade

North: 27.286031667 Habitat type:CBLF

SN	Family name	Scientific name	Common name	DBH(cm)	Height(m)
1	Pinaceae	<i>Pinus wallichiana</i>	Bluepine	54	7
2	Pinaceae	<i>Pinus wallichiana</i>	Bluepine	136	18
3	Salicaceae	<i>Populus ciliata</i>		47	11
4	Salicaceae	<i>Populus ciliata</i>		94	14
5	Salicaceae	<i>Populus ciliata</i>		68	13
6	Pinaceae	<i>Pinus wallichiana</i>	Bluepine	37	6
7	Salicaceae	<i>Populus ciliata</i>		85	13
8	Salicaceae	<i>Populus ciliata</i>		71	12
9	Pinaceae	<i>Pinus wallichiana</i>	Bluepine	105	19
10	Pinaceae	<i>Pinus wallichiana</i>	Bluepine	143	19
11	Pinaceae	<i>Pinus wallichiana</i>	Bluepine	145	19
12	Salicaceae	<i>Populus ciliata</i>		84	16
13	Salicaceae	<i>Populus ciliata</i>		98	18

1.2 Vegetation Assessment Protocol for Shrubs

Data sheet(Shrub Vegetation)

Plot Type(square): Shrub(20x20m)

SN	Family	Scientific name	Common name	DBH(cm)	Height(m)
1	Buxaceae	<i>Sarcococca saligna</i>	Christmas Box	0.3	50
2	Scrophulariaceae	<i>Buddleja crispa</i>	Butterflybush	1.5	11
3	Celastraceae	<i>Euonymus tingens</i>		0.5	2
4	Rosaceae	<i>Rubus biflorus</i>		0.3	6
5	Labiatae	<i>Colquhounia coccinea</i>		1	3
6	Oleaceae	<i>Jasminum humile</i>		0.5	4

1.3 Data sheet (Herbs)

Plot type(square): Herb (2x

2m)

SN	Family name	Scientific name	Common name	Cover% or number
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1	Pteridaceae	<i>Onychium spp</i>		50
2	Rubiaceae	<i>Rubia manjith</i>		25
3	Rosaceae	<i>Rubus calycinus</i>		15
4	Ranunculaceae	<i>Clematis montana</i>		10

1.4 Regeneration

SN	Family name	Scientific name	Common name	Number
1	Pinaceae	<i>Pinus wallichiana</i>	Bluepine	10

1.1 Other Plants by RECEE

SN	Family name	Scientific name	Common name	Type of plant
1	Compositae	<i>Cissampelopsis cordifolia</i>		Climbing Shrub
2	Vitaceae	<i>Parthenocissus semicordata</i>		Climbing Shrub
3	Umbelliferae	<i>Selinum wallichianum</i>		Herb
4	Araliaceae	<i>Hedera nepalensis</i>		Climbing Shrub
5	Rosaceae	<i>Rosa brunonii</i>		Climbing Shrub
6	Compositae	<i>Conyza bonariensis</i>		Herb
7	Compositae	<i>Conyza stricta</i>		Herb
8	Umbelliferae	<i>Angelica sikkimensis</i>		Herb
9	Asclepiadaceae	<i>Cynanchum corymbosum</i>		Climbing Shrub
10	Ranunculaceae	<i>Clematis bucharaniana</i>		Climbing Shrub
11	Orchidaceae	<i>Chamaegastrodia asraoa</i>		Orchid

1.1 Data sheet (Tree Vegetation > 1.3m)

Plot type(square): Trees (20 x 20 m)

Dzongkhag: Chukha

Altitude: 2858.5

Locality: Shame Goenpa

Aspect:

Transect name: Near Goenpa

Northwest

Slope%: 10

Plot no: 23

North: 27.22141667

East: 89.54740833

Canopy cover: partial shade

Habitat type:CBLF

SN	Family	Scientific name	Common name	DBH(cm)	Height(m)
1	Pinaceae	<i>Tsuga dumosa</i>	Hemlock	65	7
2	Pinaceae	<i>Tsuga dumosa</i>	Hemlock	144	13
3	Pinaceae	<i>Picea spinulosa</i>	Spruce	60	12
4	Pinaceae	<i>Picea spinulosa</i>	Spruce	38	7
5	Symplocaceae	<i>Symplocos paniculata</i>	Sapphire berry	55	9
6	Pinaceae	<i>Pinus walllichiana</i>	Blue pine	85	13
7	Pinaceae	<i>Pinus walllichiana</i>	Blue pine	87	13
8	Pinaceae	<i>Pinus walllichiana</i>	Blue pine	75	13
9	Pinaceae	<i>Pinus walllichiana</i>	Blue pine	40	11
10	Pinaceae	<i>Pinus walllichiana</i>	Blue pine	165	18
11	Pinaceae	<i>Pinus walllichiana</i>	Blue pine	95	15
12	Fagaceae	<i>Quercus semecarpifolia</i>	Brown oak	45	5

1.2 Vegetation Assessment Protocol for Shrubs

Data sheet(Shrub

Vegetation)

Plot Type(square):

Shrub(20x20m)

SN	Family	Scientific name	Common name	DBH(cm)	Height(m)
1	Adoxaceae	<i>Viburnum erubescens</i>	reddish viburnum	1.5	3
2	Hydrangeaceae	<i>Philadelphus spp</i>		1	1
3	Berberidaceae	<i>Berberis aristata</i>		1	3
4	Thymelaeaceae	<i>Daphne bholua</i>	Australian cheesewood	1	4
5	Ericaceae	<i>Rhododendron triflorum</i>		1	4
6	Ericaceae	<i>Rhododendron arboreum</i>		2	3
7	Pinaceae	<i>Tsuga dumosa</i>	Hemlock	1	11
8	Aquifoliaceae	<i>Ilex dipyrena</i>	Himalayan holly	1	3

9	Betulaceae	<i>Carpinus viminea</i>	Himalayan hornbeam	1	3
10	Rosaceae	<i>Rosa sericea</i>	Silky rose	2	8
11	Ericaceae	<i>Pieris formosa</i>	Taipei pieris	1	30
12	Symplocaceae	<i>Symplocos paniculata</i>	Sapphire berry	0.5	2
13	Rosaceae	<i>Cotoneaster spp</i>		1	3
14	Pinaceae	<i>Picea spinulosa</i>	Spruce	1	4

1.3 Data sheet (Herbs)

Plot type(square): Herb (2x 2m)

SN	Family name	Scientific name	Common name	Cover% or number
1	Compositae	<i>Anaphalis nepalensis</i>		25
2	Rosaceae	<i>Rubus calycinus</i>		25
3	Compositae	<i>Carpesium nepalense</i>		25
4	Compositae	<i>Dichrocephala benthamii</i>		25

1.4 Regeneration

SN	Family name	Scientific name	Common name	Number
1	Rosaceae	<i>Cotoneaster spp</i>		2
2	Thymelaeaceae	<i>Daphne bholua</i>		3
3	Ericaceae	<i>Enkianthus deflexus</i>		3

1.5 Other Plants by RECEE

SN	Family name	Scientific name	Common name	Type of plant
1	Polygonaceae	<i>Rheum australe</i>		herb
2	Grossulariaceae	<i>Ribes laciniatum</i>		Shrub
3	Betulaceae	<i>Corylus ferox</i>		Shrub
4	Compositae	<i>Ligularia amplexicaulis</i>		herb
5	Rosaceae	<i>Sorbus microphylla</i>		Shrub

6	Compositae	<i>Senecio laetus</i>		herb
7	Juncaceae	<i>Juncus spp</i>		herb
8	Blechnaceae	<i>woodwardia unigemmata</i>		Fern
9	Gleicheniaceae	<i>Gleichenia gigantea</i>		Fern
10	Labiatae	<i>Prunella vulgaris</i>		herb
11	Polygonaceae	<i>Rumex nepalensis</i>		herb
12	Orchidaceae	<i>Spiranthes sinensis</i>		Orchid
13	Orchidaceae	<i>Satyrium nepalense, var. nepalense</i>		Orchid
14	Juncaceae	<i>Juncus spp</i>		Herb

1.1 Data sheet (Tree Vegetation > 1.3m)

Plot type(square): Trees (20 x 20 m)

Dzongkhag: Chukha Altitude: 1646

Locality: Wangkha Aspect: North

Transect name: above road Slope%: 15

Plot no: 24 Canopy cover: partial shade

North: 27.057935 Habitat type:CBLF

East: 89.555745

SN	Family	Scientific name	Common name	DBH(cm)	Height(m)
1	Betulaceae	<i>Carpinus viminea</i>		65	10
2	Fagaceae	<i>Quercus glauca</i>		66	10
3	Betulaceae	<i>Carpinus viminea</i>		34	8
4	Betulaceae	<i>Carpinus viminea</i>		28	7
5	Betulaceae	<i>Carpinus viminea</i>		34	8
6	Fagaceae	<i>Quercus glauca</i>		121	11
7	Betulaceae	<i>Carpinus viminea</i>		63	10

- 1.2 Vegetation Assessment Protocol for Shrubs
 Data sheet(Shrub Vegetation)
 Plot Type(square): Shrub(20x20m)

SN	Family	Scientific name	Common name	DBH(cm)	Height(m)
	Myrsinaceae	<i>Ardisia macrocarpa</i>		1	8
	Poaceae	<i>Yushania</i>		2	50
	Oleaceae	<i>Fraxinus spp</i>		1	4

- 1.3 Data sheet (Herbs)
 Plot type(square): Herb (2x 2m)

SN	Family name	Scientific name	Common name	Cover% or number
1	Dryopteridaceae	<i>Polysticum spp</i>		25
2	Poaceae	<i>Ophiopogon</i>		25
3	Piperaceae	<i>Piper spp</i>		25
4	Poaceae	<i>Oplismenus hirtellus</i>	Basket grass	25

- 1.4 Other Plants by RECEE

SN	Family name	Scientific name	Common name	Type of plant
1	Compositae	<i>Gynura nepalensis</i>		Shrub
2	Urticaceae	<i>Girardinia diversifolia</i>		Herb
3	Dioscoreaceae	<i>Dioscorea bulbifera</i>		Climber
4	Urticaceae	<i>Debregeasia longifolia</i>		Shrub
5	Orchidaceae	<i>Agrostophyllum callosum</i>		Orchid

- 1.1 Data sheet (Tree Vegetation > 1.3m)
 Plot type(square): Trees (20 x 20 m)

Dzongkhag:
 Chukha Altitude:
 Locality: Lobnekha Aspect: south
 Transect name:
 Above school Slope%: 5
 Plot no: 25 Canopy cover: open
 North: 27.175115 Habitat type: Meadow

SN	Family name	Scientific name	Common name	DBH(cm)	Height(m)
	No tree				

1.2 Vegetation Assessment Protocol for Shrubs
 Data sheet(Shrub Vegetation)
 Plot Type(square): Shrub(20x20m)

SN	Family	Scientific name	Common name	DBH(cm)	Height(m)
1	Rosaceae	<i>Cotoneaster microphyllus</i>		0.5	30
2	Pinaceae	<i>Pinus wallichiana</i>	Blue pine	0.5	18
3	Berberidaceae	<i>Berberis aristata</i>		0.5	15

1.3 Data sheet (Herbs)
 Plot type(square): Herb (2x 2m)

SN	Family name	Scientific name	Common name	Cover% or number
1	Leguminosae	<i>Trifolium repens</i>		25
2	Dennstaedtiaceae	<i>Pteridium aquilinum</i>		10
3	Compositae	<i>Anaphalis contorta</i>		10
4	Compositae	<i>Anaphalis margaritacea</i>		10
5	Compositae	<i>Anaphalis nepalensis</i>		10

6	Rosaceae	<i>Potentilla peduncularis</i>		35
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1.4 Other Plants by RECEE

SN	Family name	Scientific name	Common name	Type of plant
1	Caprifoliaceae	<i>Viburnum cylindricum</i>		shrub
2	Caprifoliaceae	<i>Viburnum mullaha</i>		shrub
3	Dipsacaceae	<i>Dipsacus inermis</i>		herb
4	Philadelphaceae	<i>Philadelphus tomentosus</i>		shrub
5	Rosaceae	<i>Prinsepia utilis</i>		shrub
6	Compositae	<i>Aster albescens</i>		herb
7	Hypericaceae	<i>Hypericum spp</i>		shrub
8	Umbelliferae	<i>Selinum wallichianum</i>		herb
9	Leguminosae	<i>Crotalaria spp</i>		herb
10	Rosaceae	<i>Spiraea spp</i>		Herb
11	Ericaceae	<i>Rhododendron maddenii</i>		shrub
12	Cornaceae	<i>Benthamedia capitata</i>		shrub
13	Onagraceae	<i>Oenothera biennis</i>		herb
14	Gentianaceae	<i>Halenia elliptica</i>		herb

1.1 Data sheet (Tree Vegetation > 1.3m)

Plot type(square): Trees (20 x 20 m)

Dzongkhag: Chukha Altitude: 2509.3

Locality: Nyakha Aspect: 10%

Transect name:

Above road Slope%: Southwest

Plot no: 26 Canopy cover,: partial shade

North:
27.147836667 Habitat type: CBLF
East: 89.51308500

SN	Family	Scientific name	Common name	DBH(cm)	Height(m)
1	Aceraceae	<i>Acer campbellii</i>	Himalayan Maple	220	15
2	Pinaceae	<i>Tsuga dumosa</i>	Hemlock	520	30
3	Fagaceae	<i>Lithocarpus elegans</i>	Spike oak	156	18
4	Fagaceae	<i>Lithocarpus fenestratus</i>	Stone oak	293	20
5	Rosaceae	<i>Prunus nepalensis</i>	wild cherry	255	13
6	Lauraceae	<i>Dodecadenia grandiflora</i>	Tailiya	174	10
7	Symplocaceae	<i>Symplocos sumuntia</i>	Shan fan	65	10
8	Salicaceae	<i>Populus ciliata</i>	Himalayan poplar	521	25
9	Theaceae	<i>Eurya acuminata</i>	Tapering leaf eurya	115	10
10	Theaceae	<i>Eurya acuminata</i>	Tapering leaf eurya	75	9
11	Pinaceae	<i>Tsuga dumosa</i>	Hemlock	289	25
12	Lauraceae	<i>Cinnamomum glanduliferum</i>	Cinnamon tree	95	8

1.2 Vegetation Assessment Protocol for Shrubs

Data sheet(Shrub Vegetation)

Plot Type(square): Shrub(20x20m)

SN	Family	Scientific name	Common name	DBH(cm)	Height(m)
1	Poaceae	<i>Yushania spp</i>	Bamboo	4	100
2	Smilacaceae	<i>Smilax spp</i>		0.3	5
3	Buxaceae	<i>Sarcococca saligna</i>	Christmas box	0.5	100
4	Aceraceae	<i>Acer campbellii</i>	Himalayan Maple	2-Jan	2

5	Adoxaceae	<i>Viburnum erubescens</i>	reddish viburnum	2	12
6	Thymelaeaceae	<i>Daphne bholua</i>	Australian cheesewood	1	13
7	Berberidaceae	<i>Mahonia napalensis</i>	Nepal barberry	0.5	4
8	Aquifoliaceae	<i>Ilex dipyrena</i>	Himalayan holly	2	2
9	Berberidaceae	<i>Berberis spp</i>		4	2

1.3 Data sheet (Herbs)

Plot type(square): Herb (2x 2m)

SN	Family name	Scientific name	Common name	Cover% or number
1	Umbelliferae	<i>Heracleum nepalense</i>		25
2	Rosaceae	<i>Fragaria nubicola</i>		25
3	Geraniaceae	<i>Geranium nepalense</i>		25
4	Leguminosae	<i>Desmodium podocarpum</i>		25

1.4 Regeneration

SN	Family name	Scientific name	Common name	Number
1	Thymelaeaceae	<i>Daphne spp</i>		10

1.5 Other Plants by RECEE

SN	Family name	Scientific name	Common name	Type of plant
1	Melastomataceae	<i>Sarcopyramis napalensis</i>		Herb
2	Lardizabalaceae	<i>Holboellia latifolia</i>		climber
3	Leguminosae	<i>Piptanthus nepalensis</i>		Shrub
4	Aristolochiaceae	<i>Aristolochia griffithii</i>		climber
5	Uvulariaceae	<i>Disporum cantoniense</i>		Herb
6	Orchidaceae	<i>Listera pinetorum</i>		Orchid
7	Trilliaceae	<i>Paris Polyphylla</i>		Herb

8	Ericaceae	<i>Rhododendron grande</i>		Shrub
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1.1 Vegetation Assessment Protocol for Trees

Data sheet (Tree Vegetation > 1.3m)

Plot type(square): Trees (20 x 20 m)

Dzongkhag: Chukha Altitude: 2042.9
 Locality: Damchu Aspect: south
 Transect name: above
 road Slope%: 15
 Plot no: 27 Canopy cover: open
 North: 27.24179 Habitat type: Shrub
 East: 89.524695

SN	Family name	Scientific name	Common name	DBH(cm)	Height(m)
1	Anacardiaceae	<i>Rhus spp</i>		55	6
2	Anacardiaceae	<i>Rhus spp</i>		32	5
3	Fagaceae	<i>Quercus lanata</i>	Ban oak	93	5
4	Fagaceae	<i>Quercus lanata</i>	Ban oak	134	7
5	Rutaceae	<i>Zanthoxylum armatum</i>		32	5
6	Rutaceae	<i>Zanthoxylum armatum</i>		23	4

1.2 Vegetation Assessment Protocol for Shrubs

Data sheet(Shrub Vegetation)

Plot Type(square): Shrub(20x20m)

SN	Family	Scientific name	Common name	DBH(cm)	Height(m)
1	Caprifoliaceae	<i>Lonicera quinquelocularis</i>	Honey suckle	2	9
2	Berberidaceae	<i>Berberis spp</i>		2	7
3	Rosaceae	<i>Cotoneaster spp</i>		3	5
4	Rosaceae	<i>Rosa sericea</i>		1	6

1.3

Data sheet (Herbs)

Plot type(square): Herb (2x 2m)

SN	Family name	Scientific name	Common name	Cover% or number
1	Commelinaceae	<i>Cyanotis vaga</i>		10
2	Convallariaceae	<i>Polygonatum spp</i>		15
3	Asteraceae	<i>Artemisia vulgaris</i>		25
4	Crassulaceae	<i>Sedum griffithii</i>		20
5	Cyperaceae	<i>Carex spp</i>		30

1.4 Other Plants by RECEE

SN	Family name	Scientific name	Common name	Type of plant
1	Meliaceae	<i>Melia azedarach</i>		Tree
2	Verbenaceae	<i>Verbena officinalis</i>		herb
3	Compositae	<i>Conyza bonariensis</i>		herb
4	Polygonaceae	<i>Persicaria nepalensis</i>		herb
5	Polygonaceae	<i>Aconogonon molle</i>		Shrub
6	Compositae	<i>Gynura nepalensis</i>		Shrub
7	Amaranthaceae	<i>Chenopodium spp</i>		herb
8	Dennstaedtiaceae	<i>Pteridium aquilinum</i>		Fern
9	Rubiaceae	<i>Leptodermis stapfiana</i>		Herb

1.1 Vegetation Assessment Protocol for Trees

Data sheet (Tree Vegetation > 1.3m)

Plot type(square): Trees (20 x 20 m)

Dzongkhag: Paro Altitude: 2308.4m

Locality: Wanakha Aspect: East

Transect name: Below

road Slope%: 15

Plot no: 28 Canopy cover: open
 North: 27.215698333 Habitat type: Shrub
 East: 89.509630000

SN	Family	Scientific name	Common name	DBH(cm)	Height(m)
1	Fagaceae	<i>Quercus lanata</i>	Ban oak	65	3
2	Fagaceae	<i>Quercus lanata</i>	Ban oak	20	2
3	Fagaceae	<i>Quercus lanata</i>	Ban oak	120	4
4	Fagaceae	<i>Quercus semecarpifolia</i>		40	3
5	Fagaceae	<i>Quercus semecarpifolia</i>		45	3
6	Fagaceae	<i>Quercus lanata</i>	Ban oak	85	5
7	Fagaceae	<i>Quercus lanata</i>	Ban oak	43	2
8	Fagaceae	<i>Quercus lanata</i>	Ban oak	156	5

1.2 Vegetation Assessment Protocol for Shrubs

Data sheet (Shrub Vegetation)

Plot Type (square): Shrub (20x20m)

SN	Family	Scientific name	Common name	DBH(cm)	Height(m)
1	Ericaceae	<i>Rhododendron maddenii</i>		1	7
2	Rosaceae	<i>Malus baccata</i>		1	1
3	Rosaceae	<i>Rosa brunonii</i>		2	1
4	Pinaceae	<i>Pinus wallichiana</i>		2	6
5	Fagaceae	<i>Quercus semicarpifolia</i>		2	7
6	Fagaceae	<i>Quercus lanata</i>	Ban oak	1	10
7	Theaceae	<i>Eurya acuminata</i>		2	15

1.3 Data sheet (Herbs)

Plot type (square): Herb (2x2m)

SN	Family name	Scientific name	Common name	Cover% or number
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1	Compositae	<i>Bidens pilosa</i>		25
2	Compositae	<i>Conyza bonariensis</i>		25
3	Compositae	<i>Conyza stricta</i>		25
4	Poaceae	<i>Carex spp</i>		25

1.4 Other Plants by RECEE

SN	Family name	Scientific name	Common name	Type of plant
1	Polygonaceae	<i>Aconogonon molle</i>		Shrub
2	Compositae	<i>Gynura nepalensis</i>		Shrub
3	Saxifragaceae	<i>Bergenia ciliata</i>		Herbs
4	Compositae	<i>Tagetes minuta</i>		Herbs
5	Leguminosae	<i>Parochetus communis</i>		Herbs

1.1 Vegetation Assessment Protocol for Trees

Data sheet (Tree Vegetation > 1.3m)

Plot type(square): Trees (20 x 20 m)

Dzongkhag: Chukha Altitude: 2117.9

Locality: Chanachen Aspect: East

Transect name: New

PC(Above road) Slope%: 15

Plot no: 29 Canopy cover: closed

North: 27.125251667 Habitat type:CBLF

East: 89.533115

SN	Family name	Scientific name	Common name	DBH(cm)	Height(m)
1	Salicaceae	<i>Populus ciliata</i>	Himalayan poplar	114	25
2	Lauraceae	<i>Persea spp</i>		45	10
3	Fagaceae	<i>Quercus glauca</i>		70	15
4	Lauraceae	<i>Persea spp</i>		30	12
5	Salicaceae	<i>Populus ciliata</i>	Himalayan poplar	80	20

6	Lauraceae	<i>Persea spp</i>		12	7
7	Symplocaceae	<i>Symplocus sumantia</i>		12	7

1.2 Vegetation Assessment Protocol for Shrubs

Data sheet(Shrub Vegetation)

Plot Type(square): Shrub(20x20m)

SN	Family	Scientific name	Common name	Ht(M)	Number
1	Gramineae	<i>Chimonobambusa callosa</i>		2	100
2	Thymelaeaceae	<i>Daphne spp</i>		0.5	2
3	Myrsinaceae	<i>Ardisia macrocarpa</i>		0.5	4

1.3 Data sheet (Herbs)

Plot type(square): Herb (2x 2m)

SN	Family name	Scientific name	Common name	Cover% or number
1	Compositae	<i>Dichrocephala benthamii</i>		15
2	Compositae	<i>Adenostemma lavenia</i>		30
3	Poaceae	<i>Oplismenus hirtellus</i>	Basket grass	15
4	Rubiaceae	<i>Rubia manjith</i>		10
5	Poaceae	<i>Carax spp</i>		30

1.4 Other Plants by RECEE

SN	Family name	Scientific name	Common name	Type of plant
1	Aristolochiaceae	<i>Aristolochia cathcartii</i>		woody climber
2	Orchidaceae	<i>Coelogyne corymbosa</i>		Orchid
3	Leguminosae	<i>Mucuna imbricata</i>		Climber
4	Polygonaceae	<i>Aconogonon molle</i>		Shrub
5	Balsaminaceae	<i>Impatiens racemosa</i>		herbs
6	Compositae	<i>Sigesbeckia orientalis</i>		herbs

7	Caprifoliaceae	<i>Leycesteria formosa</i>		Shrubs
8	Gentianaceae	<i>Swertia bimaculata</i>		herbs
9	Polygonaceae	<i>Aconogonon molle</i>		Shrub
10	Scrophulariaceae	<i>Verbascum thapsus</i>		Herbs
11	Compositae	<i>Gynura nepalensis</i>		Shrub
12	Urticaceae	<i>Girardinia diversifolia</i>		herbs
13	Compositae	<i>Conyza bonariensis</i>		herbs

1.1 Vegetation Assessment Protocol for Trees

Data sheet (Tree Vegetation > 1.3m)

Plot type(square): Trees (20 x 20 m)

Dzongkhag: Chukha Altitude: 2093.5

Locality: Dam area Aspect: South

Transect name: New PC

MD Slope%: 12

Canopy cover:

Plot no: 30 partial shade

North: 27.117151667 Habitat type: CBLF

East: 89.531488333

SN	Family name	Scientific name	Common name	DBH(cm)	Height(m)
1	Symplocaceae	<i>Symplocus sumantia</i>		43	15
2	Symplocaceae	<i>Symplocus sumantia</i>		41	11
3	Symplocaceae	<i>Symplocus sumantia</i>		26	10
4	Symplocaceae	<i>Symplocus sumantia</i>		32	10
5	Fagaceae	<i>Quercus glauca</i>		95	25
6	Fagaceae	<i>Quercus glauca</i>		50	16
7	Lauraceae	<i>Persea spp</i>		12	6
8	Symplocaceae	<i>Symplocos ramosissima</i>		16	7
9	Lauraceae	<i>Persea spp</i>		45	15

1.2 Vegetation Assessment Protocol for Shrubs

Data sheet(Shrub Vegetation)

Plot Type(square): Shrub(20x20m)

SN	Family	Scientific name	Common name	Ht(m)	Number
1	Symplocaceae	<i>Symplocus sumantia</i>		3	7
2	Caprifoliaceae	<i>Viburnum erubescens</i>		2	7
3	Berberidaceae	<i>Berberis spp</i>		1	6
4	Theaceae	<i>Eurya acuminata</i>		1	10
5	Berberidaceae	<i>mahonia nepalensis</i>		1	8
6	Elaeagnaceae	<i>Elaeagnus parvifolia</i>		1	4
7	Theaceae	<i>Eurya acuminata</i>		1	10
8	Myrsinaceae	<i>Ardisia macrocarpa</i>		0.5	6
9	Thymelaeaceae	<i>Daphne bholua</i>		1	8
10	Araliaceae	<i>Hedera nepalensis</i>		5	1
11	Ranunculaceae	<i>Clematis buchananiana</i>			

1.3 Orchids

SN	Family	Scientific name	Number
1	Orchidaceae	<i>Eria coronaria</i>	3 cluster
2	Ericaceae	<i>Agapetes serpens</i>	1
3	Orchidaceae	<i>liparis bootanensis</i>	2 cluster

1.4 Data sheet (Herbs)

Plot type(square): Herb (2x
2m)

SN	Family name	Scientific name	Common name	Cover% or number
1	Pteridaceae	<i>Onychium spp</i>		10
2	Pteridaceae	<i>Coniogramme pubescens</i>		35
3	Orchidaceae	<i>Calanthe spp</i>		55

1.5 Other Plants by RECEE

SN	Family name	Scientific name	Common name	Type of plant
1	Orchidaceae	<i>Cymbidium erythraeum</i>		Orchid
2	Gentianaceae	<i>Swertia bimaculata</i>		herbs
3	Geraniaceae	<i>Geranium nepalense</i>		herbs
4	Lardizabalaceae	<i>Holboellia latifolia</i>		Climber
5	Polygonaceae	<i>Aconogonon molle</i>		Shrub
6	Compositae	<i>Gynura nepalensis</i>		Shrub
7	Urticaceae	<i>Girardinia diversifolia</i>		herbs
8	Compositae	<i>Conyza bonariensis</i>		herbs
9	Compositae	<i>Dichrocephala benthamii</i>		Type of plant

1.1 Vegetation Assessment Protocol for Trees

Data sheet (Tree Vegetation >
1.3m)

Plot type(square): Trees (20 x 20
m)

Dzongkhag: Chukha

Altitude: 2164.3 m

Locality:

Bunakha

Aspect: South

Transect

name: New

PC-

(Above Lhakhang)

Slope%: 5

Plot no: 31

Canopy cover: partial shade

North: 27.147238333

Habitat type:

East: 89.544001667

SN	Family	Scientific name	Common name	DBH(cm)	Height(m)
1	Pinaceae	<i>Pinus wallichiana</i>	Blue pine	45	15
2	Pinaceae	<i>Pinus wallichiana</i>	Blue pine	45	15
3	Pinaceae	<i>Pinus wallichiana</i>	Blue pine	45	15

4	Fagaceae	<i>Quercus lanata</i>		35	7
5	Fagaceae	<i>Quercus lanata</i>		15	5
6	Fagaceae	<i>Quercus lanata</i>		15	5
7	Ericaceae	<i>Lyonia ovalifolia</i>		15	5
8	Ericaceae	<i>Lyonia ovalifolia</i>		25	5
9	Fagaceae	<i>Quercus lanata</i>		40	10
10	Ericaceae	<i>Rhododendron arboreum</i>		12	5

1.2 Vegetation Assessment Protocol for Shrubs

Data sheet(Shrub Vegetation)

Plot Type(square): Shrub(20x20m)

SN	Family	Scientific name	Common name	DBH(cm)	Height(m)
1	Lauraceae	<i>Cinnamomum glanduliferum</i>	Cinnamon tree	0.5	1
2	Aquifoliaceae	<i>Ilex dipyrena</i>		0.5	1
3	Ericaceae	<i>Lyonia ovalifolia</i>		1	15
4	Symplocaceae	<i>Symplocos paniculata</i>		0.5	1
5	Theaceae	<i>Eurya acuminata</i>		0.5	3
6	Smilacaceae	<i>Smilax spp</i>		0.5	5
7	Hamamelidaceae	<i>Corylopsis himalayana</i>		1	1

1.3 Epiphyte

SN	Family	Scientific name	Number
1	Orchidaceae	<i>Phalaenopsis taenialis</i>	1

1.4 Data sheet (Herbs)

Plot type(square): Herb (2x 2m)

SN	Family name	Scientific name	Common name	Cover% or number
1	Poaceae	<i>Oplismenus hirtellus</i>	Basket grass	25%
2	Lycopodiaceae	<i>Lycopodium clavatum</i>	Stag's horn club moss	25%
3	Zingibaraceae	<i>Hedychium spp</i>		25%

4	Orchidaceae	<i>Goodyera dongchenii</i>		25%
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1.5 Regeneration

SN	Family	Scientific name	Number
1	Fagaceae	<i>Quercus lanata</i>	5
2	Theaceae	<i>Eurya acuminata</i>	10

1.1 Other Plants by RECEE

SN	Family name	Scientific name	Common name	Type of plant
1	Polygonaceae	<i>Aconogonon molle</i>		Shrub
2	Compositae	<i>Gynura nepalensis</i>		Shrub
3	Labiatae	<i>Elsholtzia fruticosa</i>		Shrub
4	Polygonaceae	<i>Fagopyrum dibotrys</i>		Herb
5	Compositae	<i>Conyza bonariensis</i>		Herb

1.1 Vegetation Assessment Protocol for Trees

Data sheet (Tree Vegetation > 1.3m)

Plot type(square): Trees (20 x 20 m)

Dzongkhag: Chukha

Altitude: 2194.2 m

Locality: Bunakha

Aspect:SW

Transect name: New PC Client

Slope%: 7

Plot no: 32

Canopy cover: partial shade

North: 27.148668333

Habitat type: CBLF

East: 89.543636667

SN	Family	Scientific name	Common name	DBH(cm)	Height(m)
1	Ericaceae	<i>Rhododendron arboreum</i>		15	7
2	Ericaceae	<i>Rhododendron arboreum</i>		15	7

3	Ericaceae	<i>Rhododendron arboreum</i>		15	7
4	Ericaceae	<i>Rhododendron arboreum</i>		15	7
5	Ericaceae	<i>Rhododendron arboreum</i>		15	7
6	Ericaceae	<i>Rhododendron arboreum</i>		15	7
7	Ericaceae	<i>Lyonia ovalifolia</i>		14	7
8	Ericaceae	<i>Lyonia ovalifolia</i>		14	7
9	Ericaceae	<i>Lyonia ovalifolia</i>		14	7
10	Fagaceae	<i>Quercus lanata</i>		35	10
11	Fagaceae	<i>Quercus lanata</i>		35	10
12	Fagaceae	<i>Quercus lanata</i>		35	10
13	Fagaceae	<i>Quercus lanata</i>		35	10
14	Fagaceae	<i>Quercus lanata</i>		35	10
15	Ericaceae	<i>Lyonia ovalifolia</i>		60	10
16	Ericaceae	<i>Lyonia ovalifolia</i>		60	10
17	Ericaceae	<i>Lyonia ovalifolia</i>		60	10
18	Ericaceae	<i>Lyonia ovalifolia</i>		60	10
19	Pinaceae	<i>Pinus wallichiana</i>		45	15
20	Pinaceae	<i>Pinus wallichiana</i>		45	15
21	Pinaceae	<i>Pinus wallichiana</i>		45	15

1.2 Vegetation Assessment Protocol for Shrubs
Data sheet(Shrub Vegetation)
Plot Type(square): Shrub(20x20m)

SN	Family	Scientific name	Common name	Ht(m)	Number
1	Ericaceae	<i>Enkianthus deflexus</i>		3	20
2	Ericaceae	<i>Rhododendron maddenii</i>		2	20

3	Berberidaceae	<i>Berberis spp</i>		1	5
4	Caprifoliaceae	<i>Viburnum cylindricum</i>		2	10
5	Theaceae	<i>Eurya acuminata</i>		3	15
6	Olacaceae	<i>Schoepfia jasminodora</i>		2	1
7	Smilacaceae	<i>Smilax spp</i>		0.5	7

1.3 Epiphyte

SN	Family	Scientific name	Number
1	Orchidaceae	<i>liparis bootanensis</i>	1 cluster
2	Orchidaceae	<i>Bulbophyllum retusiusculum</i>	3 cluster
3	Dryopteridaceae	<i>Drynaria propinqua</i>	10 cluster

1.3 Data sheet (Herbs)

Plot type(square): Herb (2x 2m)

SN	Family name	Scientific name	Common name	Cover% or number
1	Orchidaceae	<i>Goodyera dongchenii</i>		50%
2	Compositae	<i>Ainsliaea aptera</i>		25%
3	Poaceae	<i>Carex spp</i>		25%

1.4 Regeneration

SN	Family	Scientific name	Numbers
1	Symplocaceae	<i>Quercus lanata</i>	5
2	Theaceae	<i>Eurya acuminata</i>	10

1.5 Other plants by Recce

SN	Family	Scientific name	Common name	Type of plant
1	Ophioglossaceae	<i>Botrychium lanuginosum</i>		Fern
2	Leguminosae	<i>Erythrina arborescens</i>		Tree
3	Rosaceae	<i>Malus baccata</i>		Shrub
4	Polygonaceae	<i>Aconogonon molle</i>		Shrub

5	Scrophulariaceae	<i>Verbascum thapsus</i>		Herb
6	Compositae	<i>Gynura nepalensis</i>		Shrub
7	Urticaceae	<i>Girardinia diversifolia</i>		Herb
8	Polygonaceae	<i>Fagopyrum dibotrys</i>		Herb

1.1 Vegetation Assessment Protocol for Trees

Data sheet (Tree Vegetation > 1.3m)

Plot type(square): Trees (20 x 20 m)

Dzongkhag: Altitude: 1963.6

Chukha m

Locality: Bunagu Aspect: SW

Transect name:

New PC client

camp 1

Slope%: 5

Plot no: 33

Canopy cover: Partial shade

North:

Habitat type:

27.144223333

CBLF

East: 89.537515

SN	Family	Scientific name	Common name	DBH(cm)	Height(m)
1	Fagaceae	<i>Quercus lanata</i>		115	20
2	Fagaceae	<i>Quercus lanata</i>		110	20
3	Fagaceae	<i>Quercus lanata</i>		65	15
4	Fagaceae	<i>Quercus lanata</i>		60	15
5	Fagaceae	<i>Quercus lanata</i>		60	15
6	Fagaceae	<i>Quercus lanata</i>		20	13
7	Fagaceae	<i>Quercus lanata</i>		15	10
8	Fagaceae	<i>Quercus lanata</i>		110	20
9	Fagaceae	<i>Quercus lanata</i>		35	15
10	Fagaceae	<i>Quercus lanata</i>		30	10

1..2 Vegetation Assessment Protocol for Shrubs

SN	Family	Scientific name	Common name	Ht(m)	number
1	Theaceae	<i>Eurya acuminata</i>		2	30
2	Ericaceae	<i>Rhododendron maddenii</i>		3	1
3	Ericaceae	<i>Lyonia ovalifolia</i>		2	3
4	Berberidaceae	<i>Berberis spp</i>		1	5
5	Ericaceae	<i>Rhododendron arboreum</i>		1	1

1.3 Data sheet (Herbs)

Plot type(square): Herb (2x 2m)

SN	Family name	Scientific name	Common name	Cover% or number
1	Poaceae	<i>Carax spp</i>		100

1.1 Other Plants by RECEE

SN	Family name	Scientific name	Common name	Type of plant
1	Polygonaceae	<i>Aconogonon molle</i>		Shrub
2	Compositae	<i>Gynura nepalensis</i>		Shrub
3	Polygonaceae	<i>Fagopyrum dibotrys</i>		Herbs

1.1 Vegetation Assessment Protocol for Trees

Data sheet (Tree Vegetation > 1.3m)

Plot type(square): Trees (20 x 20 m)

Dzongkhag:

Chukha Altitude: 2023.300 m

Locality: Bunakha Aspect:

Transect name:

Above Lhakhang Slope%:
Canopy cover: partial

Plot no: 34 shade

North:
 27.143325000 Habitat type: CBLF
 East: 89.541656667

SN	Family	Scientific name	Common name	Height(m)
1	Fagaceae	<i>Quercus lanata</i>		15
2	Fagaceae	<i>Quercus lanata</i>		12
3	Fagaceae	<i>Quercus lanata</i>		10
4	Fagaceae	<i>Quercus lanata</i>		10
5	Fagaceae	<i>Quercus griffithii</i>		15
6	Fagaceae	<i>Quercus griffithii</i>		15
7	Fagaceae	<i>Quercus griffithii</i>		10
8	Fagaceae	<i>Quercus griffithii</i>		10
9	Fagaceae	<i>Quercus griffithii</i>		10
10	Ericaceae	<i>Rhododendron arboreum</i>		10
11	Symplocaceae	<i>Symplocos sumuntia</i>		10

1.2 Vegetation Assessment Protocol for Shrubs

SN	Family	Scientific name	Common name	Height(m)	Number
1	Caprifoliaceae	<i>Viburnum cylindricum</i>		1	15
2	Caprifoliaceae	<i>Viburnum erubescens</i>		1	3
3	Theaceae	<i>Eurya acuminata</i>		2	4
4	Thymelaeaceae	<i>Daphne bholua</i>		1	7
5	Myrsinaceae	<i>Ardisia macrocarpa</i>		0.5	10
6	Hamamelidaceae	<i>Corylopsis himalayana</i>		2	4
7	Ericaceae	<i>Rhododendron maddenii</i>		2	10
8	Ericaceae	<i>Lyonia ovalifolia</i>		1	3
9	Berberidaceae	<i>Berberis spp</i>		1	6

1.3 Data sheet (Herbs)

Plot type(square): Herb (2x 2m)

SN	Family name	Scientific name	Common name	Cover% or number
1	Umbelliferae	<i>Torilis japonica</i>		10
2	Zingiberaceae	<i>Roscoeia spp</i>		5
3	Compositae	<i>Ainsliaea aptera</i>		45
4	Compositae	<i>Anaphalis margaritacea</i>		40

1.4 Other Plants by RECEE

SN	Family name	Scientific name	Common name	Type of plant
1	Polygonaceae	<i>Aconogonon molle</i>		Shrub
2	Compositae	<i>Gynura nepalensis</i>		Shrub
3	Rosaceae	<i>Rosa brunonii</i>		Climber
4	Urticaceae	<i>Girardinia diversifolia</i>		Herb
5	Polygonaceae	<i>Fagopyrum dibotrys</i>		Herb

1.1 Vegetation Assessment Protocol for Trees

Data sheet (Tree Vegetation > 1.3m)

Plot type(square): Trees (20 x 20 m)

Dzongkhag: Chukha Altitude: 2035.1

Locality: Bunagu Aspect: west

Transect name: New PC

CCF Cluster Slope%: 10

Plot no: 35 Canopy cover: partial shade

North: 27.138785 Habitat type: CBLF

East: 89.543241667

SN	Family name	Scientific name	Common name	DBH(cm)	Height(m)
1	Fagaceae	<i>Quercus lanata</i>		40	15
2	Fagaceae	<i>Quercus lanata</i>		115	20
3	Betulaceae	<i>Alnus nepalensis</i>		65	17

4	Betulaceae	<i>Alnus nepalensis</i>		65	17
5	Betulaceae	<i>Alnus nepalensis</i>		40	12
6	Betulaceae	<i>Alnus nepalensis</i>		15	10
7	Fagaceae	<i>Quercus griffithii</i>		35	7
8	Ericaceae	<i>Lyonia ovalifolia</i>		13	5
9	Ericaceae	<i>Lyonia ovalifolia</i>		13	5

1.2 Vegetation Assessment Protocol for Shrubs

Data sheet(Shrub Vegetation)

Plot Type(square): Shrub(20x20m)

SN	Family	Scientific name	Common name	Ht(M)	Number
1	Symplocaceae	<i>Symplocos sumantia</i>		2	10
2	Hamamelidaceae	<i>Corylopsis himalayana</i>		5	15
3	Thymelaeaceae	<i>Daphne bholua</i>		0.5	3
4	Berberidaceae	<i>Berberis spp</i>		1	5
5	Caprifoliaceae	<i>Viburnum erubescens</i>		1	5
6	Myrsinaceae	<i>Ardisia macrocarpa</i>		0.2	10

1.3 Epiphyte

SN	Family	Scientific name	Common name	Number
1	Dryopteridaceae	<i>Drynaria propinqua</i>		5
2	Orchidaceae	<i>Phalaenopsis taenialis</i>		2

1.4 Data sheet (Herbs)

SN	Family name	Scientific name	Common name	Cover% or number
1	Poaceae	<i>Oplismenus hirtellus</i>	Basket grass	30
2	Zingiberaceae	<i>Hedychium spicatum</i>		10
3	Urticaceae	<i>Urtica dioica</i>		10

4	Amaranthaceae	<i>Alternanthera spp</i>		25
5	Convallariaceae	<i>Ophiopogon spp</i>		25

1.5 Other Plants by RECEE

SN	Family name	Scientific name	Common name	Type of plant
1	Leguminosae	<i>Desmodium podocarpum</i>		Shrub
2	Rosaceae	<i>Agrimonia pilosa</i>		Herb
3	Solanaceae	<i>Solanum viarum</i>		Herb
4	Gentianaceae	<i>Swertia bimaculata</i>		herb
5	Compositae	<i>Galinsoga parviflora</i>		herb
6	Polygonaceae	<i>Aconogonon molle</i>		Shrub
7	Compositae	<i>Gynura nepalensis</i>		Shrub
8	Urticaceae	<i>Girardinia diversifolia</i>		Herb
9	Polygonaceae	<i>Fagopyrum dibotrys</i>		Herb

1.1 Vegetation Assessment Protocol for Trees

Data sheet (Tree Vegetation > 1.3m)

Plot type(square): Trees (20 x 20 m)

Dzongkhag: Chukha Altitude: 2004.7

Locality: Chanachen Aspect: East

Transect name: New PC Plants Slope%: 10

Canopy cover: Partial

Plot no: 36 shade

North: 27.129763333 Habitat type: CBLF

East: 89.535958333

SN	Family name	Scientific name	Common name	DBH(cm)	Height(m)
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1	Lauraceae	<i>Cinnamomum glanduliferum</i>	Cinnamon tree	45	15
2	Fagaceae	<i>Quercus glauca</i>		50	16
3	Fagaceae	<i>Quercus glauca</i>		31	15
4	Fagaceae	<i>Quercus griffithii</i>		51	15
5	Rutaceae	<i>Rhus spp</i>		37	15
6	Rutaceae	<i>Tetradium fraxinifolium</i>		12	10
7	Rutaceae	<i>Tetradium fraxinifolium</i>		12	10
8	Fagaceae	<i>Quercus griffithii</i>		75	15
9	Betulaceae	<i>Betula alnoides</i>		30	12
10	Magnoliaceae	<i>Michelia doltsopa</i>		14	11
11	Symplocaceae	<i>Symplocos ramosissima</i>		15	7

1.2 Vegetation Assessment Protocol for Shrubs

SN	Family	Scientific name	Common name	ht(m)	number
1	Symplocaceae	<i>Symplocos ramosissima</i>		1	60
2	Symplocaceae	<i>Symplocos sumantia</i>		1	4
3	Caprifoliaceae	<i>Viburnum erubescens</i>		2	30
4	Thymelaeaceae	<i>Daphne bholua</i>		1	4
5	Theaceae	<i>Eurya acuminata</i>		1	4

1.3 Epiphyte

SN	Family	Scientific name	Common name	Number
1	Dryopteridaceae	<i>Drynaria propinqua</i>		2
2	Ericaceae	<i>Agapetes serpens</i>		1

1.4 Data sheet (Herbs)

Plot type(square): Herb (2x 2m)

SN	Family name	Scientific name	Common name	Cover% or number
1	Compositae	<i>Adenostemma lavenia</i>		10
2	Compositae	<i>Bidens pilosa</i>		10
3	Compositae	<i>Erigeron spp</i>		10
4	Gentianaceae	<i>Swertia bimaculata</i>		10
5	Compositae	<i>Sigesbeckia orientalis</i>		10
6	Labiatae	<i>Clinopodium umbrosum</i>		10
7	Compositae	<i>Ainsliaea aptera</i>		10
8	Zingiberaceae	<i>Hedychium spicatum</i>		10
9	Asteraceae	<i>dichrocephala integrifolia</i>		10
10	Compositae	<i>Crassocephalum crepidioides</i>		10

1.5 Regeneration

SN	Family name	Scientific name	Common name	Number
1	Fagaceae	<i>Quercus griffithii</i>		20

1.6 Other Plants by RECEE

SN	Family name	Scientific name	Common name	Type of plant
1	Campanulaceae	<i>Lobelia seguinii</i>		Shrub
2	Compositae	<i>Gynura nepalensis</i>		Shrub
	Orchidaceae	<i>Zeuxine goodyeroides</i>		Orchid
	Orchidaceae	<i>Calanthe mannii</i>		Orchid
	Polygonaceae	<i>Aconogonon molle</i>		Shrub
	Urticaceae	<i>Girardinia diversifolia</i>		Herb
	Polygonaceae	<i>Fagopyrum dibotrys</i>		Herb

1.1 Vegetation Assessment Protocol for Trees

Data sheet (Tree Vegetation > 1.3m)

Plot type(square): Trees (20 x 20 m)

Dzongkhag: Chukha Altitude: 1952.4
 Locality: Bunakha Aspect: NW
 Transect name: New
 PC MD3 HM Slope% 35:
 Plot no: 37 Canopy cover: partial shade
 North:27. 12483333 Habitat type: CBLF
 East: 89.541148333

SN	Family name	Scientific name	Common name	DBH(cm)	Height(m)
1	Betulaceae	<i>Alnus nepalensis</i>		20	15
2	Betulaceae	<i>Alnus nepalensis</i>		12	15
3	Betulaceae	<i>Alnus nepalensis</i>		25	15
4	Betulaceae	<i>Alnus nepalensis</i>		15	15
5	Betulaceae	<i>Alnus nepalensis</i>		20	15
6	Betulaceae	<i>Alnus nepalensis</i>		30	15
7	Betulaceae	<i>Alnus nepalensis</i>		40	15
8	Betulaceae	<i>Alnus nepalensis</i>		45	15
9	Betulaceae	<i>Alnus nepalensis</i>		15	15
10	Betulaceae	<i>Alnus nepalensis</i>		25	15

1.2 Vegetation Assessment Protocol for Shrubs

Data sheet(Shrub Vegetation)

Plot Type(square): Shrub(20x20m)

SN	Family	Scientific name	Common name	Height(m)	Number
1	Gramineae	<i>Yushania spp</i>		2	15

2	Polygonaceae	<i>Aconogonon molle</i>		3	5
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1.3 Data sheet (Herbs)

Plot type(square): Herb (2x 2m)

SN	Family name	Scientific name	Common name	Cover% or number
1	Urticaceae	<i>Pilea spp</i>		25
2	Urticaceae	<i>Elatostema lineolatum</i>		25
3	Urticaceae	<i>Lecanthus peduncularis</i>		25
4	Oxalidaceae	<i>Oxalis corniculata</i>		25

1.4 Other Plants by RECEE

SN	Family name	Scientific name	Common name	Type of plant
1	<i>Rosaceae</i>	<i>Agrimonia pilosa</i>		Herb
2	Compositae	<i>Adenostemma lavenia</i>		Shrub
3	Compositae	<i>Gynura nepalensis</i>		Herb
4	Polygonaceae	<i>Fagopyrum dibotrys</i>		Herb

1.1 Vegetation Assessment Protocol for Trees

Data sheet (Tree Vegetation > 1.3m)

Plot type(square): Trees (20 x 20 m)

Altitude: 1841.7

Dzongkhag:

Chukha Aspect: west

Locality:

Chanachen Slope%: 25

Transect name:
 New PC
 Magazine Canopy cover: partial shade
 Plot no: 38 Habitat type:CBLF
 North: 27.119335
 East: 89.538055

SN	Family name	Scientific name	Common name	DBH(cm)	Height(m)
1	Lauraceae	<i>Persea spp</i>		50	17
2	Lauraceae	<i>Persea spp</i>		55	20
3	Rutaceae	<i>Tetradium fraxinifolium</i>		35	12
4	Rutaceae	<i>Rhus spp</i>		30	10
5	Symplocaceae	<i>Symplocos ramosissima</i>		12	5
6	Symplocaceae	<i>Symplocos ramosissima</i>		12	5

1.2 Vegetation Assessment Protocol for Shrubs

Data sheet(Shrub Vegetation)

Plot Type(square): Shrub(20x20m)

SN	Family	Scientific name	Common name	HT(M)	Number
1	Theaceae	<i>Eurya acuminata</i>		0.5	10
2	Gramineae	<i>Chimonobambusa callosa</i>		2	100

1.3 Data sheet (Herbs)

Plot type(square): Herb (2x 2m)

SN	Family name	Scientific name	Common name	Cover% or number
1	Pteridaceae	<i>Coniogramme pubescens</i>		45
2	Dryopteridaceae	<i>Polystichum spp</i>		25
3	Orchidaceae	<i>Calanthe spp</i>		15
4	Zingibaraceae	<i>Hedychium spp</i>		15

1.4 Other Plants by RECEE

SN	Family name	Scientific name	Common name	Type of plant
1	Polygalaceae	<i>Polygala arillata</i>		shrub
2	Buddlejaceae	<i>Buddleja asiatica</i>		shrub
3	Rosaceae	<i>Prunus carmesina</i>		Tree
4	Polygonaceae	<i>Aconogonon molle</i>		Herb
5	Balsaminaceae	<i>Impatiens racemosa</i>		Herb
6	Compositae	<i>Sigesbeckia orientalis</i>		Herb
	Compositae	<i>Adenostemma lavenia</i>		Herb
	Compositae	<i>Gynura nepalensis</i>		shrub
	Urticaceae	<i>Girardinia diversifolia</i>		Herb

1.1 Vegetation Assessment Protocol for Trees

Data sheet (Tree Vegetation > 1.3m)

Plot type(square): Trees (20 x 20 m)

Dzongkhag: Chukha Altitude: 1892.6

Locality: Below

Tshimasham Aspect:W

Transect name: New PC-

MD 4 Slope%: 35

Plot no: 39 Canopy cover: partial shade, close

North: 27.096495 Habitat type: CBLF

SN	Family	Scientific name	Common name	DBH(cm)	Height(m)
1	Lauraceae	<i>Persea spp</i>		45	12
2	Magnoliaceae	<i>Michelia doltsopa</i>		60	17
3	Magnoliaceae	<i>Michelia doltsopa</i>		35	15
4	Fagaceae	<i>Quercus lamellosa</i>	Bull oak	110	20
5	Symplocaceae	<i>Symplocus sumantia</i>		21	7

6	Symplocaceae	<i>Symplocus sumantia</i>		35	8
7	Symplocaceae	<i>Symplocus sumantia</i>		45	12
8	Fagaceae	<i>Castanopsis spp</i>		40	20

1.2 Vegetation Assessment Protocol for Shrubs

Data sheet(Shrub Vegetation)

Plot Type(square): Shrub(20x20m)

SN	Family	Scientific name	Common name	Ht(M)	Number
1	Symplocaceae	<i>Symplocus sumantia</i>		2	5
2	Symplocaceae	<i>Symplocos ramosissima</i>		2	3
3	Rutaceae	<i>Zanthoxylum armatum</i>		2	1
4	Araliaceae	<i>Brassaiopsis hainla</i>		3	2
5	Gramineae	<i>Chimonobambusa callosa</i>		2	50
6	Araliaceae	<i>Hedera nepalensis</i>		4	1
7	Rosaceae	<i>Rubus acuminatus</i>		5	1

1.3 Data sheet (Herbs)

Plot type(square): Herb (2x 2m)

SN	Family name	Scientific name	Common name	Cover% or number
1	Urticaceae	<i>Elatostema spp</i>		55%
2	Urticaceae	<i>Girardinia diversifolia</i>		20%
3	Urticaceae	<i>Pilea spp</i>		10%
4	Acanthaceae	<i>Strobilanthes spp</i>		15%

1.4 Other Plants by RECEE

SN	Family name	Scientific name	Common name	Type of plant
1	Elaeocarpaceae	<i>Sloanea tomentosa</i>		Tree
2	Urticaceae	<i>Boehmeria cylindrica</i>	False nettle	Shrub

3	Urticaceae	<i>Zanthoxylum asiaticum</i>		Climber
4	Urticaceae	<i>Lecanthus peduncularis</i>		Herb
5	Polygonaceae	<i>Aconogonon molle</i>		Herb
6	Compositae	<i>Adenostemma lavenia</i>		Herb
7	Compositae	<i>Gynura nepalensis</i>		shrub
8	Urticaceae	<i>Girardinia diversifolia</i>		Herbs
9	Polygonaceae	<i>Fagopyrum dibotrys</i>		Herbs
10	Ranunculaceae	<i>Anemone vitifolia</i>		Herbs
11	Balanophoraceae	<i>Balanophora dioica</i>		Herbs

5.2 STATUS OF FLORA AS PER NATIONAL LEGISLATION, IUCN STATUS AND CITES LISTING

Sl no	Family name	Botanical name	Comon name	Local name	Uses	National legislation	CITES listing	IUCN status
1	Aceraceae	<i>Acer campbellii</i>	Himalayan Maple	Chalam(Dz), Sermaling shing(Sh), Kapasey(Lh)	Ph, Co, Arts & craft, Fe	Schedule-II		LC
2	Adoxaceae	<i>Viburnum erubescens</i>	Reddish viburnum		Ph, Fo, Fe			LC
3	Anarcardiaceae	<i>Rhus spp</i>	Tanners	Choka shing(Dz), Roptang shing(Sh)	Ph, Fo			LC
4	Araliaceae	<i>Brassiopsis hainla</i>	Seto chuletro tree		Fo			LC
5	Betulaceae	<i>Alnus nepalensis</i>	Himalayan Alder	Gama(Dz), Utis(Lh)	Ph, Fe, Co, Dy	Schedule-III		LC
6	Betulaceae	<i>Betula alnoides</i>	Himalayan birch	Taab(Dz), Charr Shing(Sh), Saur(Lh)	Ph, Fo, CO,	Schedule-II		LC
7	Betulaceae	<i>Carpinus viminea</i>	Himalayan hornbeam	Rootoshing(Dz), Loong shing(sh)	Ph, Co, En,	Schedule-II		LC
8	Betulaceae	<i>Corylus ferox</i>	Himalayam hazelnut		Fo, Co, Arts& craft			LC
9	Canabaceae	<i>Celtis tetranda</i>	Nilgiri elm	Sok sokpa shing(Sh), Khari(Lh)	Ph, fo, Co			LC
10	Fagaceae	<i>Castonopsis spp</i>		Sokey(Dz)	Ph, En,			LC
11	Cornaceae	<i>Benthamedia capitata</i>	Dogwood	Phoetse(Dz), Ramkattar(Lh)	Ph, Fo, Arts & craft			LC

12	Ericaceae	<i>Rhododendron arboreum</i>	Rhodo	Aeto meto(Dz), Gurass(Lh)	Ph, Fo, Dy, Arts &crafts	Schedule-III		LC
13	Ericaceae	<i>Lyonia ovalifolia</i>	Fetterbush	Zentu shing(Dz), Shajur shing(Sh), Angeri(Lh)	Ph, En,	Schedule-III		LC
14	Ericaceae	<i>Rhododendron griffithianum</i>		Tag-shar-meto(Dz), Seto chimal(Lh),	Ph, Arts & crafts	Schedule-III		LC
15	Ericaceae	<i>Pieris formosa</i>	Himalayan andromeda	Kheppchhey(Dz), Balu(Lh)	Ph			LC
16	Fagaceae	<i>Quercus oxyodon</i>	Sharp-toothed oak	Thomp shing(Dz), Thongpa shing(Sh)	Fe, En	Schedule-III		LC
17	Fagaceae	<i>Quercus lamellosa</i>	Bull oak	Dhom sokey(Dz), Fangkhio shing(Sh)	Fe, En	Schedule-III		LC
18	Fagaceae	<i>Quercus glauca</i>	Japanese blue oak	Thomp(Dz), Thongpa shing(Sh), Musre phalant(Lh)	Ph, Fe, En	Schedule-III		LC
19	Fagaceae	<i>Quercus lanata</i>	Ban oak	Goom shing(Dz), Betsinang shing(Sh), Banj(Lh)	Ph, Fe, En	Schedule-III		LC
	Fagaceae	<i>Lithocarpus elegans</i>		Shakor shing(Sh), Arkaula(Lh)	Fe, En	Schedule-III		LC
20	Fagaceae	<i>Lithocarpus fenestratus</i>	Stone oak	Shakor shing(Sh), Arkaula(Lh)	Arts & craft, Dy, En	Schedule-III		LC
21	Lauraceae	<i>Actinodaphne obovata</i>		Runchey pat(Lh)	Ph, Fe			LC
22	Lauraceae	<i>Persea spp</i>	Wild avocado	Golee shing(Sh), Chiplicawla(Lh)	Ph, Fo	Schedule-III		LC
23	Lauraceae	<i>Dodecadenia grandiflora</i>	One flowered litsea		Ph, Fo, Co, Fe			LC
24	Lauraceae	<i>Cinnamomum glanduliferum</i>	Cinnamon tree	Kipchu shing(Sh), Kawla(Lh)	Ph, Co			LC
25	Magnoliaceae	<i>Michelia doltsapa</i>	Temple magnolia	Champe shing(Sh), Champ(Lh)	Ph, Co, Arts & crafts			LC

26	Pinaceae	<i>Pinus wallichiana</i>	Bluepine	Tongphu(Dz), Changshing(Sh), Dhupi(Lh)	Ph, Fo, Arts & crafts, Co, En	Schedule-II		LC
27	Pinaceae	<i>Tsuga dumosa</i>	Hemlock	Sey shing(Dz), Threngre salla	Ph, Co, En,			LC
28	Pinaceae	<i>Picea spinulosa</i>	Spruce	Ba shing(Dz), Kalo salla(Lh)	Ph, Co, En,	Schedule-III		LC
29	Rosaceae	<i>Prunus carmesina</i>	Wild himalayan cherry		Ph, Fo			LC
30	Rosaceae	<i>Prunus nepalensis</i>	wild cherry	Khamgo shing(Dz), Arupate(Lh)	Ph, Fo,			LC
31	Rutaceae	<i>Zanthoxylum armatum</i>	Prickly ash	Khaigee(Sh), Bale timbur(Lh)	Ph, Fo			LC
32	Salicaceae	<i>Salix spp</i>	Willow	Changma(Dz)	Ph			LC
33	Salicaceae	<i>Populus ciliata</i>	Himalayan poplar	Kashing(Dz)	Co, Ph, Arts & crafts, Fe			LC
34	Schoepfiaceae	<i>Schoepfia jasminodora</i>	Green bark tree		Ph			LC
35	Symplocaceae	<i>Symplocos ramosissima</i>	Many branched sapphire berry		Ph, Fo, Co			LC
36	Symplocaceae	<i>Symplocos racemosa</i>	Lodh tree		Ph			LC
37	Symplocaceae	<i>Symplocos sumuntia</i>	Shan fan		Ph, Dy, Fo			LC
38	Symplocaceae	<i>Symplocos paniculata</i>	Sapphire berry	Pang tse shing(Dz),	Ph, Fo, Dy			LC
39	Theaceae	<i>Eurya acuminata</i>	Tapering leaf eurya		Ph, Fo			LC
40	Toricelliaceae	<i>Toricellia tiliifolia</i>	Linden leaf	Dhengboor-laga(Sh)	Ph			LC
41	Fagaceae	<i>Quercus semicarpifolia</i>	Brown oak	Bji Shing(Dz), Betsnang shing(Sh)	Ph, Fo, Fe, Co, En	Schedule-III		LC
42	Fagaceae	<i>Quercus griffithii</i>	Oak	Sisi shing(Dz), Bainang shing(Sh), Kasru(Lh)	Ph, Fo, Fe, En	Schedule-III		LC
43	Salicaceae	<i>Salix wallichiana</i>	Willow	Changma(Dz)	Ph, Fo, Arts & crafts			LC

Shrub

Sl No.	Family name	Botanical name	Comon name	Local name	Uses	National legislation	CITES listing	IUCN status
1	Thymelaeaceae	<i>Edgeworthia gardneri</i>	Indian paper tree	Dheykap(Dz), Argayle(Lh)	Ph, Arts & crafts	Schedule-III		LC
2	Myrtaceae	<i>Syzygium cumini</i>	Java plum	Nyasse shing(Dz), Menntse shing(Sh),Jamuna(Lh)	Ph, Fo, Fe, En			LC
3	Araliaceae	<i>Eleutherococcus cissifolium</i>	Siberian Ginseng		Ph			LC
4	Primulaceae	<i>Maesa chisia</i>	Chisia wild berry		Fe			LC
5	Primulaceae	<i>Ardisia macrocarpa</i>	Himalayan coralberry	Ressim(Dz), Damai phal(Lh)	Ph, Fo			LC
6	Elaeagnaceae	<i>Elaeagnus parvifolia</i>	Oleaster	Bji(Dz), Dhang-boor zoo(Sh)	Ph, Fo			LC
7	Thymelaeaceae	<i>Daphne bholua</i>	Paper daphne	Dheynap(Dz), Shogo shing(Sh), Kagate(Lh)	Ph, Arts & crafts	Schedule-III		LC
9	Balsaminaceae	<i>Jasminum dispersum</i>	Pink jasmine		Ph			LC
10	Lardizabalaceae	<i>Holbelia latifolia</i>	Sausage vine	Trogchangsey(Sh)	Ph, Fo			LC
11	Urticaceae	<i>Debregaesia longifolia</i>	Orange wild rhea	Chammbatang boning(Sh), Tusare(Lh)	Ph, Fo, Arts & crafts			LC
12	Sapindaceae	<i>Acer oblongum</i>	Evergreen maple	Chibla shing(Dz), Phirphiri(Lh)	Ph, Co	Schedule-II		LC
13	Polygonaceae	<i>Aconogonum molle</i>	Soft knotweed	Kochoma(Sh), Thohtney(Lh)	Ph, Fo, Fe, En			LC
14	Poaceae	<i>Chimonobambusa callosa</i>	Bamboo	Rashi(Sh)	Co, Fe, Fo Arts & crafts			LC
15	Poaceae	<i>Yushania spp</i>	Bamboo	Mingma(Dz),	Co			LC

16	Moraceae	<i>Morus spp</i>	Mulberries	Shakhongma shing(Sh), sanu kimbu(Lh)	Ph, Fo, Fe,		LC
17	Buxaceae	<i>Sarcococca saligna</i>	Willow-leaf sweet box	Jaheom goenhoe(Dz)	Ph, Arts & crafts		LC
18	Berberidaceae	<i>Berberis spp</i>	Barberry	Kapia tsang(Dz), Kerpa zoo(Sh)	Ph, Arts & crafts		LC
19	Berberidaceae	<i>Mahonia napalensis</i>	Nepal mahonia	Kesari(Lh)	Ph, Arts & crafts,		LC
20	Trochodendraceae	<i>Tetracentron sinense</i>	Qing pi tree	Yangdar shing(Sh),	Ph, Arts & crafts	Appendix -III	DD
21	Adoxaceae	<i>Viburnum cylindricum</i>	Tubeflower viburnum	Nom shing(Sh),	Ph, Fo, Arts & crafts		LC
22	Caprifoliaceae	<i>Lycesteria formosa</i>	Pheasant berry		Ph, Fe		LC
24	Rosaceae	<i>Rubus acuminatus</i>	Gaint bramble	Komatsang(Sh), Sanu aselu(Lh)	Ph		LC
25	Smilacaceae	<i>Smilax spp</i>	Prickly ivy	Kukoor zoo(Sh), Runche(Lh)	Ph,		LC
26	Oleaceae	<i>Fraxinus spp</i>	Common ash	Draythub(Dz), Lakuri(Lh)	Co,		LC
27	Rosacea	<i>Rosa sericea</i>	Silky rose	Sew meto(Dz), Sisi(Lh)	Ph, Arts & crafts		LC
28	Rosaceae	<i>Cotoneaster spp</i>	Rockspray cotoneaster	Katragpa roo(Sh)	Ph, Arts & crafts		LC
29	Caprifoliaceae	<i>Lonicera quinquelocularis</i>	Honey suckle		Ph, En		LC
30	Coriariaceae	<i>Coriaria nepalensis</i>	Masuri berry	Limphu shing(Dz), Thabshing(Sh)	Ph, Fo		LC
31	Rosaceae	<i>Rosa brunonii</i>	Himalayan musk rose	Tagtsher(Dz),	Ph, Fo, Arts & crafts		LC
32	Ericaceae	<i>Rhododendron maddenii</i>	Pink trumpets	Saga meto(Dz)	Arts & crafts		LC

34	Ericaceae	<i>Vaccinium vacciniaceum</i>	Tibetan blueberry		Ph, Fo			LC
35	Scrophulariaceae	<i>Buddleja crispa</i>	Himalayan butterfly bush	Omsa nesma(Sh)	Ph			LC
36	Celastraceae	<i>Euonymus tingens</i>	Purple veined spindle tree	Nga pa meto shing(Dz)	Ph, Fe, Arts & crafts			LC
37	Rosaceae	<i>Rubus biflorus</i>	Himalayan raspberry	Thulu gong sey(Sh)	Fo, Dye			LC
38	Aquifoliaceae	<i>Ilex dipyrena</i>	Himalayan holly	Ratsa shing(Sh), Ilse(Lh)	Ph,			LC
39	Hydrangeaceae	<i>Philadelphus spp</i>	Mock orange		Ph, Arts & crafts			LC
40	Berberidaceae	<i>Berberis aristata</i>	Indian barberry	Kerpa zoo(Sh), Chutro(Lh)	Ph			LC
41	Ericaceae	<i>Rhododendron triflorum</i>		Pahenle Chimal(Lh)	Ph, Arts & crafts	Scheduel-III		LC
42	Rosaceae	<i>Malus baccata</i>	Siberian crap apple	Nyera leetong(Sh)	Fo, Arts & crafts			LC

Herbs

Sl no	Family name	Botanical name	Comon name	Local name	Uses	National legislation	CITES listing	IUCN status
1	Acanthaceae	<i>Strobilanthes spp</i>	Persian shield	Khamkha nagma(Sh)	Ph			LC
2	Araliaceae	<i>Hedera nepalensis</i>	Himalayan ivy	Loyee mekha(Dz), Pan roo(Sh)	Ph, Fe			LC
3	Asparagaceae	<i>Ophiopogon spp</i>	Lily turf		Arts & crafts			LC
4	Asparagaceae	<i>Asparagus racemosus</i>	Buttermilk root	Reege nya khagchu(Dz), Borang nga-la nyom(Sh)	Ph, Fo			LC
5	Asparagaceae	<i>Tupistra spp</i>		Nakima(Lh)	Ph			LC

6	Asteraceae	<i>Laggera crispata</i>	Curly blumea		Ph			LC
7	Asteraceae	<i>Bidens pilosa</i>	Plackjack	Zoompee thoorpang(Sh), Kuro(Lh)	Ph			LC
8	Asteraceae	<i>Ainsliaea aptera</i>	Wingless ainsliaea		Ph			LC
9	Asteraceae	<i>Senecio diversifolia</i>	Mexican sunflower		Ph			LC
10	Asteraceae	<i>Artemisia vulgaris</i>	Mugwort	Khempa(Dz)	Ph			LC
11	Athyriaceae	<i>Diplazium esculentum</i>	Fern	Nakay(Dz), Dawia(Sh)	Ph, Fo, Fe			LC
12	Balsaminaceae	<i>Impatiens spp</i>	Busy lizzie	Nakay(Dz), Dawia(Sh)	Ph, Dy,			LC
13	Dennstaedtiaceae	<i>Pteridium aquilinum</i>	Bracken fern	Nakay(Dz), Dawia(Sh)	Ph, Fe, Dy, Arts & crafts			LC
14	Dryopteridaceae	<i>Polystichum spp</i>	Shield fern	Nakay(Dz), Dawia(Sh)	Ph			LC
15	Equisetaceae	<i>Equisetum diffusum</i>	Horsetail	Tentso(Sh), Salley(Lh)	Ph			LC
16	Ericaceae	<i>Pyrola spp</i>	Wintergreen		Ph			LC
17	Euphorbiaceae	<i>Euphorbia griffithii</i>	Griffith's spurge	Dhoor-jeedh(DZ)	Arts & crafts			DD
18	Fabaceae	<i>Desmodium spp</i>	Begger's lice		Ph, Fe			LC
19	Hypoxidaceae	<i>Curculigo capitulata</i>	Palm grass		Ph			LC
20	Lamiaceae	<i>Perilla frutescens</i>	Beefsteak plant		Ph, Arts & crafts			LC
21	Lamiaceae	<i>Salvia spp</i>	Sage	Jipshi karmo(Dz)	Ph			LC
22	Melanthiaceae	<i>Paris polyphylla</i>	Himalayan Paris	Dochu kewa(Dz), Thogsampa(Sh), satuwa(Lh)	Ph	Schedule-III		VU
23	Piperaceae	<i>Piper pedicellatum</i>	Long pipla	Peepeeling(Sh), Pipla(Lh)	Ph, Fo			VU
24	Plumbaginaceae	<i>Ceratostigma griffithii</i>	Burmese plumbago	Yoodroen meto(Sh)	Arts & crafts			LC

25	Poaceae	<i>Oplismenus hirtellus</i>	Basket grass		Arts & crafts, Fe			LC
26	Poaceae	<i>Carex spp</i>	Sedge		Ph, Fe			LC
28	Polygonaceae	<i>Rumex nepalensis</i>	Nepal Dock	Sheylempa(Sh)	Ph, Dy, Fo			LC
29	Polygonaceae	<i>Persicaria capitata</i>	Pink knotweed	Lha lop(Dz), Gangchimeen(Sh)	Ph, Arts & crafts			LC
30	Ranunculaceae	<i>Clematis spp</i>	Old man's beard		Ph, Arts & crafts			LC
32	Rosaceae	<i>Potentilla spp</i>	Barren strawberries	Chiriya(Lh)	Ph, Fo, Fe			LC
33	Rosaceae	<i>Rubus calycinus</i>	Wild raspberry	Gong zoo(Sh),	Ph, Dye			LC
34	Rubiaceae	<i>Rubia spp</i>	Madder	Tsoey(Dz), La-nye-roo(Sh)	Ph, Dy			LC
35	Rubiaceae	<i>Galium spp</i>	Bedstraw	Roo-roba(Sh)	Ph, Fo			LC
36	Solanaceae	<i>Solanum viarum</i>	Tropical soda apple		Ph			LC
37	Urticaceae	<i>Girardinia diversifolia</i>	Himalayan nettle	Zocha(Dz), Zangroo(Sh)	Ph, Fo, Arts & crafts			LC
38	Urticaceae	<i>Pouzolzia hirta</i>	Oyik	Mizuma laga ngon(Sh)	Ph, Fo			LC
39	Urticaceae	<i>Urtica dioica</i>	common nettle	Zocha(Dz), Khee jazoo(Sh)	Ph			LC
40	Urticaceae	<i>Pilea spp</i>	Friendship plant	Jazoo boning(Sh)	Ph, Arts & crafts			LC
41	Violaceae	<i>Viola spp</i>	Pansy	Mamphoong ngon(Sh)	Ph			LC
42	Vitaceae	<i>Tetrastigma spp</i>	Chestnut vine		Ph			LC

5.3 STATIONWISE MAMMAL DATA FOR BUNAKHA HPP

Plot No.	Locality	North	East	Altitude(m)	Family name	Scientific name	Common name	Direct observation	No. of pellets	Other evidence
ST-1	Tala dam upper end reservoir	27.048065	89.58015	1338.100	-	-	-	-	-	-
ST-2	Below Tsimasham (camp area-3)	27.092710000	89.5285811667	1881.2000	Cervidae	<i>Rusa unicolor</i>	Sambar	-	3	Foot prints
ST-3	Chukha dam (below dam)	27.109348333	89.529831667	1791.100	-	-	-	-	-	-
ST-4	Chanachan (INRQ-2)	27.119645000	89.52952667	2151.500	Cervidae	<i>Rusa unicolor</i>	Sambar	-	-	Rubbing on pole
					Cervidae	<i>Rusa unicolor</i>	Sambar	-	-	Foot prints
					Cervidae	<i>Rusa unicolor</i>	Sambar	-	-	Resting place
ST-5	Above Chanachan junction (MD-3,6,7 & access road)	27.118275000	89.538933333	1969.600	-	-	-	-	-	-
ST-6	Chanachen (above bridge)	27.127936667	89.539026667	1821.800	-	-	-	-	-	-

Plot No.	Locality	North	East	Altitude(m)	Family name	Scientific name	Common name	Direct observation	No. of pellets	Other evidence
	downstream of Bunakha dam									
ST-7	Below Chanachan (upstream right bank)	27.137010000	89.539243333	1923.800	Cervidae	<i>Rusa unicolor</i>	Sambar	-	1	-
					Cervidae	<i>Muntiacus muntjak</i>	Barking Deer	-	1	-
					Suidae	<i>Sus scrofa</i>	Wild Pig	-	-	Poop
ST-8	Bunagu (camp area-5 & MD-1)	27.138356667	89.544936667	2076.700	Cervidae	<i>Rusa unicolor</i>	Sambar	-	1	
ST-9	Chanachan (near village INRQ-3)	27.164230000	89.528840000	2261.600	Cervidae	<i>Muntiacus muntjak</i>	Barking Deer	-	1	
ST-10	Below Bunagu (upstream left bank)	27.145166667	89.536510000	1970.900	Cervidae	<i>Rusa unicolor</i>	Sambar	-	6	1 bed
					Bovidae	<i>Naemorhedus goral</i>	Himalayan Goral	-	4	-
					Cervidae	<i>Muntiacus muntjak</i>	Barking Deer	-	1	Hoof prints
ST-11	Above Bunakha (camp area-6)	27.150410000	89.547240000	2336.200	Cervidae	<i>Rusa unicolor</i>	Sambar	-	5	-
ST-12	Tanalum new bridge	27.154913333	89.536795000	1974.000	Cervidae	<i>Rusa unicolor</i>	Sambar	-	-	1 bed
ST-13	Near old Tanalum bridge (INRQ-4)	27.160778333	89.553545000	2198.100	-	-	-	-	-	-

Plot No.	Locality	North	East	Altitude(m)	Family name	Scientific name	Common name	Direct observation	No. of pellets	Other evidence
ST-14	Geling Goenpa	27.16363666	89.524805000	2464.300	-	-	-	-	-	-
ST-15	Near old Tanalum highway (INRQ-6)	27.164180000	89.548663333	2128.900	-	-	-	-	-	-
ST-16	Near Bunakha	27.173826667	89.53283666	1974.1000	Cervidae	<i>Rusa unicolor</i>	Sambar	-	3	-
					Cervidae	<i>Muntiacus muntjak</i>	Barking Deer	-	3	-
ST-17	Near Tanalum old highway (INRQ-7)	27.183995000	89.545820000	2169.900	Suidae	<i>Sus scrofa</i>	Wild Pig	-	-	4 burrows
					Cervidae	<i>Rusa unicolor</i>	Sambar	-	1	-
ST-18	New Tanalum Bridge (along tributary left bank)	27.183955000	89.528225000	2063.200	Bovidae	<i>Naemorhedus goral</i>	Himalayan Goral	-	1	-
ST-19	Along Haachhu below Bjizhigang village	27.193660000	89.48675000	2058.800	Cervidae	<i>Rusa unicolor</i>	Sambar	-	1	-
					Cervidae	<i>Muntiacus muntjak</i>	Barking Deer	-	1	-
					Suidae	<i>Sus scrofa</i>	Wild Pig	-	-	4 Poops
ST-20	Near Haa bridge (Wangchhu right bank)	27.200471667	89.520813333	1964.900	-	-	-	-	-	-
ST-21	Near Haa bridge (Wangchhu upstream right bank)	27.204816667	89.51883333	1920.400	-	-	-	-	-	-

Plot No.	Locality	North	East	Altitude(m)	Family name	Scientific name	Common name	Direct observation	No. of pellets	Other evidence
ST-22	Damchu below highway	27.228008333	89.517783333	2038.100	-	-	-	-	-	-
ST-23	Damchu (INRQ-10)	27.232386667	89.528786667	2238.800	Cervidae	<i>Muntiacus muntjak</i>	Barking Deer	-	1	-
					Cervidae	<i>Rusa unicolor</i>	Sambar	-	2	-
					Cercopithecidae	<i>Semnopithecus schistaceus</i>	Grey Langur	7 nos	-	-
ST-24	Damchu (riverine)	27.262618333	89.528415000	2005.900	-	-	-	-	-	-
ST-25	Bunagu below highway (near 1st bore hole)	27.131876667	89.542165000	2011.700	Cercopithecidae	<i>Macaca assamensis</i>	Assamese macaque	-	-	Poof (droppings)
ST-26	Near Bridge (Chanachan)	27.129773333	89.540440000	1821.800	-	-	-	-	-	-
ST-27	Below Bunagu highway	27.136948333	89.543318333	2007.100	Cervidae	<i>Rusa unicolor</i>	Sambar	-	1	1 bed
ST-28	Paga Goenpa	27.285971667	89.561858333	2798.200	Cervidae	<i>Muntiacus muntjak</i>	Barking Deer	-	4	-
ST-29	Below Shema Goenpa	27.220886667	89.547620000	2794.300	-	-	-	-	-	-
ST-30	Chukha (Wangkha above highway)	27.057893333	89.555813333	1653.600	-	-	-	-	-	-
ST-31	Near Lobneykha Primary School	27.175095000	89.545270000	2625.200	-	-	-	-	-	-

Plot No.	Locality	North	East	Altitude(m)	Family name	Scientific name	Common name	Direct observation	No. of pellets	Other evidence
ST-32	Above Chananchan village	27.147958333	89.513200000	2557.000	-	-	-	-	-	-
ST-33	Damchu above highway	27.241800000	89.524776667	2011.500	Cervidae	<i>Muntiacus muntjak</i>	Barking Deer	-	6	-
ST-34	Near Wanakha village	27.215681667	89.509671667	2296.800	-	-	-	-	-	-

5.4 STATUS OF MAMMALS AS PER NATIONAL LEGISLATION, IUCN RED LIST AND CITES LISTING

SN	Family name	Scientific name	Common name	National legislation	CITES listing	IUCN Red list
1	Cervidae	<i>Muntiacus muntjak</i>	Barking Deer	FNCA III	II	LC
2	Cervidae	<i>Rusa unicolor</i>	Sambar	FNCA II	II	VU
3	Suidae	<i>Sus scrofa</i>	Wild Pig	FNCA III	II	LC
4	Cercopithecidae	<i>Semnopithecus schistaceus</i>	Grey Langur	FNCA II	I	LC
5	Cercopithecidae	<i>Macaca assamensis</i>	Assamese macaque	FNCA III	II	NT
6	Bovidae	<i>Nemorhaedus goral</i>	Himalayan Goral	FNCA II	I	NT
7	Ursidae	<i>Ursus thibetanus</i>	Asiatic Black Bear	FNCA II	I	VU
8	Sciuridae	<i>Funambulus pennatii</i>	Five striped Palm Squirrel	-	-	LC
9	Felidae	<i>Prionailurus bengalensis</i>	Leopard Cat	FNCA II	II	LC

5.5 SECOND SEASON STATION-WISE BIRD SURVEY DATA SHEET FOR BUNAKHA HPP

Second season (monsoon) birds surveyed for Bunakha HPP											GPS Coordinate		Time		Altitude
ST No.	SL No	Common name	Species	M	F	Juv	Count	Total	Locality	Habitat	Northing	Easting	Start	End	Meter
1	1	Great Barbet	<i>Megalaima virens</i>	0	0	0	1	1	Tala Dam	R	27.047908333°	89.580216667°	2.21PM	3:00 PM	1394
	2	Brown Dipper	<i>Cinclus pallasii</i>	0	1	0	0	1	Tala Dam	R	27.047908333°	89.580216667°	2.21PM	3:00 PM	1394
	3	White-capped Water Redstart	<i>Chaimarrornis leucocephalus</i>	1	0	0	0	1	Tala Dam	R	27.047908333°	89.580216667°	2.21PM	3:00 PM	1394
	4	Scarlet Minivet	<i>Pericrocotus flammeus</i>	0	0	0	1	1	Tala Dam	R	27.047908333°	89.580216667°	2.21PM	3:00 PM	1394
	5	White-throated Laughingthrush	<i>Garrulax albogularis</i>	6	5	0	0	11	Tala Dam	R	27.047908333°	89.580216667°	2.21PM	3:00 PM	1394
2	1	White Wagtail	<i>Motacilla alba</i>	1	0	0	0	1	Chukha Dam	R	27.109285000°	89.530040000°	10.00AM	11:00PM	1809
	2	Green-backed Tit	<i>Parus monticolus</i>	2	2	0	0	4	Chukha Dam	R	27.109285000°	89.530040000°	10.00AM	11:00PM	1809
	3	Whiskered Yuhina	<i>Yuhina flavicollis</i>	5	4	0	0	9	Chukha Dam	R	27.109285000°	89.530040000°	10.00AM	11:00PM	1809
	4	Black - throated Tit	<i>Aegithalos concinnus</i>	2	3	0	0	5	Chukha Dam	R	27.109285000°	89.530040000°	10.00AM	11:00PM	1809
	5	Striated Laughingthrush	<i>Garrulax striatus</i>	2	2	0	0	4	Chukha Dam	R	27.109285000°	89.530040000°	10.00AM	11:00PM	1809
	6	Scarlet Minivet	<i>Pericrocotus flammeus</i>	1	0	0	0	1	Chukha Dam	R	27.109285000°	89.530040000°	10.00AM	11:00PM	1809
3	1	Rufous Sibia	<i>Heterophasia capistrata</i>	0	1	1	0	2	Chanachen	CBLF	27.1190606667°	89.529740000°	1.3PM	1.30PM	2133
	2	Black - throated Tit	<i>Aegithalos concinnus</i>	1	2	0	0	3	Chanachen	CBLF	27.1190606667°	89.529740000°	1.3PM	1.30PM	2133
	3	White-tailed Nuthatch	<i>Sitta himalayensis</i>	1	0	0	0	1	Chanachen	CBLF	27.1190606667°	89.529740000°	1.3PM	1.30PM	2133
	4	Red-tailed Minla	<i>Minla ignotincta</i>	4	3	0	0	7	Chanachen	CBLF	27.1190606667°	89.529740000°	1.3PM	1.30PM	2133
	5	Greater Yellownape	<i>Picus flavinucha</i>	1	0	0	0	1	Chanachen	CBLF	27.1190606667°	89.529740000°	1.3PM	1.30PM	2133

4	1	Whiskered Yuhina	<i>Yuhina flavicollis</i>	3	2	0	0	5	Chanachen	CBLF	27.118288333°	89.538913333°	1.10PM	1.30PM	1961
	2	White-tailed Nuthatch	<i>Sitta himalayensis</i>	1	0	0	0	1	Chanachen	CBLF	27.118288333°	89.538913333°	1.10PM	1.30PM	1961
	3	Ashy Drongo	<i>Dicrurus leucophaeus</i>	1	1	0	0	2	Chanachen	CBLF	27.118288333°	89.538913333°	1.10PM	1.30PM	1961
	4	Rufous Sibia	<i>Heterophasia capistrata</i>	1	1	2	0	4	Chanachen	CBLF	27.118288333°	89.538913333°	1.10PM	1.30PM	1961
5	1	White-throated Laughingthrush	<i>Garrulax albogularis</i>	1	1	0	0	2	Chanachen	CBLF	27.127935000°	89.539278333°	2.40PM	3.00PM	1883
	2	Greater Yellow-nape	<i>Picus flavinucha</i>	1	1	0	0	2	Chanachen	CBLF	27.127935000°	89.539278333°	2.40PM	3.00PM	1883
	3	Whiskered Yuhina	<i>Yuhina flavicollis</i>	2	3	1	0	6	Chanachen	CBLF	27.127935000°	89.539278333°	2.40PM	3.00PM	1883
	4	Verditer Flycatcher	<i>Eumyias thalassina</i>	1	0	0	0	1	Chanachen	CBLF	27.127935000°	89.539278333°	2.40PM	3.00PM	1883
	5	Chestnut-bellied Rock Thrush	<i>Monticola rufiventris</i>	0	1	0	0	1	Chanachen	CBLF	27.127935000°	89.539278333°	2.40PM	3.00PM	1883
6	1	Oriental White-eye	<i>Zosterops palpebrosus</i>	2	1	2	0	5	Chanachen	CBLF	27.137031667°	89.539318333°	12.35PM	1.20PM	1889
	2	Green-tailed Sunbird	<i>Aethopyga nipalensis</i>	0	1	0	0	1	Chanachen	CBLF	27.137031667°	89.539318333°	12.35PM	1.20PM	1889
	3	White-throated Laughingthrush	<i>Garrulax albogularis</i>	1	1	0	0	2	Chanachen	CBLF	27.137031667°	89.539318333°	12.35PM	1.20PM	1889
	4	Yellow-billed Blue Magpie	<i>Urocissa flavirostris</i>	0	0	1	0	1	Chanachen	CBLF	27.137031667°	89.539318333°	12.35PM	1.20PM	1889
7	1	Rufous Sibia	<i>Heterophasia capistrata</i>	0	0	0	2	2	Bunakha	CBLF	27.138536667°	89.54508500°	5.9PM	5.30PM	2088
	2	Kalij Pheasant	<i>Lophura leucomelanos</i>	2	1	0	0	3	Bunakha	CBLF	27.138536667°	89.54508500°	5.9PM	5.30PM	2088
	3	Lemon-rumped Warbler	<i>Phylloscopus chloronotus</i>	1	1	0	0	2	Bunakha	CBLF	27.138536667°	89.54508500°	5.9PM	5.30PM	2088
	4	Green-tailed Sunbird	<i>Aethopyga nipalensis</i>	1	0	0	0	1	Bunakha	CBLF	27.138536667°	89.54508500°	5.9PM	5.30PM	2088
8	1	Ashy Bulbul	<i>Hemixos flava</i>	0	1	0	0	1	Chanachen	CBLF	27.146240000°	89.528710000°	2.5PM	2.35PM	2213
	2	Rufous Sibia	<i>Heterophasia capistrata</i>	3	2	0	0	5	Chanachen	CBLF	27.146240000°	89.528710000°	2.5PM	2.35PM	2213

	3	Great Barbet	<i>Megalaima virens</i>	0	0	0	2	2	Chanachen	CBLF	27.146240000°	89.528710000°	2.5PM	2.35PM	2213
	4	Red-tailed Minla	<i>Minla ignotincta</i>	5	6	3	0	14	Chanachen	CBLF	27.146240000°	89.528710000°	2.5PM	2.35PM	2213
	5	Grey-backed Shrike	<i>Lanius tephronotus</i>	0	1	2	0	3	Tanalung	CBLF	27.146240000°	89.528710000°	2.5PM	2.35PM	2213
9	1	Rufous Sibia	<i>Heterophasia capistrata</i>	0	0	0	3	3	Tanalung/below high way	CBLF	27.145088333°	89.536455000°	2.00PM	2.29PM	1983
	2	Kalij Pheasant	<i>Lophura leucomelanos</i>	0	0	0	1	1	Tanalung/below high way	CBLF	27.145088333°	89.536455000°	2.00PM	2.29PM	1983
	3	Long-tailed Minivet	<i>Pericrocotus ethologus</i>	1	2	0	0	3	Tanalung/below high way	CBLF	27.145088333°	89.536455000°	2.00PM	2.29PM	1983
	4	White-throated Fantail	<i>Rhipidura albicollis</i>	1	1	0	0	2	Tanalung/below high way	CBLF	27.145088333°	89.536455000°	2.00PM	2.29PM	1983
	1	Hume's Warbler	<i>Phylloscopus humei</i>	1	0	0	0	1	Tanalung/below high way	CBLF	27.254858333°	89.536900000°	12.15PM	12.40PM	1974
10	2	Greater Yellownape	<i>Picus flavinucha</i>	0	0	0	2	2	Tanalung/below high way	CBLF	27.254858333°	89.536900000°	12.15PM	12.40PM	1974
	3	Rufous-bellied Woodpecker	<i>Dendrocopos hyperythrus</i>	1	1	0	0	2	Tanalung/below high way	CBLF	27.254858333°	89.536900000°	12.15PM	12.40PM	1974
	1	Scarlet Minivet	<i>Pericrocotus flammeus</i>	1	2	1	0	4	Zheling Goenpa	CBLF	27.163690000°	89.524815000°	11.50PM 12.23PM		2476
11	2	Green-tailed Sunbird	<i>Aethopyga nipalensis</i>	1	0	0	0	1	Zheling Goenpa	CBLF	27.163690000°	89.524815000°	11.50PM	12.23pm	2476
	3	Rufous-vented Yuhina	<i>Yuhina occipitalis</i>	2	2	0	0	4	Zheling Goenpa	CBLF	27.163690000°	89.524815000°	11.50PM	12.23pm	2476
	4	White-browed Shrike Babbler	<i>Pteruthius flaviscapis</i>	1	1	0	0	1	Zheling Goenpa	CBLF	27.163690000°	89.524815000°	11.50PM	12.23pm	2476
	5	Striated Laughingthrush	<i>Garrulax striatus</i>	1	2	0	0	3	Zheling Goenpa	CBLF	27.163690000°	89.524815000°	11.50PM	12.23pm	2476
	1	White-throated Laughingthrush	<i>Garrulax albogularis</i>	6	4	1	0	11	Tanalung / below high way	CBLF	27.173816667°	89.532931667°	11.20PM	11.45PM	1979
12	2	Whiskered Yuhina	<i>Yuhina flavicollis</i>	2	2	0	0	4	Tanalung / below high way	CBLF	27.173816667°	89.532931667°	11.20PM	11.45PM	1979
	3	Green-tailed Sunbird	<i>Aethopyga nipalensis</i>	1	0	0	0	1	Tanalung / below high way	CBLF	27.173816667°	89.532931667°	11.20PM	11.45PM	1979
	4	Great Barbet	<i>Megalaima virens</i>	1	1	1	0	3	Tanalung / below high way	CBLF	27.173816667°	89.532931667°	11.20PM	11.45PM	1979

13	1	Whiskered Yuhina	<i>Yuhina flavicollis</i>	4	6	1	0	11	Chanachen	CBLF	27.184211667°	89.527851667°	3.18PM	3.45PM	2007
	2	Blue Whistling Thrush	<i>Myophonus caeruleus</i>	1	0	0	0	1	Chanachen	CBLF	27.184211667°	89.527851667°	3.18PM	3.45PM	2007
14	1	Brown Parrotbill	<i>Paradoxornis unicolor</i>	6	5	0	0	11	Zhishigang/Bank of Haa chu	CBLF	27.193623333°	89.486586667°	11.00PM	11.30PM	2024
	2	White-throated Fantail	<i>Rhipidura albicollis</i>	1	0	0	0	1	Zhishigang/Bank of Haa chu	CBLF	27.193623333°	89.486586667°	11.00PM	11.30PM	2024
	3	Great Barbet	<i>Megalaima virens</i>	0	0	0	1	1	Zhishigang/Bank of Haa chu	CBLF	27.193623333°	89.486586667°	11.00PM	11.30PM	2024
	4	White-throated Laughingthrush	<i>Garrulax albogularis</i>	0	0	0	2	2	Zhishigang/Bank of Haa chu	CBLF	27.193623333°	89.486586667°	11.00PM	11.30PM	2024
15	1	Plumbeous Water Redstart	<i>Rhyacomis fuliginosus</i>	1	1	0	0	2	Below Damchu Bridge	R	27.200560000°	89.520838333°	3.00PM	3.51PM	1956
	2	White-capped Water Redstart	<i>Chaimarornis leucocephalus</i>	0	0	0	1	1	Below Damchu Bridge	R	27.200560000°	89.520838333°	3.00PM	3.51PM	1956
	3	Great Barbet	<i>Megalaima virens</i>	0	0	1	1	2	Below Damchu Bridge	R	27.200560000°	89.520838333°	3.00PM	3.51PM	1956
16	1	Rufous-bellied Woodpecker	<i>Dendrocopos hyperythrus</i>	1	0	0	0	1	Below Damchu Bridge/Bank Wangchu chu	R	27.204848333°	89.518766667°	4.15PM	4.40PM	1959
	2	Plumbeous Water Redstart	<i>Rhyacomis fuliginosus</i>	1	1	0	0	2	Below Damchu Bridge/Bank Wangchu chu	R	27.204848333°	89.518766667°	4.15PM	4.40PM	1959
	3	Blue Whistling Thrush	<i>Myophonus caeruleus</i>	1	0	0	0	1	Below Damchu Bridge/Bank Wangchu chu	R	27.204848333°	89.518766667°	4.15PM	4.40PM	1959
17	1	Oriental White-eye	<i>Zosterops palpebrosus</i>	1	1	0	0	2	Watsha	SL	27.227985000°	89.517805000°	2.30PM	2.50PM	2049
	2	Green-backed Tit	<i>Parus monticolus</i>	0	0	0	3	3	Watsha	SL	27.227985000°	89.517805000°	2.30PM	2.50PM	2049
18	1	Plumbeous Water Redstart	<i>Rhyacomis fuliginosus</i>	0	1	0	0	1	Damchu	R	27.262568333°	89.528373333°	1.10PM	1.30PM	1975
	2	Ashy Bulbul	<i>Hemixos flava</i>	0	0	0	1	1	Damchu	R	27.262568333°	89.528373333°	1.10PM	1.30PM	1975
	3	Green-backed Tit	<i>Parus monticolus</i>	2	1	0	0	3	Damchu	R	27.262568333°	89.528373333°	1.10PM	1.30PM	1975
19	1	Greater Yellownape	<i>Picus flavinucha</i>	0	0	0	1	1	Bunagu	CBLF	27.131851667°	89.541990000°	3.14PM	3.45PM	2025

	2	Mrs Gould's Sunbird	<i>Aethopyga gouldiae</i>	1	0	0	0	1	Bunagu	CBLF	27.131851667°	89.541990000°	3.14PM	3.45PM	2025
	3	Common Stonechat	<i>Saxicola torquata</i>	1	0	0	0	1	Bunagu	CBLF	27.131851667°	89.541990000°	3.14PM	3.45PM	2025
	4	Maroon Oriole	<i>Oriolus trailii</i>	0	0	0	2	2	Bunagu	CBLF	27.131851667°	89.541990000°	3.14PM	3.45PM	2025
20	1	Blue Whistling Thrush	<i>Myophonus caeruleus</i>	1	0	0	0	1	Chanachen	CBLF	27.129905000°	89.540391667°	4.20PM	4.50PM	1855
	2	White-throated Laughingthrush	<i>Garrulax albogularis</i>	3	3	0	0	6	Chanachen	CBLF	27.129905000°	89.540391667°	4.20PM	4.50PM	1855
	3	Wedge-tailed Green Pigeon	<i>Treron sphenura</i>	1	0	0	0	1	Chanachen	CBLF	27.129905000°	89.540391667°	4.20PM	4.50PM	1855
21	1	Rufous Sibia	<i>Heterophasia capistrata</i>	0	0	0	1	1	Bunagu	CBLF	27.136941667°	89.543556667°	3.30PM	4.00PM	1956
	2	Kalij Pheasant	<i>Lophura leucomelanos</i>	0	0	0	1	1	Bunagu	CBF	27.136941667°	89.543556667°	3.30PM	4.00PM	1956
	3	Oriental Turtle Dove	<i>Streptopelia orientalis</i>	1	1	0	0	2	Bunagu	CBF	27.136941667°	89.543556667°	3.30PM	4.00PM	1956
	4	Grey-headed Woodpecker	<i>Picus canus</i>	1	0	0	0	1	Bunagu	CBF	27.136941667°	89.543556667°	3.30PM	4.00PM	1956
	5	Grey-winged Blackbird	<i>Turdus boulboul</i>	0	1	0	0	1	Bunagu	CBF	27.136941667°	89.543556667°	3.30PM	4.00PM	1956
22	1	Green-backed Tit	<i>Parus monticolus</i>	1	1	0	0	2	Paga Goenpa	CF	27.286031667°	89.561640000°	9.56PM	10.20PM	2793
	2	Eurasian Jay	<i>Garrulus glandarius</i>	0	0	0	3	3	Paga Goenpa	CF	27.286031667°	89.561640000°	9.56PM	10.20PM	2793
	3	Black Bulbul	<i>Hypsipetes leucocephalus</i>	2	1	0	0	3	Paga Goenpa	CF	27.286031667°	89.561640000°	9.56PM	10.20PM	2793m
	4	Yellow-browed Warbler	<i>Phylloscopus inornatus</i>	4	1	0	0	5	Paga Goenpa	CF	27.286031667°	89.561640000°	9.56PM	10.20PM	2793
	5	Whiskered Yuhina	<i>Yuhina flavicollis</i>	2	0	0	0	2	Paga Goenpa	CF	27.286031667°	89.561640000°	9.56PM	10.20PM	2793
	6	Spotted Nutcracker	<i>Nucifraga caryocatactes</i>	0	0	0	1	1	Paga Goenpa	CF	27.286031667°	89.561640000°	9.56PM	10.20PM	2793
	7	Spotted Forktail	<i>Enicurus maculatus</i>	0	0	0	1	1	Paga Goenpa	CF	27.286031667°	89.561640000°	9.56PM	10.20PM	2793
	8	Rufous Sibia	<i>Heterophasia capistrata</i>	0	0	0	1	1	Paga Goenpa	CF	27.286031667°	89.561640000°	9.56PM	10.20PM	2793
23	1	Grey-backed Shrike	<i>Lanius tephronotus</i>	1	1	0	0	2	Sema Goenpa	MC	27.221111667°	89.547408333°	12.11PM	12.35PM	2858

	2	Common Stonechat	<i>Saxicola torquata</i>	1	0	0	0	1	Sema Goenpa	MC	27.221111667°	89.547408333°	12.11PM	12.35PM	2858
	3	Oriental White-eye	<i>Zosterops palpebrosus</i>	1	1	0	0	2	Sema Goenpa	MC	27.221111667°	89.547408333°	12.11PM	12.35PM	2858
	4	Black Bulbul	<i>Hypsipetes leucocephalus</i>	0	0	0	0	1	Sema Goenpa	MC	27.221111667°	89.547408333°	12.11PM	12.35PM	2858
24	1	Grey-headed Canary Flycatcher	<i>Culicicapa ceylonensis</i>	1	1	0	0	2	Tala Dam	CBLF	27.057935000°	89.555745000°	11.30PM	12.30PM	1646
	2	Verditer Flycatcher	<i>Eumyias thalassina</i>	1	1	0	0	2	Tala Dam	CBLF	27.057935000°	89.555745000°	11.30PM	12.30PM	1646
	3	Oriental Turtle Dove	<i>Streptopelia orientalis</i>	1	1	0	0	2	Tala Dam	CBLF	27.057935000°	89.555745000°	11.30PM	12.30PM	1646
	4	Striated Laughingthrush	<i>Garrulax striatus</i>	1	2	0	0	3	Tala Dam	CBLF	27.057935000°	89.555745000°	11.30PM	12.30PM	1646
25	1	Rufous Sibia	<i>Heterophasia capistrata</i>	1	1	0	0	2	Loknaykha	M	27.175115000°	89.545215000°	3.16PM	3.45PM	2635
	2	Green-backed Tit	<i>Parus monticolus</i>	1	3	0	0	4	Loknaykha	M	27.175115000°	89.545215000°	3.16PM	3.45PM	2635
	3	Grey-backed Shrike	<i>Lanius tephronotus</i>	0	0	1	0	1	Loknaykha	M	27.175115000°	89.545215000°	3.16PM	3.45PM	2635
26	1	Whiskered Yuhina	<i>Yuhina flavicollis</i>	3	2	0	0	5	Nayakha	CBLF	27.147963333°	89.513306667°	10.59PM	11.25AM	2533
	2	Scarlet Minivet	<i>Pericrocotus flammeus</i>	2	4	1	0	7	Nayakha	CBLF	27.147963333°	89.513306667°	10.59PM	11.25AM	2533
	3	Rufous Sibia	<i>Heterophasia capistrata</i>	0	0	0	2	2	Nayakha	CBLF	27.147963333°	89.513306667°	10.59PM	11.25AM	2533
	4	Mrs Gould's Sunbird	<i>Aethopyga gouldiae</i>	1	0	0	0	1	Nayakha	CBLF	27.147963333°	89.513306667°	10.59PM	11.25AM	2533
	5	White-spectacled Warbler	<i>Seicercus affinis</i>	1	1	0	0	2	Nayakha	CBLF	27.147963333°	89.513306667°	10.59PM	11.25AM	2533
	6	Cutia	<i>Cutia nipalensis</i>	1	0	0	0	1	Nayakha	CBLF	27.147963333°	89.513306667°	10.59PM	11.25AM	2533
	7	Maroon Oriole	<i>Oriolus traillii</i>	2	1	0	0	3	Nayakha	CBLF	27.147963333°	89.513306667°	10.59PM	11.25AM	2533
	8	Blyth's Leaf Warbler	<i>Phylloscopus reguloides</i>	1	0	0	0	1	Nayakha	CBLF	27.147963333°	89.513306667°	10.59PM	11.25AM	2533

27	1	Oriental White-eye	<i>Zosterops palpebrosus</i>	0	0	0	4	4	Damchu/Near stone quarry	CBLF	27.241790000°	89.524695000°	1.47PM	2.00AM	2042
	2	Stripe-throated Yuhina	<i>Yuhina gularis</i>	3	1	1	0	5	Damchu/Near stone quarry	CBLF	27.241790000°	89.524695000°	1.47PM	2.00AM	2042
28	1	Green-tailed Sunbird	<i>Aethopyga nipalensis</i>	0	1	0	0	1	Wangkha	CBLF	27.215716667°	89.509673333°	5.10PM	5.40PM	2287
	2	Russet Sparrow	<i>Passer rutilans</i>	4	3	0	1	8	Wangkha	CBLF	27.215716667°	89.509673333°	5.10PM	5.40PM	2287
	3	Rufous Sibia	<i>Heterophasia capistrata</i>	0	0	0	1	1	Wangkha	CBLF	27.215716667°	89.509673333°	5.10PM	5.40PM	2287
29	1	Rufous Sibia	<i>Heterophasia capistrata</i>	1	1	0	0	2	Chanachen	CBLF	27.1252516667°	89.533115000°	4.9PM	4.45PM	2117
	2	Red-tailed Minla	<i>Minla ignotincta</i>	2	1	0	0	3	Chanachen	CBLF	27.1252516667°	89.533115000°	4.9PM	4.45PM	2117
	3	Scarlet Minivet	<i>Pericrocotus flammeus</i>	1	2	0	0	3	Chanachen	CBLF	27.1252516667°	89.533115000°	4.9PM	4.45PM	2117
	4	Grey-headed Canary Flycatcher	<i>Culicicapa ceylonensis</i>	1	0	0	0	1	Chanachen	CBLF	27.1252516667°	89.533115000°	4.9PM	4.45PM	2117
	5	Common Stonechat	<i>Saxicola torquata</i>	0	1	0	0	1	Chanachen	CBLF	27.1252516667°	89.533115000°	4.9PM	4.45PM	2117
	6	Stripe-throated Yuhina	<i>Yuhina gularis</i>	1	3	0	0	4	Chanachen	CBLF	27.1252516667°	89.533115000°	4.9PM	4.45PM	2117
	7	Nepal Fulvetta	<i>Alcippe nipalensis</i>	4	2	0	0	6	Chanachen	CBLF	27.1252516667°	89.533115000°	4.9PM	4.45PM	2117
30	1	Green-tailed Sunbird	<i>Aethopyga nipalensis</i>	1	0	0	0	1	Chanachen	CBLF	27.117151667°	89.531488333°	1.40PM	2.00PM	2093
	2	Rufous Sibia	<i>Heterophasia capistrata</i>	1	1	0	0	2	Chanachen	CBLF	27.117151667°	89.531488333°	1.40PM	2.00PM	2093
	3	White-collared Blackbird	<i>Turdus albocinctus</i>	1	0	0	0	1	Chanachen	CBLF	27.117151667°	89.531488333°	1.40PM	2.00PM	2093
	4	Ashy Drongo	<i>Dicrurus leucophaeus</i>	1	1	0	0	2	Chanachen	CBLF	27.117151667°	89.531488333°	1.40PM	2.00PM	2093
	5	Blue Whistling Thrush	<i>Myophonus caeruleus</i>	1	0	0	0	1	Chanachen	CBLF	27.117151667°	89.531488333°	1.40PM	2.00PM	2093
	6	Golden-breasted Fulvetta	<i>Alcippe chrysotis</i>	2	2	0	0	4	Chanachen	CBLF	27.117151667°	89.531488333°	1.40PM	2.00PM	2093

31	1	Rufous Sibia	<i>Heterophasia capistrata</i>	2	2		0	4	Bunagu	CBLF	27.147238333°	89.544001667°	2.00PM	2.30PM	2164
	2	Common Stonechat	<i>Saxicola torquata</i>	1	0	0	0	1	Bunagu	CBLF	27.147238333°	89.544001667°	2.00PM	2.30PM	2164
	3	Drongo Cuckoo	<i>Surniculus lugubris</i>	1	0	0	0	1	Bunagu	CBLF	27.147238333°	89.544001667°	2.00PM	2.30PM	2164
	4	Common Hoopoe	<i>Upupa epops</i>	1	1	0	0	2	Bunagu	CBLF	27.147238333°	89.544001667°	2.00PM	2.30PM	2164
32	1	Large-billed Crow	<i>Corvus macrorhynchos</i>	2	2	3	0	7	Bunagu	CBLF	27.148668333°	89.543636667°	3.00PM	3.45PM	2194
	2	Rufous-bellied Niltava	<i>Niltava sundara</i>	0	1	0	0	1	Bunagu	CBLF	27.148668333°	89.543636667°	3.00PM	3.45PM	2194
	3	Green-backed Tit	<i>Parus monticolus</i>	2	1	2	0	5	Bunagu	CBLF	27.148668333°	89.543636667°	3.00PM	3.45PM	2194
	4	Darjeeling Woodpecker	<i>Dendrocopos darjellensis</i>	0	1	0	0	1	Bunagu	CBLF	27.148668333°	89.543636667°	3.00PM	3.45PM	2194
	5	Greater Yellow-nape	<i>Picus flavinucha</i>	1	1	0	0	2	Bunagu	CBLF	27.148668333°	89.543636667°	3.00PM	3.45PM	2194
	6	Common Buzzard	<i>Buteo</i>	1	0	0	0	1	Bunagu	CBLF	27.148668333°	89.543636667°	3.00PM	3.45PM	2194
33	1	Rufous Sibia	<i>Heterophasia capistrata</i>	0	0	0	1	1	Bunagu	CBLF	27.144223333°	89.437515000°	11.45PM	12.10PM	1963
	2	White-tailed Nuthatch	<i>Sitta himalayensis</i>	1	0	0	0	1	Bunagu	CBLF	27.144223333°	89.437515000°	11.45PM	12.10PM	1963
	3	Great Barbet	<i>Megalaima virens</i>	0	0	0	1	1	Bunagu	CBLF	27.144223333°	89.437515000°	11.45PM	12.10PM	1963
	4	Nepal Fulvetta	<i>Alcippe nipalensis</i>	1	1	0	0	2	Bunagu	CBLF	27.144223333°	89.437515000°	11.45PM	12.10PM	1963
	5	Blyth's Leaf Warbler	<i>Phylloscopus reguloides</i>	1	2	0	0	3	Bunagu	CBLF	27.144223333°	89.437515000°	11.45PM	12.10PM	1963
	6	Collared Grosbeak	<i>Mycerobas affinis</i>	0	0	0	2	2	Bunagu	CBLF	27.144223333°	89.437515000°	11.45PM	12.10PM	1963
34	1	Grey-headed Canary Flycatcher	<i>Culicicapa ceylonensis</i>	0	0	0	2	2	Bunagu	CBLF	27.143325000°	89.541656667°	10.00AM	11.00PM	2023
	2	Oriental White-eye	<i>Zosterops palpebrosus</i>	1	0	0	0	1	Bunagu	CBLF	27.143325000°	89.541656667°	10.00AM	11.00PM	2023
	3	Kalij Pheasant	<i>Lophura leucomelanos</i>	2	2	0	0	4	Bunagu	CBLF	27.143325000°	89.541656667°	10.00AM	11.00PM	2023

	4	Rufous Sibia	<i>Heterophasia capistrata</i>	2	1	0	0	3	Bunagu	CBLF	27.143325000°	89.541656667°	10.00AM	11.00PM	2023
	5	Green-backed Tit	<i>Parus monticolus</i>	0	0	0	2	2	Bunagu	CBLF	27.143325000°	89.541656667°	10.00AM	11.00PM	2023
	6	Hill Partridge	<i>Arborophila torqueola</i>	0	0	0	2	2	Bunagu	CBLF	27.143325000°	89.541656667°	10.00AM	11.00PM	2023
	1	Long-tailed Minivet	<i>Pericrocotus ethologus</i>	1	2	1	0	4	Bunagu	CBLF	27.138765000°	89.543241667°	1.35PM	2.7PM	2035
	2	Rufous Sibia	<i>Heterophasia capistrata</i>	1	1	1	0	3	Bunagu	CBLF	27.138765000°	89.543241667°	1.35PM	2.7PM	2035
	3	Green-backed Tit	<i>Parus monticolus</i>	1	0	0	0	1	Bunagu	CBLF	27.138765000°	89.543241667°	1.35PM	2.7PM	2035
	4	Wedge-tailed Green Pigeon	<i>Treron sphenura</i>	0	0	0	0	1	Bunagu	CBLF	27.138765000°	89.543241667°	1.35PM	2.7PM	2035
	5	White-throated Laughingthrush	<i>Garrulax albogularis</i>	2	3	2	0	7	Bunagu	CBLF	27.138765000°	89.543241667°	1.35PM	2.7PM	2035
	1	Green-tailed Sunbird	<i>Aethopyga nipalensis</i>	1	1	0	0	2	Chanachen	CBLF	27.129763333°	89.535958333°	1.57PM	2.30PM	2004
	2	Brown-throated Treecreeper	<i>Certhia discolor</i>	1	1	0	0	2	Chanachen	CBLF	27.129763333°	89.535958333°	1.57PM	2.30PM	2004
	3	Long-tailed Minivet	<i>Pericrocotus ethologus</i>	1	1	1	0	3	Chanachen	CBLF	27.129763333°	89.535958333°	1.57PM	2.30PM	2004
	4	Grey-headed Canary Flycatcher	<i>Culicicapa ceylonensis</i>	2	1	0	0	3	Chanachen	CBLF	27.129763333°	89.535958333°	1.57PM	2.30PM	2004
	5	White-throated Fantail	<i>Rhipidura albicollis</i>	1	0	0	0	1	Chanachen	CBLF	27.129763333°	89.535958333°	1.57PM	2.30PM	2004
	1	Rufous Sibia	<i>Heterophasia capistrata</i>	2	0	0	0	2	Bunagu	CBLF	27.124833333°	89.541148333°	3.50PM	4.20PM	1952
	2	Ashy Drongo	<i>Dicrurus leucophaeus</i>	1	1	0	0	2	Bunagu	CBLF	27.124833333°	89.541148333°	3.50PM	4.20PM	1952
	3	White-tailed Nuthatch	<i>Sitta himalayensis</i>	1	1	0	0	2	Bunagu	CBLF	27.124833333°	89.541148333°	3.50PM	4.20PM	1952
	4	Green-backed Tit	<i>Parus monticolus</i>	1	0	1	0	2	Bunagu	CBLF	27.124833333°	89.541148333°	3.50PM	4.20PM	1952
	5	Spotted Laughingthrush	<i>Garrulax ocellatus</i>	1	0	0	0	1	Bunagu	CBLF	27.124833333°	89.541148333°	3.50PM	4.20PM	1952
38	1	Greater Yellownape	<i>Picus flavinucha</i>	0	0	0	2	2	Chanachen	CBLF	27.119335000°	89.538055000°	4.40PM	5.20PM	1841

	2	White-tailed Nuthatch	<i>Sitta himalayensis</i>	0	1	0	0	1	Chanachen	CBLF	27.119335000°	89.538055000°	4.40PM	5.20PM	1841
	3	Rufous Sibia	<i>Heterophasia capistrata</i>	1	1	0	0	2	Chanachen	CBLF	27.119335000°	89.538055000°	4.40PM	5.20PM	1841
	4	Brown-throated Treecreeper	<i>Certhia discolor</i>	1	0	0	0	1	Chanachen	CBLF	27.119335000°	89.538055000°	4.40PM	5.20PM	1841
39	1	Rufous Sibia	<i>Heterophasia capistrata</i>	0	1	0	0	1	Chimasam	CBLF	27.096495000°	89.527310000°	2.40PM	3.15PM	1892
	2	Kalij Pheasant	<i>Lophura leucomelanos</i>	0	0	0	2	2	Chimasam	CBLF	27.096495000°	89.527310000°	2.40PM	3.15PM	1892
	3	Blue Whistling Thrush	<i>Myophonus caeruleus</i>	0	0	0	1	1	Chimasam	CBLF	27.096495000°	89.527310000°	2.40PM	3.15PM	1892
	4	Ashy Drongo	<i>Dicrurus leucophaeus</i>	1	1	0	0	2	Chimasam	CBLF	27.096495000°	89.527310000°	2.40PM	3.15PM	1892
	5	White-tailed Nuthatch	<i>Sitta himalayensis</i>	0	1	0	0	1	Chimasam	CBLF	27.096495000°	89.527310000°	2.40PM	3.15PM	1892

Habitat Type : WBLF-Warm broadleaf forest, CBLF-cool broadleaf forest, BPF-Blue pine forest , MCF- Mixed coniferous forest, CF-coniferous forest, R-riverine, SL-shrubland , M-meadow, Cluster Size; M-male, F-female, J-Juvenile
Area=400 sq.m.

SN	No of tree species (1600 sq.m)	Shrub specie (1600 sq.m)s	Herb species (4 sq.m)
1	10	8	4
2	12	6	4
3	19	7	3
4	8	5	2
5	14	3	0
6	11	6	4
7	16	7	1
8	14	6	4
9	11	4	3
10	12	3	2
11	23	11	3
12	13	3	4
13	10	4	5

14	12	5	4
15	11	9	2
16	13	5	3
17	1	4	3
18	12	8	4
19	7	4	6
20	11	7	4
21	18	4	1
22	13	6	4
23	12	14	4
24	7	3	4
25	0	3	6
26	12	9	4
27	6	4	5
28	8	7	4
29	7	3	5
30	9	11	3
31	10	7	4
32	21	7	3
33	10	5	1
34	11	9	4
35	9	6	5
36	11	5	10
37	10	2	4
38	6	2	4
39	8	7	4

5.6 BIRDS CHECKLISTS WITHIN THE SURVEY PLOTS

SI No	Common name	Scientific name	LUCN Status	FNCA of Bhutan 2023
1	Great Barbet	<i>Megalaima virens</i>	LC	Nil
2	Brown Dipper	<i>Cinclus pallasii</i>	LC	
3	White-capped Water Redstart	<i>Chaimarrornis leucocephalus</i>	LC	
4	Scarlet Minivet	<i>Pericrocotus flammeus</i>	LC	
5	White-throated Laughingthrush	<i>Garrulax albobularis</i>	LC	
6	White Wagtail	<i>Motacilla alba</i>	LC	
7	Green-backed Tit	<i>Parus monticolus</i>	LC	
8	Whiskered Yuhina	<i>Yuhina flavicollis</i>	LC	
9	Black - throated Tit	<i>Aegithalos concinnus</i>	LC	
10	Striated Laughingthrush	<i>Garrulax striatus</i>	LC	
11	Rufous Sibia	<i>Heterophasia capistrata</i>	LC	
12	White-tailed Nuthatch	<i>Sitta himalayensis</i>	LC	
13	Red-tailed Minla	<i>Minla ignotincta</i>	LC	
14	Greater Yellownape	<i>Picus flavinucha</i>	LC	
15	Ashy Drongo	<i>Dicrurus leucophaeus</i>	LC	
16	Verditer Flycatcher	<i>Eumyias thalassina</i>	LC	
17	Chestnut-bellied Rock Thrush	<i>Monticola rufiventris</i>	LC	
18	Oriental White-eye	<i>Zosterops palpebrosus</i>	LC	
19	Green-tailed Sunbird	<i>Aethopyga nipalensis</i>	LC	
20	Yellow-billed Blue Magpie	<i>Urocissa flavirostris</i>	LC	
21	Kalij Pheasant	<i>Lophura leucomelanos</i>	LC	Schedule III
22	Lemon-rumped Warbler	<i>Phylloscopus chloronotus</i>	LC	Nil
23	Ashy Bulbul	<i>Hemixos flava</i>	LC	
24	Grey-backed Shrike	<i>Lanius tephronotus</i>	LC	
25	Long-tailed Minivet	<i>Pericrocotus ethologus</i>	LC	
26	White-throated Fantail	<i>Rhipidura albicollis</i>	LC	
27	Hume's Warbler	<i>Phylloscopus humei</i>	LC	
28	Rufous-bellied Woodpecker	<i>Dendrocopos hyperythrus</i>	LC	

29	Rufous-vented Yuhina	<i>Yuhina occipitalis</i>	LC	
30	White-browed Shrike Babbler	<i>Pteruthius flaviscapis</i>	LC	
31	Blue Whistling Thrush	<i>Myophonus caeruleus</i>	LC	
32	Brown Parrotbill	<i>Paradoxornis unicolor</i>	LC	
33	Plumbeous Water Redstart	<i>Rhyacornis fuliginosus</i>	LC	
34	Mrs Gould's Sunbird	<i>Aethopyga gouldiae</i>	LC	
35	Common Stonechat	<i>Saxicola torquata</i>	LC	
36	Maroon Oriole	<i>Oriolus traillii</i>	LC	
37	Wedge-tailed Green Pigeon	<i>Treron sphenura</i>	LC	
38	Oriental Turtle Dove	<i>Streptopelia orientalis</i>	LC	
39	Grey-headed Woodpecker	<i>Picus canus</i>	LC	
40	Grey-winged Blackbird	<i>Turdus boulboul</i>	LC	
41	Eurasian Jay	<i>Garrulus glandarius</i>	LCLC	
42	Black Bulbul	<i>Hypsipetes leucocephalus</i>	LC	
43	Spotted Nutcracker	<i>Nucifraga caryocatactes</i>	LC	
44	Spotted Forktail	<i>Enicurus maculatus</i>	LC	
45	Grey-headed Canary Flycatcher	<i>Culicicapa ceylonensis</i>	LC	
46	White-spectacled Warbler	<i>Seicercus affinis</i>	LC	
47	Cutia	<i>Cutia nipalensis</i>	LC	
48	Blyth's Leaf Warbler	<i>Phylloscopus reguloides</i>	LC	
49	Stripe-throated Yuhina	<i>Yuhina gularis</i>	LC	
50	Russet Sparrow	<i>Passer rutilans</i>	LC	
51	Nepal Fulvetta	<i>Alcippe nipalensis</i>	LC	
52	White-collared Blackbird	<i>Turdus albocinctus</i>	LC	
53	Golden-breasted Fulvetta	<i>Alcippe chrysotis</i>	LC	
54	Drongo Cuckoo	<i>Surniculus lugubris</i>	LC	
55	Common Hoopoe	<i>Upupa epops</i>	LC	
56	Large-billed Crow	<i>Corvus macrorhynchos</i>	LC	Schedule III
57	Darjeeling Woodpecker	<i>Dendrocopos darjellensis</i>	LC	

58	Common Buzzard	<i>Buteo</i>	LC	Nil
59	Collared Grosbeak	<i>Mycerobas affinis</i>	LC	
60	Hill Partridge	<i>Arborophila torqueola</i>	LC	Schedule III
61	Brown-throated Treecreeper	<i>Certhia discolor</i>	LC	Nil
62	Yellow-breasted Greenfinch	<i>Carduelis spinoides</i>	LC	
63	Grey Wagtail	<i>Motacilla cinerea</i>	LC	
64	Barred Cuckoo Dove	<i>Macropygia unchall</i>	LC	
65	Small Niltava	<i>Niltava macgregoriae</i>	LC	
66	Red-billed Leiothrix	<i>Leiothrix lutea</i>	LC	
67	Streak-breasted Scimitar Babbler	<i>Pomatorhinus ruficollis</i>	LC	
68	House crow	<i>Corvus splendens</i>	LC	
69	Spotted Laughingthrush	<i>Garrulax ocellatus</i>	LC	

Annexure 5.7: Bunakha Terrestrial Survey Photographs



Figure 1: Terrestrial field surveys at Bunakha HEP project area



Figure 2: Social surveys for biodiversity at Bunakha HEP



Figure 3: Grey Langur



Asiatic Black Bear fruit residue



Himalayan Goral pellet



Barking Deer hoofprint



Figure 4: Sambar Deer dung



Wild Pig dropping



Leopard Cat scat

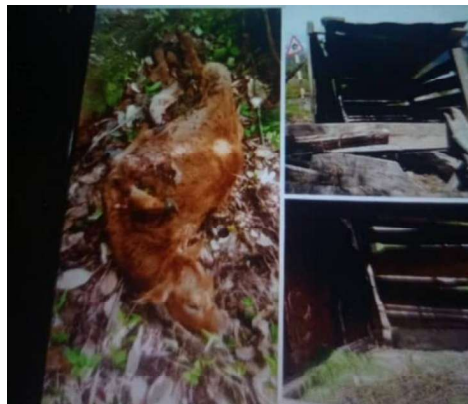


Figure 5: Red Panda rescued @ Former Range Officer, Tshimasham 2023 Cattle calf killed by Asiatic Black Bear @ May 2025



Figure 6: Blue pine forest

Broadleaf forest

Riparian Forest



Figure 7: Mixed Conifer forest



Shrubland



Meadow

Bird Photographs



Figure 8: Bird watching and data recording



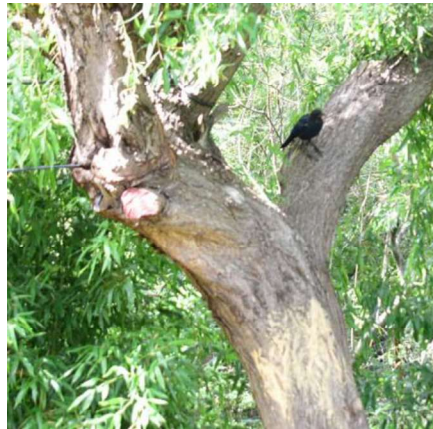
Figure 9: Oriental Turtle Dove



White-throated Laughingthrush



Figure 10: House crow



Blue Whistling Thrush



Figure11: White-browed Wagtail



Ashy Drongo

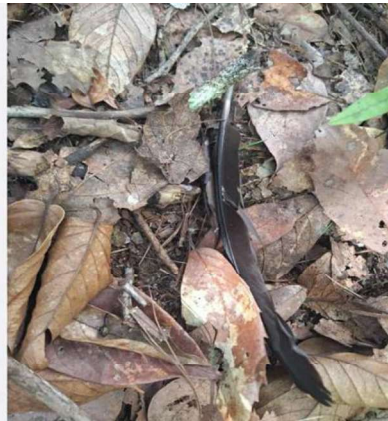


Figure 12: Feather of Kalij Pheasant



Feather of Blue Whistling Thrush

Images of snakes recorded from the project area and adjoining area



Ptyas nigromarginata Green Rat Snake



Ovophis monticola Blotched Pit Viper



Coelognathus radiatus Copper-headed
Trinket Snake



Lycodon gammiei Gammie's Wolf Snake



Boiga ochracea Tawny Cat Snake



Gonyosoma prasinum Green Trinket Snake

Images of lizards recorded from the project area and adjoining area



Japalura variegata Variegated Mountain Lizard



Japalura austeniana Abor Hills Agama



Sphenomorphus indicus Himalayan Litter Skink



Hemidactylus platyurus Flat-tailed House Gecko

Images of frogs and toad recorded from the project area and adjoining area



Duttaphrynus melanostictus Asian common toad (Adult)



Duttaphrynus melanostictus Asian common toad (Juvenile)



Duttaphrynus melanostictus Asian common toad (Tadpole)



Euphlyctis cyanophlyctis Skipper Frog

Butterfly



Papilio bianor



Byasa polyeutes



Neptis miah



Parantica swinhoei



Junonia orithya



Parantica sita



Graphium sarpedon



Papilio hopponis



Acraea issoria



Bunakha Hydropower Project

Druk Green Power Corporation Ltd.

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List of Abbreviations

ADB	Asian Development Bank
D/S	Downstream
E	East
El.	Elevation
EPT	Ephemeroptera Plecoptera and Trichoptera
ESIA	Environmental and Social Impact Assessment
FD	Forest division/Forest Department
RGoB	Royal Government of Bhutan
GWh	Gigawatt-hours
HEP	Hydroelectric Project
IUCN	International Union for Conservation of Nature
kV	Kilo volt
L	Litre
LULC	Land Use land Classification
m	Metre
m ³	metre cube
MW	Megawatt
N	North
NTFPs	Non-Timber Forest Products
PA	Protected Area
RCC	Roller Compacted Concrete
S	Second
S	South
ST	Station
TDS	Total Dissolved Solids
U/S	Upstream

W West

LOA Letter of Award

1 Introduction

1.1 Project Background

The Royal Government of Bhutan has applied for financial assistance under a Project Readiness Financing (PRF) facility from the Asian Development Bank (ADB). The application, titled “BHU: Green Power Project Readiness Enhancement,” seeks funding to support the review and update of the Detailed Project Report (DPR) and the Environmental and Social Impact Assessment (ESIA) for the Bunakha Hydropower Project. The services provided under the project will enhance the readiness and preparedness of the project proponent for securing funding and implementing the Bunakha Hydropower Project.

The Bunakha HEP is a proposed 180 MW project located near the villages of Bunagu and Chanachan. This project is planned to be the most upstream component of a series of at least four projects along the Wangchhu River (Figure 1-2). These include the existing 336 MW Chukha HEP, situated 3.5 km downstream from the proposed Bunakha dam site, the existing 1020 MW Tala HEP, located 15 km downstream, and the proposed 570 MW Wangchhu HEP, with an uncertain distance downstream of Bunakha.

All four plants would function together, with Bunakha HEP acting as a large water storage reservoir. It would operate for peak power generation but also ensure dependable dry season water flow, boosting the downstream plants' total annual electricity production by 932 Gigawatt-hours (GWh).

The project is easily accessible from the Phuntsholing-Thimphu highway. Construction would involve a 197-meter-high dam, a 700-hectare reservoir, and a powerhouse built where the dam meets the riverbed.



Figure 1-1 Project Location

Project Features	Description
	Tala HEP
Operating mode	Storage/ Peaking

1.2 Objectives of Survey

The main objective of this survey is to document the terrestrial species of the project area and prepare its base line seasonally.

Provide relevant inputs related to biodiversity aspects to the tender documents. Support the implementing agency to evaluate the bids if applicable

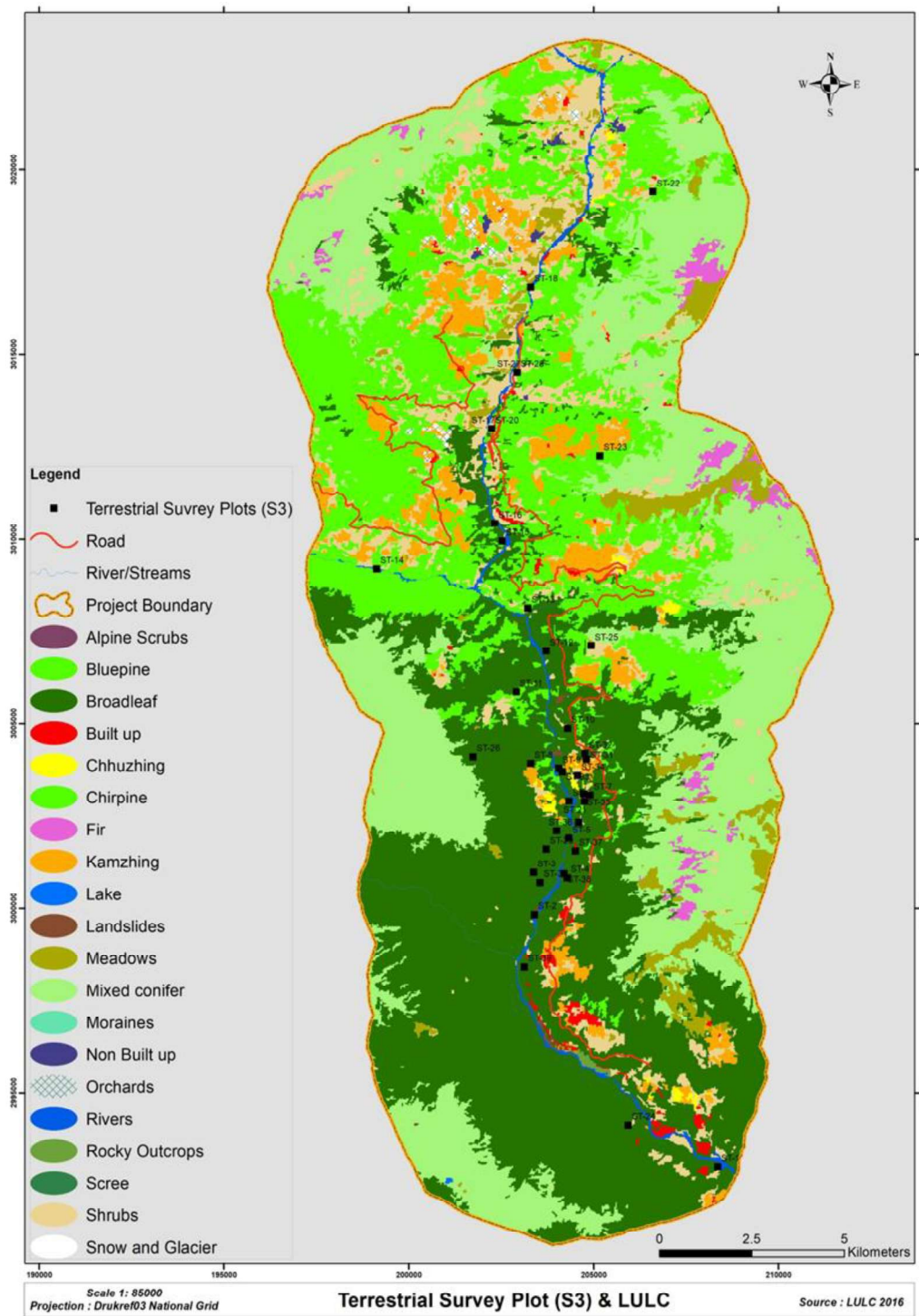


Figure 1-3 Study area showing the sample sites

The terrestrial survey includes a total of 39 sampling points (**Error! Reference source not found.**) across different forest types. Broadleaf forests have the highest representation with 19 plots, followed by Blue Pine (7 plots), Mixed Conifer (3 plots), Shrubs (4 plots), and Meadows (1 plot) (Table 2). Sampling is distributed across all directions - North, South, East, and West - to ensure comprehensive coverage of the study area.

Table 2 Details of Forest Type Representation

Forest Type	Directions				Total
	N	S	W	E	
Broadleaf	2	13	5	7	27
Blue pine	2	2	1	2	7
Mixed conifer	0	0	0	0	0
Shrubs	1	2	0	1	4
Meadows	0	1	0	0	1
Total terrestrial sampling points					39

2 Objectives and Scope of Work

The main objective and scope of this survey is to develop and implement a terrestrial biodiversity baseline study plan and protocol, overseeing proper execution of the baseline study, evaluating the collected data, and ensuring results accurately reflected in reports.

Collect all biological environmental inputs to the ESIA to ensure that the report meets all the TOR requirements (including the ESIA requirements in Appendices A and B) in terms of content, time, and quality as well as documenting project conformance with ADB's Safeguard Policy Statement (2009) and government requirements.

To include biodiversity baseline studies, alternatives analysis, and impact assessment and the development of appropriate biodiversity management plans, covering both upstream and downstream areas, and a Biodiversity Action Plan. Special attention to terrestrial biodiversity, and the Project's conformance with ADB natural and critical habitat requirements.

Provide biodiversity inputs to the environmental flow assessment and cumulative impact assessment.

Document how the project conforms with ADB's safeguard requirements relating to natural and critical habitat.

Provide relevant inputs related to biodiversity aspects to the tender documents. Support the implementing agency to evaluate the bids if applicable.

3 Study Survey Area (geophysical location, area, vegetation) and Methods

3.1 Survey design

3.1.1 Vegetation Sampling

Method for terrestrial biodiversity survey, 3rd season, November 2025

- Continue the plot monitoring for plant
- Continue between the plot, in plot and around the plot for mammal presence through signs and observation. If carnivore signs are observed, follow trail to ascertain its continuity and minimum individuals.
- Continue bird observation between the plot, in plot and around the plot for bird presence through direct observation and calls. If nest and other signs such as defecation, feathers are recorded will be noted.
- Continue the herpetofauna survey as active search in potential habitats.
- Insects and butterfly recorded as and when observed

After the field survey

1. Expert individual and institutions of the biodiversity sector particularly mammal, bird, insect and butterfly, reptiles and amphibians, flora will be consulted to verify presence and status of the species identified as critical habitat assessment.
2. Anecdotal individual enquiry will be made as and when opportunity provided with the local person while conducting survey.
3. If signs of species are recorded in the transect and plots such as for red panda, carnivores such as tiger and dhole, further trail and transect survey will be continued as proposed in second season/monsoon survey.
4. Later during the social consultation, questions pertaining to the species will be added.

Table 3 Geographical coordinates of sampling plots

Stations	Latitude	Longitude
ST-1	27.04790833	89.58021667
ST-2	27.10928500	89.53004000
ST-3	27.11960667	89.52974000
ST-4	27.11828833	89.53891333
ST-5	27.12793500	89.53927833
ST-6	27.13703167	89.53931833
St-7	27.13853667	89.54508500
ST-8	27.14623000	89.52884000
ST-9	27.14508833	89.53645500
ST-10	27.15485833	89.53890000
ST-11	27.16369000	89.52481500
ST-12	27.17381667	89.53293167

Stations	Latitude	Longitude
ST-13	27.18421167	89.52785167
ST-14	27.19362333	89.48658667
ST-15	27.20056000	89.52083833
ST-16	27.20484833	89.51876667
ST-17	27.22798500	89.51780500
ST-18	27.26256833	89.52837333
ST-19	27.13185167	89.54199000
ST-20	27.22798500	89.51780500
ST-21	27.13694167	89.54355667
ST-22	27.28603167	89.56164000
ST-23	27.22141667	89.54740833
ST-24	27.05793500	89.55574500
ST-25	27.17511500	89.54521500
ST-26	27.14783667	89.51308500
ST-27	27.24179000	89.52469500
ST-28	27.2417900	89.52469500
ST-29	27.12525167	89.53311500
ST-30	27.11715167	89.53148833
ST-31	27.14723833	89.54400167
ST-32	27.14866833	89.54363667
ST-33	27.14422333	89.53751500
ST-34	27.14332500	89.54165667
ST-35	27.13878500	89.54324167
ST-36	27.12976333	89.53595833
ST-37	27.12483333	89.54114833
ST-38	27.11933500	89.53805500
ST-39	27.09649500	89.52731000

3.1.1.1 Focus/target species

Based on Initial Screening for Critical Habitat (CH) qualifying Species provided in IBAT list.

Table 2: List of Focus/Target Species

S. No.	Common Name	Scientific Name	Global IUCN status	Rationale for Critical Habitat
Mammal				
1	Red Panda	<i>Ailurus fulgens</i>	EN	Bhutan hosts >3% of the global Red Panda population; 42 were in Jigme Khesar SNR and 39 in Jigme Dorji NP, both within 50 km of Bunakha Dam
2	Dhole	<i>Cuon alpinus</i>	EN	The global Dhole population is estimated at only 949– 2,215, so 5–11 mature individuals within the EAAA would meet CH criterion 1(a). In JDNP, 609 evidences (46 images, 41 tracks, 522 scats) from 170 locations at altitudes of 1,468–4,620 m over 60 days (256 km, 2.2 signs/km) 6 indicate a population of >10 individuals. Given the EAAA's proximity and contiguity with JDNP, and the species' altitudinal range of 0–5,300 m
3	Tiger	<i>Panthera tigris</i>	EN	Though the exact number of tigers within the EAAA is unknown, the national population represents 3.36– 5.02% of the global population. Therefore, it is likely that the tiger may trigger CH threshold criterion. In Chhukha district 2 tigers reported (1 male, 1 Unknown in DoFPS 2022 national survey).
Aves				
1	White-bellied Heron	<i>Ardea insignis</i>	CR	The national population of this species accounts for 10.04–50% of the global population; therefore, it is likely to meet Critical Habitat.
2	White-rumped Vulture	<i>Gyps bengalensis</i>	CR	The national population of the species accounts for 5- 7.5% of the global population.
3	Rufous-fronted Tit	<i>Aegithalos iouschistos</i>	LC	The species' EAAA is 1.28% of its EOO, likely to meet threshold criteria.
4	Dark-rumped Swift	<i>Apus acuticauda</i>	NT	The national population of the species accounts for 0.2– 2.22% of its global population. The species' EAAA represents 0.84% of its EOO
5	Sikkim Treecreeper	<i>Certhia discolor</i>	LC	The species' EAAA is 0.51% of its EOO, likely to meet threshold criteria
6	Rusty-flanked Treecreeper	<i>Certhia nipalensis</i>	LC	The species' EAAA is 0.53% of its EOO, likely to meet threshold criteria.
7	Ward's Trogon	<i>Harpactes wardi</i>	LC	The species' EAAA is 0.62% of its EOO, likely to meet threshold criteria

S. No.	Common Name	Scientific Name	Global IUCN status	Rationale for Critical Habitat
8	Fire-tailed Myzornis	<i>Myzornis pyrrhura</i>	LC	The species' EAAA is 0.87% of its EOO, likely to meet threshold criteria
9	Black-throated Prinia	<i>Prinia atrogularis</i>	LC	The species' EAAA is 0.96% of its EOO, likely to meet threshold criteria
10	Satyr Tragopan	<i>Tragopan satyra</i>	LC	The species' EAAA is 0.90% of its EOO, likely to meet threshold criteria.
11	Himalayan Forest Thrush	<i>Zoothera salimalii</i>	LC	The species' EAAA is 1.43% of its EOO, likely to meet threshold criteria.
12	Pied Shrike-babbler	<i>Pteruthius flaviscapis</i>	LC	According to the IUCN, the species is reported only from Indonesia and is not listed in Bhutan's bird checklist in the BirdLife Data Zone. However, it is mentioned in Bhutan's biodiversity checklist. The species requires further confirmation. Its EAAA accounts for 1.07% of the total, likely meeting the threshold.
Amphibia				
1	Nagaland's Toad	<i>Duttaphrynus nagalandensis</i>	DD	The species has not been reported within the EAAA, Wangchu basin, or within 50 km of the Bunakha dam. However, considering the proportion of the EAAA (3,366.7% of its EOO), its elevation range, and a record within 59 km of the Bunakha dam,
Insect				
1	INSECTA	<i>Cephaloeschna triadica</i>	DD	Though the species' EAAA is 841.7% of its EOO, it has not been recorded within the EAAA but occurs close to it. Therefore, it has been selected on a precautionary basis, considering the high percentage of EAAA and its proximity to the EAAA.
2	INSECTA	<i>Coeliccia svihleri</i>	LC	The species' EAAA is 6.41% of its EOO, likely to meet the threshold criteria.
3	INSECTA	<i>Megalestes irma</i>	DD	The species' EAAA is 5.32% of its EOO, likely to meet threshold criteria.
Fish				
1	ACTINOPTER YGII	<i>Tor putitora</i>	EN	Ten wildlife species, including the Golden Mahseer, are recognized as flagship species in Bhutan for their ecological and cultural importance in sustaining healthy ecosystems. One of the objectives of the Golden Mahseer Conservation Action Plan for Bhutan (2022– 2032) is to secure habitats and ensure viable wild populations of the species. The EAAA holds 0.08% of the species' EOO.

S. No.	Common Name	Scientific Name	Global IUCN status	Rationale for Critical Habitat
2	ACTINOPTER YGII	<i>Chagunius chagunio</i>	LC	The species' EAAA is 0.74% of its EOO, likely to meet threshold criteria.
Plant				
1	MAGNOLIOP SIDA	<i>Corallodiscus cooperi</i>	VU	Globally, the species has only been reported from Bhutan, at eight locations, out of which one location is present within EAAA. So, EAAA holds (1/8) %= 12.5% of its geographic range.
2	LILIOPSIDA	<i>Drepanostachyum annulatum</i>	VU	Globally, the species has been recorded at two locations, both within its EAAA. The complete loss of EAA and the population it supports is likely to result in an uplisting of the species' IUCN status to EN or CR.
3	MAGNOLIOP SIDA	<i>Strobilanthes accrescens subsp. accrescens</i>	EN	The species has been recorded at four locations globally, all of which are situated within the EAAA.
4	LILIOPSIDA	<i>Carex speciosa subsp. pinetorum</i>	LC	Globally, the species has only been reported from Bhutan, at seven locations, out of which one location is present within EAAA. So, EAAA is likely to hold (1/7) %= 14.3% of its geographic range.
5	MAGNOLIOP SIDA	<i>Pedicularis amplicollis</i>	NT	Globally, the species has only been reported from Bhutan, at a single location, which is inside the EAAA.
End= Endemic, RR= Restricted Range, Mig= Migratory, Con= Congregatory, Alt= Altitude, Pop=Population				

3.1.1.2 Mammal Survey Methodology

Large mammal Monitoring through Transect Survey

Survey design and methods

- Mammal transect survey will be carried in the sampled biodiversity monitoring grids of 4x4 km in the PAs and FDs and using the survey form as shown in Table 3.
- Within each 4x4 km grid, a trail transects of 3-5 km depending on the accessibility of the area will be walked covering major habitat types within the grid.
- Mammal sightings and mammal signs for all species like tracks, scats, dung, scratch marks, etc., encountered on the trail transect will be recorded.
- If the area is inaccessible, 3-5 shorter trail transects of each at least 1 km will be searched for mammal and mammal signs (Figure 3-1).
- GPS location at every 500m distance covered will be recorded in the datasheet even if there is no animal or sign observed.
- In case if direct sighting, species, GPS location details, number of animals seen and sex and age of the animal should be recorded as per the datasheet in the Table 3.
- For encounter of animal signs, record species, sign type, GPS location details and habitat type of the areas will be recorded as per the datasheet.
- In case of animal trails, each trail set is considered as one sign (not each pugmark as one sign). If an animal continues to walk along a trail for a long distance in the same direction, then this will be considered as one sign. If no sign seen on the track for over 50m then encountering a fresh track set is considered as a new sign.
- Photographic records with proper scale reference and GPS location will be taken if there is difficulty in sign identification.
- Informal discussions with local communities will be conducted, and any information on animal observations or reports will be documented in the field record.
- All team members will follow established safety protocols and use appropriate personal protective equipment (PPE) at all times.

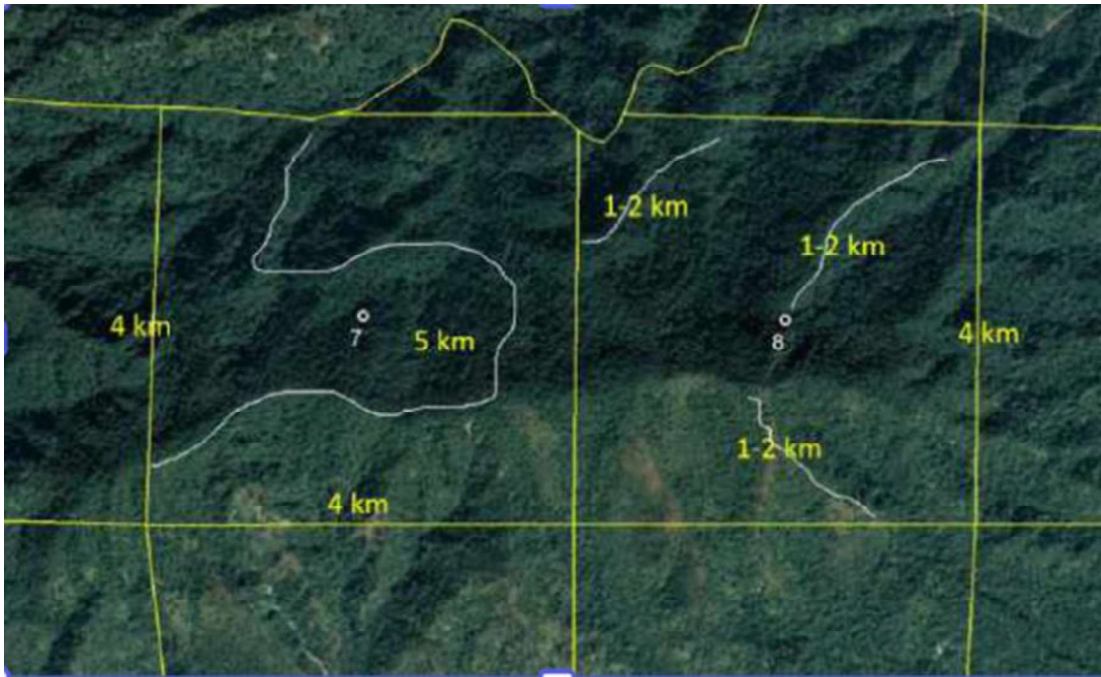


Figure 3-1 Survey grid (4x4 km) with 5 km transect

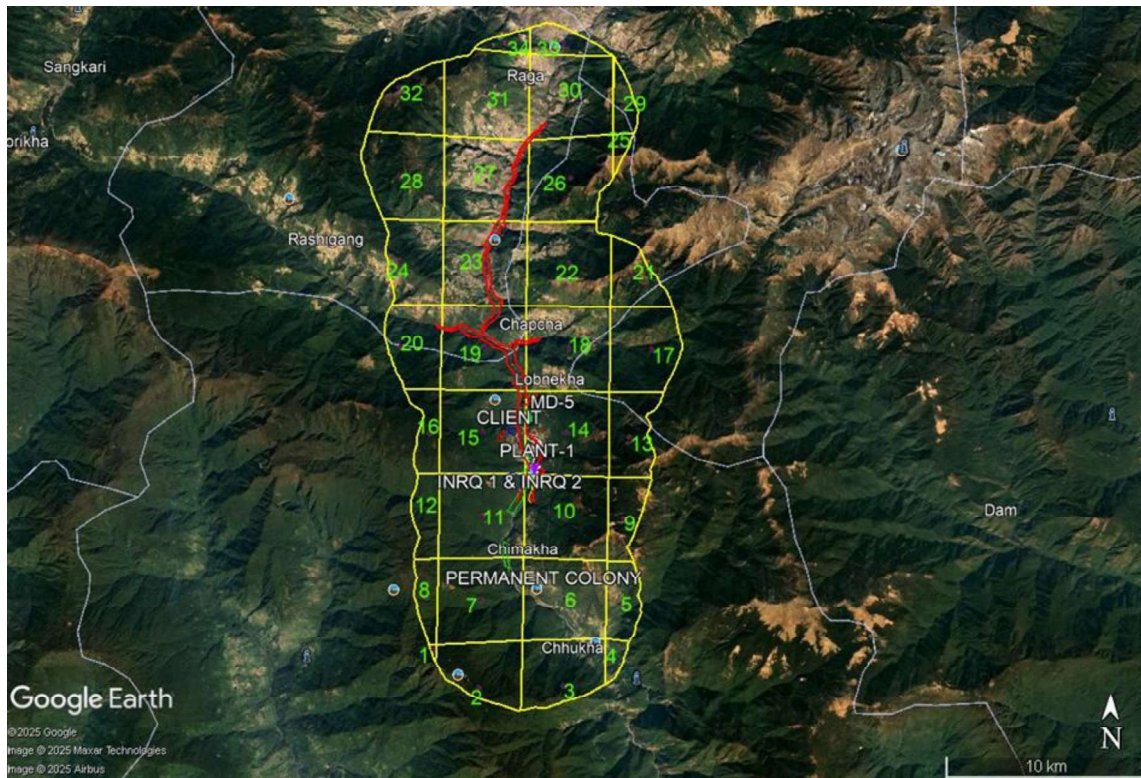


Figure 3-2 Survey grid (4x4 km) with 5 km transect

* According to the Protocol for Red Panda Survey in Bhutan (2020), the methods outlined in Figure 3-3 will be applied only in locations where evidence of Red Panda presence such as tracks, scats, droppings, scratch marks, etc. is detected along trail transects, or in potential habitat areas identified through secondary literature or local reports of Red Panda sightings from social surveys.

**A trail transect survey of 5 km will be conducted within each 4 × 4 km grid for all species across all sampling plots.*

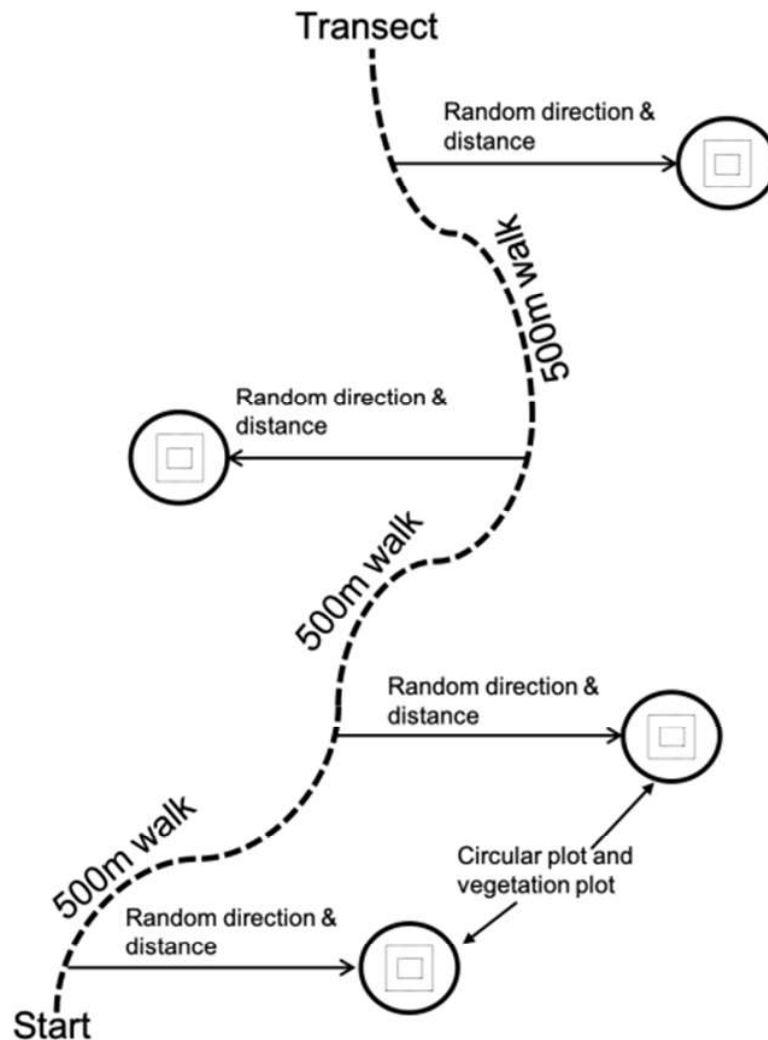


Figure 3-3 Diagrammatic representation of trail transect survey for Red Panda Survey

3.1.1.3 Bird Survey

The assessment began with the collection and review of secondary literature and avifauna maps to identify typical and critical bird habitats. Field surveys in the direct impact zones were focused on birds through direct observation. The bird survey used MacKinnon bird listing as advised by DGPC environment team, survey in the vegetation plot and 500m in both directions of the plot. One transect was taken for each plot which starts from road head to the survey plot. 34 transects were recorded for 34 survey plots and arranged based on survey plot location. In transect, species sign, call or observation were recorded. The list of species for each transect were prepared and compared. A baseline of avifauna was prepared with mapped data for subsequent assessment studies. Call recordings were taken, particularly for pheasants and any migratory birds arrived for breeding.

Different methods were used for different bird species. For common species, trail transect or any survey method adequately gathers data on common species. MacKinnon Listings were followed for this purpose. For rare species, trail transect combined with special search effort (combing or flushing) in their habitat enabled to gather enough data on rare species. For instance, Wood Snipe which is rare as well as cryptic species were given special search or acoustic survey methods. Colonial species: Counting huge colonial species is difficult; therefore, colonies were counted. For example, Nepal House Martin colonies between Chendebji and Mangde Zam. For nocturnal species, species which are active during the dusk were adequately surveyed using night vision binoculars, and listening to the bird calls.

Observations were made using binoculars along trails, ridges, riverbanks, and rock faces, with particular attention to nesting birds. Surveys were extended up to El. 2100 m in elevation (above the Full Reservoir Level of El. 2008 m) and were also covered access roads, muck disposal sites, and quarry locations.

3.2 Data Management (field data collection, data storage/database, data analysis against survey components)

Field data has been collected by the trained field technician in direct supervision of the technical national expert. The data has been collected in the designated format provided in printed form. The data has been entered into a spreadsheet. Once the data entry was done, the list of species, frequency, and density has been estimated as per the information collected. Density of bird was estimated by using the length surveyed with the average width to estimate area and then dividing with number in hectare. Diversity as number of species per unit area and important value index was calculated based on the dominance.

4 Results

4.1 Vegetation with conservation significance

The survey was carried out from 21 to 30 November, 2025 during post monsoon. The forest cover of Chukha District is 88.52% of the total land area of the district (National land Commission, 2020). The elevation varies from 200m to 3500 m above sea level. The forest types in Chukha district ranges from low sub-tropical forest to high altitude Rhododendron Forest. Depending on the floristic characteristics, the forest types classified are Rhododendron and Fir forests (>3100 masl), Cool broadleaved forest (2000-2900 masl), Warm broadleaved forest (2000-3000 masl) and subtropical broadleaved forest (150-1000 masl) (Gedu Forest Division, 2021). The major forest cover is Broadleaf forest (73.11%), followed by Mixed conifer forest (12.30%), Bluepine forest (2.67%) and Fir Forest (1.18%) (Gedu Forest Division, 2021). The habitat types in the study area are broadleaved forest (cool broadleaved forest, warm broadleaved forest and shrub land), Blue Pine Forest, Mixed Conifer Forest and meadow. The habitat types in the project areas are broadleaved forest (cool broadleaved forest, warm broadleaved forest and riparian forest), Blue Pine Forest and Mixed Conifer Forest. This is similar to the national forest types which is broadleaved forest (cool-28% & warm 25%) followed by fir forests (16%) and sub-tropical forest (13%%) (NBSAP 2025).

A total of 21 invasive plant species with 15 plant species natives to Bhutan and six plant species aliens to Bhutan have been identified in the project area. The list of invasive plant species is provided in [Table 3](#).

Table 3 List of invasive plant species in the project area

SN	Family	Scientific name	Remarks
1	Asteraceae	<i>Adenostemma lavenia</i>	Native to Bhutan
2	Amaranthaceae	<i>Alternanthera sessilis</i>	Native to Bhutan
3	Asteraceae	<i>Artemisia vulgaris</i>	Alien to Bhutan
4	Asteraceae	<i>Bidens pilosa</i>	Alien to Bhutan
5	Cyperaceae	<i>Carex spp</i>	Native to Bhutan
6	Asteraceae	<i>Crassocephalum crepidioides</i>	Alien to Bhutan
7	Commelinaceae	<i>Cyanotis vaga</i>	Native to Bhutan
8	Cyperaceae	<i>Cyperus rotundus</i>	Alien to Bhutan
9	Caryophyllaceae	<i>Drymaria cordata</i>	Native to Bhutan
10	Asteraceae	<i>Erigeron spp</i>	Native to Bhutan
11	Rubiaceae	<i>Galium aparine</i>	Native to Bhutan
12	Urticaceae	<i>Lecanthus peduncularis</i>	Native to Bhutan
13	Poaceae	<i>Oplismenus hirtellus</i>	Native to Bhutan
14	Oxalidaceae	<i>Oxalis corniculata</i>	Alien to Bhutan
15	Urticaceae	<i>Pilea bracteosa</i>	Native to Bhutan
16	Urticaceae	<i>Pouzolzia hirta</i>	Native to Bhutan
17	Dennstaedtiaceae	<i>Pteridium aquilinum</i>	Native to Bhutan
18	Asteraceae	<i>Sigesbeckia orientalis</i>	Native to Bhutan
19	Solanaceae	<i>Solanum viarum</i>	Native to Bhutan
20	Apiaceae	<i>Torilis japonica</i>	Native to Bhutan
21	Urticaceae	<i>Urtica dioica</i>	Native to Bhutan

		
Broadleaf forest	Riparian forest	Blue Pine Forest

		
Mixed Conifer Forest	Shrub land	Meadow (will update all pictures)

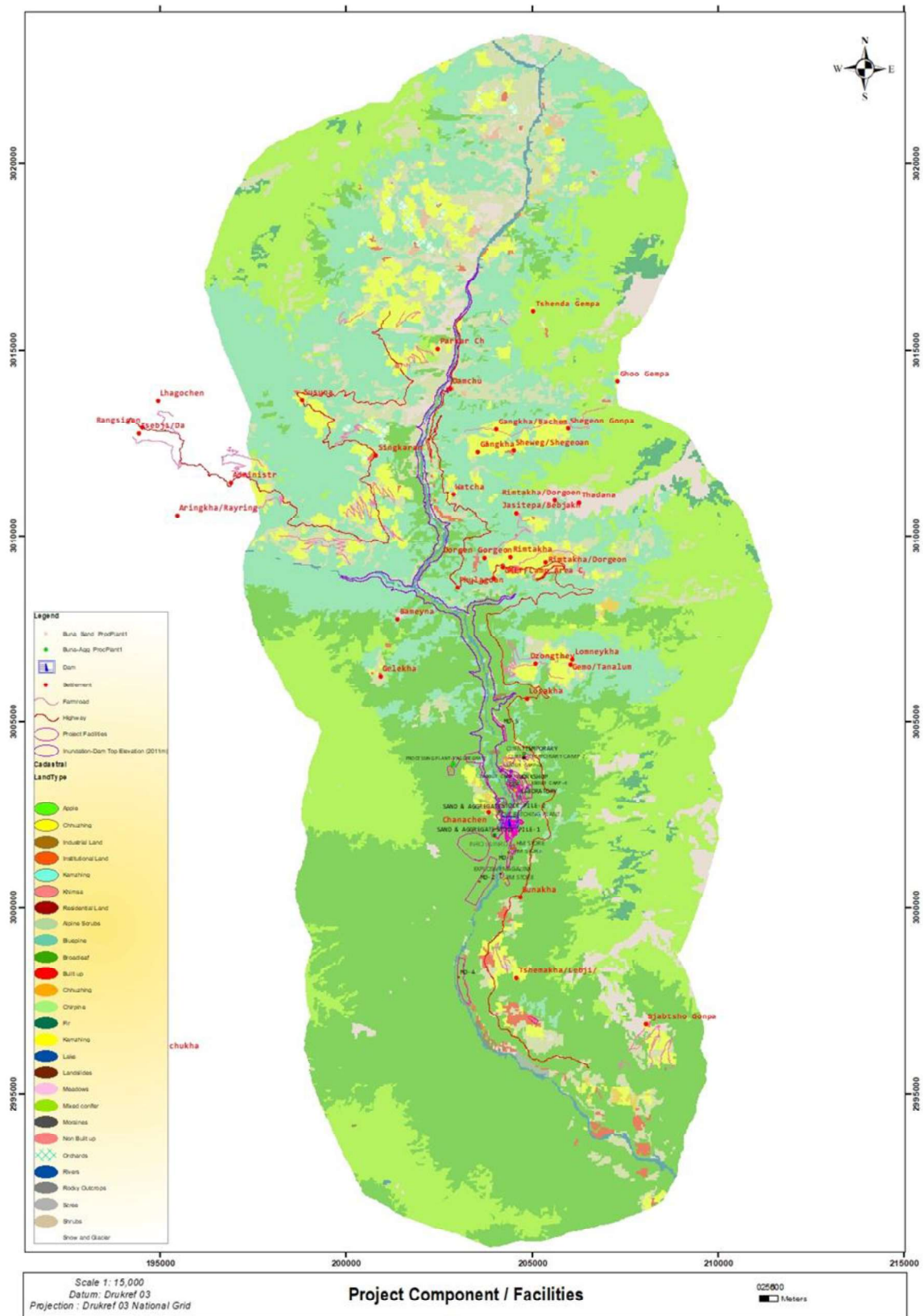


Figure 4-1 Habitat type in study area

There are reported 5390 species of seed plants in Bhutan and more than 200 plant species are used in Bhutanese traditional medicine (NBSAP 2025). Total forty-four species of trees, thirty-nine species of shrubs and forty species of herbs were recorded in the plots surveyed (Annex 5.2). Of these *Acer campbellii* (Himalayan maple), *Betula alnoides* (Himalayan birch), *Carpinus viminea* (Himalayan hornbeam) and *Pinus wallichiana* (Blue pine) are listed in schedule II of Forest and Nature Conservation Act, 2023 (FNCA). The Department of Forest and Park Services shall allow cultivation, collection or trade of this species listed in the schedule II of FNCA as per the procedure prescribed in the Rules.

Alnus nepalensis (Himalayan Alder), *Rhododendron arboreum* (Rhodo), *Lyonia ovalifolia* (Fetterbush), *Rhododendron griffithianum*, *Quercus oxyodon* (Sharp-toothed oak), *Quercus lamellosa* (Ban oak), *Quercus glauca* (Japanese blue oak), *Quercus lanata* (Ban oak), *Lithocarpus elegans* (Spike oak), *Lithocarpus fenestratus* (Stone oak), *Persea spp* (Wild avocado), *Picea spinulosa* (Spruce), *Quercus semicarpifolia* (Brown oak) and *Quercus griffithii* (Oak), *Acer oblongum* (Evergreen maple), *Edgeworthia gardneri* (Indian paper tree), *Daphne bholua* (Paper daphne), *Tetracentron sinense* (Qing pi tree) and *Rhododendron triflorum* are listed in schedule III of Forest and Nature Conservation Act, 2023 (FNCA). The Department of Forest and Park Services shall allow cultivation, collection or trade of these species listed in the schedule III of FNCA as per the procedure prescribed in the Rules.

Paris polyphylla commonly known as Himalayan Paris) is a valuable medicinal plant and listed under schedule III of Forest and Nature Conservation Act, 2023(FNCA). The Department of Forest and Park Services shall allow cultivation, collection or trade of this species listed in the schedule III of FNCA as per the procedure prescribed in the Rules. The IUCN status of *Paris polyphylla* is vulnerable. Bhutan has legalized *Paris polyphylla* in 2015 to ensure sustainable and restricted harvesting (Bhutan Trust Fund 2017). *Paris polyphylla* has been found in the sample plot of forest representation but not in the project area. So, it was not disturbed from its natural habitat.

Piper pedicellatum is commonly known as long pipla in Bhutan and categorized as vulnerable under IUCN status. It is collected for medicinal purpose. *Piper pedicellatum* has been found within the project area. Its rescue from the project area is not required since it is found in the country's broadleaved forests.

Tetracentron sinense (Qing pi tree) commonly known as leaf spur is listed in AppendixIII of CITES. The international trade in this plant is regulated.

A total of 34 vegetation species has been listed in IBAT of which six species are critically endangered, eleven species are endangered and remaining 16 species are vulnerable (*Table 4*).

Table 4 Vegetation IBAT species and CH-triggering species

S N	Scientific name	Common name	IUCN Category	IUCN Population trend	Absence/ Presence (based on IBAT & literature review)	Alt. range (m) (from-to)	Distribution (Locations or in district)	CH-triggering
1	<i>Trillium tschonoskii</i>	Keun-yeon-yeong-cho	EN	De	P	1800-2100	Eastern slope of Dochula, Punakha	
2	<i>Bulbophyllum leopardinum</i> var. <i>tuberculatum</i>		CR	un	P	1400-2000	Haa	√
3	<i>Cheirostylis sherriffii</i>		CR	un	P	Above 2000	Central & southern regions of Bhutan	
4	<i>Oreorchis sanguinea</i>		CR	un	P	1200-2200	Samdrup Jongkhar & central regions of Bhutan	
5	<i>Bambusa clavata</i>		VU	De	P	400-600	Samdrup Jongkhar & Phuentsholing	
6	<i>Drepanostachyum annulatum</i>		VU	un	P	up to 3400	Chukha	√
7	<i>Carex nigra</i> subsp. <i>drukyulensis</i>		EN	un	P	2450-2900	Bumtnag	
8	<i>Oryza malampuzhaensis</i>		VU	De	A			
9	<i>Paris polyphylla</i>	Love Apple	VU	De	P	1800-3300	Samdrup Jongkhar, Trashigang, Pema Gatsel & Chukha	√
10	<i>Trillium govanianum</i>	Himalayan Trillium	EN	De	P	2500-4000	Border himalayan range of Bhutan	
11	<i>Dactylorhiza hatagirea</i>	Salampanja	EN	De	P	2800-4200	Himalayan regions of Bhutan	

S N	Scientific name	Common name	IUCN Category	IUCN Population trend	Absence/ Presence (based on IBAT & literature review)	Alt. range (m) (from-to)	Distribution (Locations or in district)	CH-triggering
1 2	<i>Fritillaria cirrhosa</i>	Yellow Himalayan Fritillary	VU	De	P	3200-5000	Himalayan regions of Bhutan	
1 3	<i>Nardostachys jatamansi</i>	Indian Nard	CR	De	P	3000-5000	Himalayan regions of Bhutan	
1 4	<i>Podophyllum hexandrum</i>	Himalayan Mayapple	EN	De	P	2000-4500	Himalayan alpine zone of Bhutan	
1 5	<i>Mesua ferrea</i>	Churuli	VU	De	P	300-1500	Trpical & subtropical regions of Bhutan	√
1 6	<i>Ceropegia bhutanica</i>		EN	un	P	>2000	Eastern himalayas within Bhutan	
1 7	<i>Corallodiscus cooperi</i>		VU	De	P	1900-2200	Dodena, Thimphu	√
1 8	<i>Isodon atroruber</i>		EN	un	P	2117-2550	Thimphu & Lhuentse	
1 9	<i>Buddleja bhutanica</i>		VU	un	P	1700	Bhutan	
2 0	<i>Meconopsis superba</i>		EN	St	P	3500-4494	JDNP & JKSNR, Bumthang, Gasa, Haa & Punakha	√
2 1	<i>Hoya bhutanica</i>		EN	un	P	150-1800	Gelephu, Mongar & Lhuentse	
2 2	<i>Pedicularis griniformis</i>		VU	un	P	3000-3900	Eastern Himalayan regions of Bhutan to Bhutan	
2 3	<i>Saxifraga vacillans</i>		VU	un	P	upto 1500	Thimphu, Punakha, Wangdue Phodrang, Trashigang,	√

S N	Scientific name	Common name	IUCN Category	IUCN Population trend	Absence/ Presence (based on IBAT & literature review)	Alt. range (m) (from-to)	Distribution (Locations or in district)	CH-triggering
							Lhuentse & Mongar	
24	<i>Meconopsis bhutanica</i>		CR	De	P	4351-4494	JDNP	
25	<i>Astragalus paroensis</i>		CR	un	P	2000-6000	Bhutan	
26	<i>Strobilanthes accrescens</i> subsp. <i>accrescens</i>		EN	un	P	1800-3000	Haa, Paro, Thimphu, Bumthang	√
27	<i>Beilschmiedia clarkei</i>		VU	un	P		Bhutan	
28	<i>Cinnamomum impressinervium</i>	Sung soar koong	VU	un	P	600-1800	Warm broadleaved forest regins of Bhutan	√
29	<i>Litsea albescent</i>		VU	un	P	200-1700	Subtropical forests of Bhutan	√
30	<i>Litsea nitida</i>		VU	un	P	100-2400	Southern part of Bhutan	√
31	<i>Litsea panamanja</i>		VU	un	P		Bhutan	
32	<i>Litsea assamica</i>		EN	un	P	600-2500	Subtropical & temperate regions of Bhutan	√
33	<i>Impatiens infundibularis</i>	The Kurseong Balsam	VU	De	A		No record	
34	<i>Ophiocordyceps sinensis</i>	Chinese Caterpillar Fungus	VU	De	P	3400-4800	Northern remote parts of Bhutan	
De = Decreasing, st= Stable, Un= Unknown; A= Absent, P Present, blue font to show potential distribution in project area.								

Following six species has been proposed for qualifying in Critical habitat assessment: *Corallo-discus cooperi*, *Drepanostachyum annulatum*, *Strobilanthes accrescens* subsp. *Accrescens*, *Carex speciosa* subsp. *Pinetorum*, *Cephalaeschna triadica*, and *Pedicularis amplicollis*.

Abundance and density of trees among the plots ranges from 1 to 23 species with density of trees ranging from 2500-57500 individuals/sq.km.). Similarly, shrubs ranges from 2 to 14 species and density ranges from 5000-35000 individuals/sq.km. In herbs, the abundance ranges from 1 to 10 in 4 sq.m and density ranges from 250000-2500000 individuals /sq.km) (Table 6).

Table 6 showing the number of plots showing number of tree, shrub and herb species in survey.

No of tree species	No of plots	no of shrub species	No of plots	No. of herb species	No of plots
0	1	2	2	0	1
1	1	3	6	1	3
6	2	4	6	2	3
7	3	5	5	3	7
8	3	6	5	4	18
9	2	7	7	5	4
10	5	8	2	6	2
11	6	9	3	10	1
12	6	11	2		
13	3	14	1		
14	2				
16	1				
18	1				
19	1				
21	1				

4.1.1 Invasive Species

A total of 21 invasive plant species with 16 plant species natives to Bhutan and five plant species aliens to Bhutan have been identified in the project area.

The list of invasive plant species is provided in Table 7.

Table 7 List of invasive plant species in the project area

SN	Family	Scientific name	Remarks
1	Asteraceae	<i>Adenostemma lavenia</i>	Native to Bhutan
2	Amaranthaceae	<i>Alternanthera sessilis</i>	Native to Bhutan
3	Asteraceae	<i>Artemisia vulgaris</i>	Alien to Bhutan
4	Asteraceae	<i>Bidens pilosa</i>	Alien to Bhutan
5	Cyperaceae	<i>Carex spp</i>	Native to Bhutan
6	Asteraceae	<i>Crassocephalum crepidioides</i>	Alien to Bhutan
7	Commelinaceae	<i>Cyanotis vaga</i>	Native to Bhutan
8	Cyperaceae	<i>Cyperus rotundus</i>	Alien to Bhutan
9	Caryophyllaceae	<i>Drymaria cordata</i>	Native to Bhutan
10	Asteraceae	<i>Erigeron spp</i>	Native to Bhutan
11	Rubiaceae	<i>Galium aparine</i>	Native to Bhutan
12	Urticaceae	<i>Lecanthus peduncularis</i>	Native to Bhutan
13	Poaceae	<i>Oplismenus hirtellus</i>	Native to Bhutan
14	Oxalidaceae	<i>Oxalis corniculata</i>	Alien to Bhutan
15	Urticaceae	<i>Pilea bracteosa</i>	Native to Bhutan
16	Urticaceae	<i>Pouzolzia hirta</i>	Native to Bhutan

17	Dennstaedtiaceae	<i>Pteridium aquilinum</i>	Native to Bhutan
18	Asteraceae	<i>Sigesbeckia orientalis</i>	Native to Bhutan
19	Solanaceae	<i>Solanum viarum</i>	Native to Bhutan
20	Apiaceae	<i>Torilis japonica</i>	Native to Bhutan
21	Urticaceae	<i>Urtica dioica</i>	Native to Bhutan

4.2 Mammals with conservation significance

10 species of mammals were recorded in the survey (fig 4-2 and table 4) of which *Rusa unicolor* (Sambar Deer) is listed in schedule II of Forest and Nature Conservation Act, 2023 (FNCA) is protected and may not be killed, injured, destroyed, captured, collected, possessed, bred, raised, or traded except for scientific research, population management, defense against attack or imminent threat on human life or livestock and damage to crop or other private property. The Sambar Deer is classified as **Vulnerable** on the IUCN Red List and faces high risk of extinction in the wild. The Sambar Deer is listed on **CITES Appendix II** and not currently threatened with extinction. There are 129 species of mammal as per NBC 2019 (cited in NBSAP 2025).

Nemorhaedus goral (Himalayan Goral) is listed in schedule II of Forest and Nature Conservation Act, 2023 (FNCA) is protected and may not be killed, injured, destroyed, captured, collected, possessed, bred, raised, or traded except for scientific research, population management, defense against attack or imminent threat on human life or livestock and damage to crop or other private property. The Himalayan goral is currently listed as **Near Threatened** on the IUCN Red List and reflects significant population decline due to habitat loss and hunting for meat. The Himalayan goral is listed on CITES Appendix I and threatened with extinction and trade in their specimens is permitted in exceptional circumstances.

Macaca assamensis (Assamese macaque) is listed in **schedule III** of Forest and Nature Conservation Act, 2023 (FNCA) is protected and may not be killed, injured, destroyed, captured, collected, possessed, bred, raised, or traded except for scientific research, population management, defense against attack or imminent threat on human life or livestock and damage to crop or other private property. The Assamese macaque is listed as **Near Threatened** on the IUCN Red List and the primary threats to the species are habitat loss, degradation, and hunting. The Assamese macaque is listed on **CITES Appendix II** and it is not currently threatened with extinction but it may become so if the trade is not regulated.

Semnopithecus schistaceus (Gray Langur) is listed in schedule II of Forest and Nature Conservation Act, 2023 (FNCA) is protected and may not be killed, injured, destroyed, captured, collected, possessed, bred, raised, or traded except for scientific research, population management, defense against attack or imminent threat on human life or livestock and damage to crop or other private property. The Gray Langur is classified as **Least Concern** on IUCN Red List and the species is not currently considered threatened with extinction. The Gray Langur is listed on **CITES Appendix I** and the species are threatened with extinction and international trade in specimens of these species is prohibited except for exceptional cases.

Muntiacus muntjak (Barking Deer), *Sus scrofa* (Wild pig) and *Martes flavigula* (Himalayan Yellow Throated Marten) are listed in schedule III of Forest and Nature Conservation Act, 2023(FNCA) is protected and may not be killed, injured, destroyed, captured, collected, possessed, bred, raised, or traded except for scientific research, population management, defense against attack or imminent threat on human life or livestock and damage to crop or other private property. The Barking Deer known as Indian muntjac is classified as **Least Concern** on IUCN Red List and the species is not currently considered threatened with extinction. The barking deer is listed on **CITES Appendix II** and it is not currently threatened with extinction but it may become so if the trade is not regulated. The Wild pig known as wild boar is classified as **Least Concern** on IUCN Red List due to its wide range, high numbers, and its adaptability to various habitats. The Wild

pig is listed on **CITES Appendix II** in Bhutan and species are not threatened with extinction but trade must be controlled to avoid utilization incompatible with their survival. The Himalayan yellow- throated Marten is classified as **Least Concern** on IUCN Red List due to its wide distribution across Asia, relatively stable population and presence in numerous protected areas. The Himalayan yellow- throated Marten is listed on **CITES Appendix III** and India has requested other CITES member countries to assist in regulating or monitoring trade of this species (Fig 4-2).

Ursus thibetanus(Asiatic Black Bear) is listed in schedule II of Forest and Nature Conservation Act, 2023 (FNCA) is protected and may not be killed, injured, destroyed, captured, collected, possessed, bred, raised, or traded except for scientific research, population management, defense against attack or imminent threat on human life or livestock and damage to crop or other private property. The Asiatic Black Bear is currently listed as **Vulnerable** on the IUCN Red List due to decline in its population from threats such as habitat loss and degradation, poaching, illegal trade and human-bear conflict. The Asiatic Black Bear is listed on **CITES Appendix I** and prohibits international commercial trade. It is also illegal to hunt or trade the species in many countries including Bhutan. The Asiatic Black Bear had killed a 4-months old calf at night on 6th May 2025 near the Thimphu - Phuentsholing highway at Bunakha.

Prionailurus bengalensis(Leopard Cat) is listed in schedule II of Forest and Nature Conservation Act, 2023 (FNCA) is protected and may not be killed, injured, destroyed, captured, collected, possessed, bred, raised, or traded except for scientific research, population management, defense against attack or imminent threat on human life or livestock and damage to crop or other private property. The Leopard Cat is classified as **Least Concern** on IUCN Red List. It is widely distributed in many parts of its range, but face threats from habitat loss and hunting. Leopard Cat is listed in **CITES Appendix II** and regulates international trade to ensure it is not an unsustainable level and need for higher level of protection.

Cuon alpinus (Dhole) is listed in schedule II of Forest and Nature Conservation Act, 2023 (FNCA) is protected and may not be killed, injured, destroyed, captured, collected, possessed, bred, raised, or traded except for scientific research, population management, defense against attack or imminent threat on human life or livestock and damage to crop or other private property. It is listed as **Endangered** in the IUCN Red List as populations are decreasing and the factors contributing to this decline include habitat loss, loss of prey, competition with other species, persecution due to livestock predation, and disease transfer from domestic dogs. The Dhole is listed in **CITES Appendix II** as the species is globally declining.

Martes flavigula (Himalayan Yellow Throated Marten) are listed in schedule III of Forest and Nature Conservation Act, 2023(FNCA) is protected and may not be killed, injured, destroyed, captured, collected, possessed, bred, raised, or traded except for scientific research, population management, defense against attack or imminent threat on human life or livestock and damage to crop or other private property. The Himalayan yellow- throated Marten is classified as Least Concern on IUCN Red List due to its wide distribution across Asia, relatively stable population and presence in numerous protected areas. The Himalayan yellow- throated Marten is listed on CITES Appendix III and India has requested other CITES member countries to assist in regulating or monitoring trade of this species

Wild animals observed and signs documented during the second season(monsoon) survey

Grey Langur



Asiatic Black Bear fruit residue



Himalayan Goral pellet



Barking Deer hoof print



Sambar Deer dung



Wild Pig dropping



Leopard Cat scat



Figure 4- 2: Observation and signs of wildlife recorded in second survey in Bunakha HEP

Ten mammal species have been recorded in the second season survey (Table 7) and species from IBAT record (Table 8).

Table 7. The summary of the mammals recorded in first season survey

S N	Scientific name	Common Name	National legislation FNCA	CITES listing	IUCN Red list	IBAT status	Remarks
1	<i>Muntiacus muntjak</i>	Barking Deer	III	II	LC	Not in IBAT	not currently threatened with extinction
2	<i>Rusa unicolor</i>	Sambar	II	II	VU	VU	Population declines due to habitat loss and hunting for meat.
3	<i>Sus scrofa</i>	Wild Pig	III	II	LC	Not in IBAT	May become threatened if the trade is not regulated.
4	<i>Semnopithecus schistaceus</i>	Grey Langur	II	I	LC	Not in IBAT	Threatened with extinction and international trade prohibited
5	<i>Macaca assamensis</i>	Assamese Macaque	III	II	NT	Not in IBAT	Not threatened with extinction but trade must be controlled to avoid utilization incompatible with their survival.
6	<i>Nemorhaedus goral</i>	Himalayan Goral	II	I	NT	Not in IBAT	Threatened with extinction and trade in their specimens is permitted in exceptional circumstances.
7	<i>Ursus thibetanus</i>	Asiatic Black Bear	II	I	VU	Not in IBAT	Population decline from threats such as habitat loss and degradation, poaching, illegal trade and human-bear conflict.
8	<i>Prionailurus bengalensis</i>	Leopard Cat	II	II	LC	Not in IBAT	Threatened from habitat loss and hunting, and need higher level of protection.
9	<i>Funambulus pennatii</i>	Five striped Palm Squirrel	DE	DE	LC	Not in IBAT	Threatened from habitat loss, degradation from logging and human settlements, hunting for consumption and the pet trade.
10	<i>Martes flavigula</i>	Himalayan Yellow throated Marten	III	III	LC	Not in IBAT	regulating or monitoring trade of this species.

Table 8. IBAT species mammal recommended for CHA assessment based on altitude and found in 20 Km radius from the dam but only three of these have been qualified in initial screening for CHA.

SN	scientific_name	common_name	category	Movement pattern	Alt.range (m) (From-to)	Distribution (location points or in district)	Presence in 20 km radius	Remarks	Qualify for CH-assessment
1	<i>Ailurus fulgens</i>	Red Panda	EN	Alti. Migrant	2400-3700 (Red Panda population survey (2022-2023, DoFPS)	19 of 20 districts	y		y
2	<i>Platanista gangetica</i>	Ganges River Dolphin	EN	Migrant	Below 250	Ganges-Brahmaputra-Meghna River systems extending to Bhutan	y		
3	<i>Aonyx cinereus</i>	Asian Small-clawed Otter	VU	Not a Migrant	160-1000	Manas, Punatsangchhu, Mangdechhu, Wangchhu, Trashigang and Phrumsengla National Park,	y		
4	<i>Arctictis binturong</i>	Binturong	VU	Not a Migrant	up to 1500	Bhutan bordering Buxa Tiger reserve, India	y		
5	<i>Canis lupus ssp. chanco</i>	Himalayan Wolf	VU	Not a Migrant	3400-5200	WCP, JDNP, JKSNR	y		
6	<i>Neofelis nebulosa</i>	Clouded Leopard	VU	Not a Migrant	243-3893	Southern regions, Gedu, RMNP, JSWNP, WCP, PWS, JDNP, PNP, BWS	y		
7	<i>Panthera tigris</i>	Tiger	EN	Not a Migrant	100-4400; Paro FD-1 (Common to Thimpu, 1F), Thimpu FD-3 (2F, 1M), Gedu FD (Chukha district)-2 (1 M, 1 UN)	RMNP, JSWNP, PWS, Bumthang and Zhemgang forest Divisions; DoFPS 2023 BN (tiger survey 2021-22)	n	but Y sec.lit.	y
8	<i>Capricornis sumatraensis</i>	Mainland Serow	VU		200-3000	RMNP, PWS, Jhomosangkha wildlife sanctuary and Bumthang	y		

SN	scientific_name	common_name	category	Movement pattern	Alt.range (m) (From-to)	Distribution (location points or in district)	Presence in 20 km radius	Remarks	Qualify for CH-assessment
9	<i>Cuon alpinus</i>	Dhole	EN		1468-4980	widely distributed throughout Bhutan & JDNP, all 20 districts and in all PAs and BCs	y		y
10	<i>Moschus leucogaster</i>	Himalayan Muskdeer	EN		2500-4500	JDNP	y		
11	<i>Myotis sicarius</i>	Mandelli's Mouse-eared Myotis	VU			Tropical & subtropical moist montane forests in Bhutan	y		
12	<i>Panthera pardus</i>	Leopard	VU		97-3000	wide regions in Bhutan, RMNP, Gedu	y		
13	<i>Rusa unicolor</i>	Sambar	VU		2356-3655	Himalayan foot hills of Bhutan	n	y in plot	
14	<i>Ursus thibetanus</i>	Asiatic Black Bear	VU		1200-3750	Widely distributed throughout Bhutan	n	y in social survey	
Total Mammal species shown in IBAT is 30. 1 spp absent in Bhutan, CHA 29 spp to assess is proposed (CR 1, EN species 12, Vu 16) 15 species reduced as not found in 20 Km Radius in Bhutan CHA 14 spp to assess finally for Bunakha HEP.									

Of the 39 plots surveyed, 8 plots are lying outside the project impact area. Thus, of the 31 plots, no wildlife recorded from 11 plots and only 15 plots had the wildlife recorded. Among the 15 plots, the vulnerable sambar is recorded in 9 plots (Table 9).

Table 9: Plots where wildlife (mammal) recorded in Bunakha HEP project impact area

Plots IDs	Location of the plot	Altitude (m)	Wildlife /sign recorded
1	Tala dam upper end reservoir	1394.1	Barking Derer, Himalayan Goral, Grey Langur
2	Chukha dam (below dam)	1809.9	Himalayan Goral
3	Chanachan (above old road)	2133.3	Barking Deer, Assamese Macaque, Asiatic Black Bear, Wild Pig, Sambar Deer
4	Bunagu Chanachan junction	1961.4	Sambar Deer, Barking Deer
5	Chanachen (above bridge)	1983.8	Wild Pig, Asiatic Black Bear

6	Below Chanachan (upstream right bank)	1889.8	Wild Pig, Barking Deer, Asiatic Black Bear, Sambar Deer
7	Bunagu (above highway)	2088.8	Wild Pig, Sambar Deer, Barking Deer
8	Chanachan(near village)	2243.7	Wild Pig, Asiatic Black Bear
9	Bunagu (below highway)	1983.1	Wild Pig, Barking Deer, Himalayan Goral
10	Bunakha (below highway)	1974.6	Wild Pig, Sambar Deer, Barking Deer
11	Geling Goenpa (below farm road)	2476.7	Wild Pig, Asiatic Black Bear, Barking Deer, Dhole
12	Near Tanalum (below highway)	1975.1	Wild Pig, Barking Deer, Himalayan Goral
13	New Tanalum Bridge (along tributary left bank)	2007.3	Wild Pig, Himalayan Goral
14	Tanalum (above new bridge)	2024.9	Asiatic Black Bear, Wild Pig, Barking Deer, Assamese Macaque, Assamese Macaque, Yellow-throated Marten
15	Wangchhu River (near Haachhu bridge)	1956.4	Asiatic Black Bear, Wild Pig, Himalayan Goral, Barking Deer
16	Wangchhu River (Near Haachhu Confluence)	1959	Wild Pig, Asiatic Black Bear, Assamese Macaque
17	Watsa (Below highway)	2049.1	Barking Deer, Assamese Macaque
18	Damchu (Below highway riverine)	1975.07	-
19	Bunagu(below highway)	1975.7	Barking Deer, Wild Pig
20	Chanachan(Near bridge)	2049.1	Barking Deer
21	Bunagu (below highway)	1956.6	Barking Deer, Assamese Macaque
22	Paga Goenpa (below Goenpa)	2793	Barking Deer, Wild Pig
23	Shema Goenpa (below Goenpa)	2858.5	Wild Pig
24	Wangkha (Above highway)	1646	Barking Deer
25	Lobneykha Primary School(above school)	2625.2	-
26	Nayakha (above farm road)	2509.3	Wild Pig
27	Damchu (above highway)	2042.9	Himalayan Goral, Yellow-throated Marten
28	Wanakha (below highway)	2308.4	-
29	Chanachan -New PC (above farm road)	2117.9	Wild Pig, Barking Deer
30	Dam area-New PC MD	2093.5	Wild Pig, Asiatic Black Bear
31	Bunakha-New PC client office above Lhakhan	2164.3	Wild Pig, Barking Deer

32	Bunakha- New PC Client temporary camp 2	2194.2	Barking Deer, Asiatic Black Bear
33	Bunagu-New PC client temporary camp 1	1963.6	Wild Pig, Assamese Macaque, Samabr Deer
34	Bunakha-above Lhakhang	2023.3	Wild Pig, Barking Deer
35	Bunagu- New PC CCF cluster	2035.1	Wild Pig
36	Chanachan- New PC Plant	2004.7	Wild Pig, Asiatic Black Bear
37	Bunakha- New PC MD3 HM	1952.4	Wild Pig
38	Chanachan -New PC Magazine	1841.7	-
39	Below Tsimasham -New PC-MD 4	1892.6	Barking Deer

4.3 Bird status and conservation significance

71 species of birds in second season (monsoon) were recorded in the survey plots and along the transect. 2 additional bird species were recorded which were not listed in second season of bird survey. During the survey, both migratory and domestic bird species were discovered. A tiny percentage of the listed species are deemed fragile, while the rest species are categorized as least concern, according to the IUCN Red List Status. In Bhutan, so far 736 species of bird have been reported (NBSAP 2025). The survey of birds was along with the vegetation and other biodiversity elements in 21-30 November 2025 for third season (post monsoon). The quantitative survey on birds were recorded in plots and Reece transects. In each plot approx.1 km length in and around the plots observing about 25m on either side in addition to 20mx20m plots surveyed for vegetation. In this 0.05 sq.km.area, maximum of 8 species of birds were recorded and minimum of 2 species of birds (table 8). Similarly, maximum of density of 160 individuals per square kilo meter was found in two plots and minimum of 40 individuals per square kilometers were recorded in three plots (table 10).

Table 10 showing the diversity of birds in survey plots

SN	No of species of birds	Number of plots in the diversity class	Density of birds/sq.km.
1	2	3	40
2	3	7	60
3	4	11	80
4	5	9	100
5	6	6	120
6	7	1	140
7	8	2	160
	Total	39	

Bird species of national conservation significance are Oriental Cuckoo (*Cuculus saturates*), Blyth's Leaf Warbler (*Phylloscopus reguloides*), Kalij Pheasant (*Lophura leucomelanos*), Large Hawk Cuckoo (*Hierococcyx sparveroides*), Indian Cuckoo (*Cuculus Micropterus*), Red-billed Chough (*Pyrrhocorax pyrrhocorax*), Large-billed Crow(*Corvus macrorhynchos*), *Cuculus canorus* Hill Partridge (Eurasian Cuckoo), Hill Partridge (*Arborophila torqueola*), Asian Barred Owlet (*Glaucidium cuculoides*) are listed in schedule III of Forest and Nature Conservation Act, 2023 (FNCA) and protected and may not be killed, injured, destroyed, captured, collected, possessed, bred, raised, or traded except for scientific research, population management, defense against attack or imminent threat on human life or livestock and damage to

crop or other private property and are currently listed as Least Concern on the IUCN Red List, not currently considered to be threatened with extinction and the population is considered stable and wide spread.

IBAT has provided 32 species of birds for Bunakha HEP. In a radius of 50 km from Bunakha dam, 25 species were found (Fig 4-2, table 11). Of the 32 species extracted from IBAT, 21 species are considered for CHA (present in Bhutan, font not highlighted ones).

Table 11: List of birds with IBAT and preliminary screening for CHA

SN	Scientific name	Common name	Category	Movement pattern	is_restricted_range	Absence/ Presence (based on literature & surveys)	Alt.range (m) (from-to)	Distribution (location points or in district)
1	<i>Sitta formosa</i>	Beautiful Nuthatch	VU	Altit. Migrant	FALSE	P	950-2300(>300m in winter)	Phuentsholing in Chukha, Trongsa, Lingmethang in Mongar, Dewathang in Samdrup Jongkhar & Tsirang
2	<i>Aquila heliaca</i>	Eastern Imperial Eagle	VU	Full Migrant	FALSE	P	0-1600	Lower elevations in Bhutan
3	<i>Aquila nipalensis</i>	Steppe Eagle	EN	Full Migrant	FALSE	P	300-2200	Phobjikha in wangdue, RMNP, Trongsa
4	<i>Aythya baeri</i>	Baer's Pochard	CR	Full Migrant	FALSE	P	150-2817	Narphung - Samdrup Jongkhar, Shechamthang-Wakleytar & Rimchu-Gasa
5	<i>Aythya ferina</i>	Common Pochard	VU	Full Migrant	FALSE	P	150-2817	Punatsangchhu river
6	<i>Calidris falcinellus</i>	Broad-billed Sandpiper	VU	Full Migrant	FALSE	P	1600-3600	Bhutan wintering grounds in plains
7	<i>Calidris ferruginea</i>	Curlew Sandpiper	VU	Full Migrant	FALSE	P	0-4500	Whole Bhutan
8	<i>Clanga</i>	Greater Spotted Eagle	VU	Full Migrant	FALSE	P	0-1700	Lowland and foothills in Bhutan
9	<i>Emberiza aureola</i>	Yellow-breasted Bunting	CR	Full Migrant	FALSE	P	1600-3600	Central & southern foothills, Zhemgang
10	<i>Gallinago nemoricola</i>	Wood Snipe	VU	Full Migrant	FALSE	P	1800-4200	Phobjikha, Thimphu
11	<i>Grus antigone</i>	Sarus Crane	VU	Full Migrant	FALSE	A		

SN	Scientific name	Common name	Category	Movement pattern	is_restricted_range	Absence/ Presence (based on literature & surveys)	Alt.range (m) (from-to)	Distribution (location points or in district)
12	<i>Haliaeetus leucoryphus</i>	Pallas's Fish-eagle	EN	Full Migrant	FALSE	P	0-1400	Punatsangchhu, Mangdechhu, Kurichhu & Drangmechhu rivers
13	<i>Houbaropsis bengalensis</i>	Bengal Florican	CR	Full Migrant	FALSE	P	1000-1500	No record of distribution in Bhutan
14	<i>Pluvialis squatarola</i>	Grey Plover	VU	Full Migrant	FALSE	P	700-3600	Haa, Paro, Thimphu, Bumthang
15	<i>Saxicola insignis</i>	White-throated Bushchat	VU	Full Migrant	FALSE	P	400-1400	Punatsangchhu & Mangdechhu river basins
16	<i>Schoenicola striatus</i>	Bristled Grassbird	VU	Full Migrant	FALSE	P	400-1400	Central, eastern & southern foothills of Bhutan
17	<i>Turdus feae</i>	Grey-sided Thrush	VU	Full Migrant	FALSE	P	600-3050	Thimphu valley, Chelela pass, Punakha-wangdue valley & Phobjikha valley
18	<i>Gyps bengalensis</i>	White-rumped Vulture	CR	Nomadic	FALSE	P	560-1530	No detail of location in Bhutan
19	<i>Aceros nipalensis</i>	Rufous-necked Hornbill	VU	Not a Migrant	FALSE	P	150-2200	Trongsa, Zhemgang (JSWNP, RMNP)
20	<i>Ardea insignis</i>	White-bellied Heron	CR	Not a Migrant	FALSE	P	100-1500	Punatsangchhu & Mangdechhu river basins
21	<i>Buceros bicornis</i>	Great Hornbill	VU	Not a Migrant	FALSE	P	400-1400	RMNP, JSWNP, PNP, BWS, Jomotshangkha wildlife sanctuary
22	<i>Chrysomma altirostre</i>	Jerdon's Babbler	VU	Not a Migrant	TRUE	A		
23	<i>Clanga hastata</i>	Indian Spotted Eagle	VU	Not a Migrant	FALSE	P	0-1000	Lowlands & foothills of Bhutan
24	<i>Gyps tenuirostris</i>	Slender-billed Vulture	CR	Not a Migrant	FALSE	A		
25	<i>Laticilla cinerascens</i>	Swamp Grass-babbler	EN	Not a Migrant	FALSE	A		

SN	Scientific name	Common name	Category	Movement pattern	is_restricted_range	Absence/ Presence (based on literature & surveys)	Alt.range (m) (from-to)	Distribution (location points or in district)
26	<i>Mulleripicus pulverulentus</i>	Great Slaty Woodpecker	VU	Not a Migrant	FALSE	P	0-2000	PWS, Sarpang
27	<i>Paradoxornis flavirostris</i>	Black-breasted Parrotbill	VU	Not a Migrant	TRUE	A		
28	<i>Perdicula manipurensis</i>	Manipur Bush-quail	CR	Not a Migrant	FALSE	A		
29	<i>Ploceus megarhynchus</i>	Finn's Weaver	EN	Not a Migrant	FALSE	A		
30	<i>Sarcogyps calvus</i>	Red-headed Vulture	CR	Not a Migrant	FALSE	P	0-3000	Bhutan-uncommon & sparsely distributed
31	<i>Sterna acuticauda</i>	Black-bellied Tern	EN	Not a Migrant	FALSE	P	0-700	Lower river valleys of Bhutan
32	<i>Sterna aurantia</i>	River Tern	VU	Not a Migrant	FALSE	P	0-600	Punatsangchhu & Mangdechhu basin

Following 12 species of birds have been qualified from the initial screening of Critical habitat assessment: White-bellied heron, White-rumped vulture, Rufous-fronted tit, Darked-rumped swift, Sikkim tree creeper, Rusty-flanked treecreeper, Ward's trogon, Firetailed myzornis, Black-throated Prinia, Satyr tragopan, Himalayan forest thrush, and Pied Shrike-babbler.

Note: 32 species of birds in IBAT, 7 spp absent in Bhutan (red font above in table 7), 25 to be assessed, 2 terns, below 700m? may be reduced, 2 species (Bengal Florican, White-rumped Vulture)-no details in Bhutan=21 SPP CHA considered; P=presence, A=Absence

No detail of location / No record of distribution in Bhutan



Figure 4-2 Terrestrial species listed in IBAT found in 50 km radius from Bunakha HEP dam in Bhutan

4.4 Butterfly and moth

Nine butterfly species in two families (five species in Nymphalidae and four species in Papilionidae) were recorded in the second season (monsoon) survey (table 12). List of butterfly and moth along with conservation significance from all the different sites were searched. No butterfly and moth have been observed/collected during the surveys (post monsoon).

Table 12: Butterfly species recorded in the second season (monsoon)

SN	Family	Scientific name	Common Name	National Legislation FNCA	CITES Listing	IUCN Red List
1	Nymphalidae	<i>Parantica sita</i>	Chestnut Tiger	-	Not listed	No global conservation status
2	Nymphalidae	<i>Junonia orithya</i>	Blue Pansy	-	-	LC
3	Nymphalidae	<i>Acraea issoria</i>	Yellow Coster	-	Not listed	NE
4	Nymphalidae	<i>Parantica swinhoei</i>	Swinhoe's Chocolate Tiger	-	Not listed	Not listed
5	Nymphalidae	<i>Neptis miah</i>	Small Yellow Sailer	-	Not listed	Not been assessed
6	Papilionidae	<i>Byasa polyxyntes</i>	Common windmill	-	Not listed	NE

7	Papilionidae	<i>Graphium sarpedon</i>	Common Bluebottle	-	Not listed	LC
8	Papilionidae	<i>Papilio hopponis</i>	Hoppo Peacock	-	Not listed	-
9	Papilionidae	<i>Papilio bianor</i>	Chinese Peacock Swallowtail	-	Not listed	NE

Two species of insect have been qualified for critical habitat assessment, they are *Cephalaeschna triadica* and *Coelliccia svihleri*.

4.5 Herpetofauna (reptiles and amphibians)

The total of 28 herpetofauna species was recorded within the project area (Figure 4-4). Of these, 25 species were reptiles, while three were amphibians. The reptile count included 17 snake species belonging to four families, and seven lizard species belonging to three families. *Indotestudo elongata* is the only turtle species recorded in the project area. The three amphibian species recorded were one species from toad and two species from frog family. A comprehensive list of the identified species recorded in project area is provided in Table 13. No herpetofauna (reptiles and amphibians) were observed during the surveys (post monsoon).

Table 13: Number of herpetofauna species recorded in different family groups

Herpetofauna Group	Family Name	Number of Recorded Species
Frogs & Toads	Bufonidae	1
	Dicroglossidae	2
Frogs & Toads Total		3
Lizards	Agamidae	2
	Gekkonidae	2
	Scincidae	3
Lizards Total		7
Snakes	Colubridae	12
	Elapidae	2
	Pythonidae	1

	Viperidae	2
Snakes Total		17
Turtle & Tortoise	Testudinidae	1
Turtle & Tortoise Total		1
Grand Total		28

25 IBAT listed threatened herpetofauna was found in 75 km radius of which four are absent in Bhutan. Of the 21 species, 16 species are found in 50 radii from the Bunakha dam. Four Amphibian species and 21 Reptiles species totaling 25 species of herpetofauna are listed in IBAT. One amphibian & three reptilians are absent in Bhutan, thus 21 species of herpetofauna is to be assessed for CHA (

Table 4). Nagaland's toad has been identified for critical habitat assessment in initial screening.

As of 2019, 158 species of herpetofauna have been reported in Bhutan (NBC, 2019 cited in NBSAP 2025).

Table 14 List of Amphibians and Reptiles (Herpetofauna) shown in IBAT records and summary of species proposed for CHA

S N	Scientific name	common name	Category	Population trend	Movement pattern	is_restricted _range	Absence / Presence	Alt. range (m) (from-to)	Distribution (location points or in district)
AMPHIBIA									
1	<i>Amolops monticola</i>	Mountain Cascade Frog	EN	D	Not a Migrant	FALSE	Present	0-1600	Lower altitudes in Bhutan

S N	Scientific name	common name	Category	Population trend	Movement pattern	is_restricted _range	Absence / Presence	Alt. range (m) (from-to)	Distribution (location points orin district)
2	<i>Minervarya chilapata</i>	Chilapata Rainpool Frog	VU	D	Not a Migrant	TRUE	Present		Border regions with India
3	<i>Tylototriton himalayanus</i>	Himalayan Salamander	VU	D	Not a Migrant	FALSE	Present	1255-2679	Toebrongchhu zam (Punakha) & Lam Pelri Botanical Park
4	<i>Uperodon assamensis</i>	Assamese Balloon Frog	VU		Not a Migrant	TRUE	Absent		
REPTILIA									
5	<i>Batagur dhongoka</i>	Three-striped Roofed Turtle	CR	D		FALSE	Absent		
6	<i>Crocodylus palustris</i>	Mugger	VU	S		FALSE	Absent		
7	<i>Cuora amboinensis</i>	Southeast Asian Box Turtle	EN	D		FALSE	Present	253-390	Norbuling lake (RMNP, Sarpang) & Somrong (Zhemgang)
8	<i>Cuora mouhotii</i>	Keeled Box Turtle	EN	D		FALSE	Present	0-370	Gulabi top (Zhemgang)
9	<i>Elaphe taeniura</i>	Cave Racer	VU	D		FALSE	Present		
10	<i>Geoclemys hamiltonii</i>	Spotted Pond Turtle	EN	D		FALSE	Present		
11	<i>Hardella thurjii</i>	Crowned River Turtle	EN	D		FALSE	Absent		
12	<i>Indotestudo elongata</i>	Elongated Tortoise	CR	D		FALSE	Present		
13	<i>Lissemys punctata</i>	Indian Flapshell Turtle	VU	D		FALSE	Present		
14	<i>Melanochelys tricarinata</i>	Tricarinate Hill Turtle	EN	D		FALSE	Present		
15	<i>Morenia petersi</i>	Indian Eyed Turtle	EN	D		FALSE	Present		

S N	Scientific name	common name	Category	Population trend	Movement pattern	is_restricted _range	Absence / Presence	Alt. range (m) (from-to)	Distribution (location points or in district)
16	<i>Nilssonina gangetica</i>	Indian Softshell Turtle	EN	D		FALSE	Present		
17	<i>Nilssonina hurum</i>	Indian Peacock Softshell Turtle	EN	D		FALSE	Present		
18	<i>Nilssonina nigricans</i>	Black Softshell Turtle	CR	D		FALSE	Present		
19	<i>Oligodon juglandifer</i>	Walnut Kukri Snake	VU	Un		FALSE	Present		
20	<i>Ophiophagus hannah</i>	King Cobra	VU	D		FALSE	Present		
21	<i>Pangshura sylhetensis</i>	Assam Roofed Turtle	CR	D		FALSE	Present		
22	<i>Pangshura tecta</i>	Indian Roofed Turtle	VU	D		FALSE	Present		
23	<i>Python bivittatus</i>	Burmese Python	VU	D		FALSE	Present		
24	<i>Varanus flavescens</i>	Yellow Monitor	EN	D		FALSE	Present		
25	<i>Xenochrophis cerasogaster</i>	Painted Keelback	VU	D		FALSE	Present		
Note: Un=Unknown, D=Decreasing and S=stable									

4.5.1. Status of the herpetofauna in the project area

Extensive research and documentation have provided critical insights into the herpetofauna of Bhutan, revealing significant species diversity and distribution patterns. Notable studies include Wangyal (2014), who conducted an inventory in Jigme Singye Wangchuck National Park and documented 42 herpetofauna species, three of which were classified as threatened. Similarly, in Central Bhutan, Tshewang and Letro (2018) comprehensively recorded 33 reptile and nine amphibian species, contributing new findings to the field.

Despite these advances, knowledge gaps persist in certain areas. For example, the Sarpang District, a protected area, lacks a formal checklist or report. This gap, highlighted by Wangyal (2012), underscores the urgent need for increased monitoring, conservation initiatives, and further research in the region (Das et al., 2016; Das & Palden, 2000).

Global initiatives, such as the Global Amphibian Assessment (GAA), have evaluated the extinction risk of over 5,700 amphibian species. The GAA's findings emphasize the importance of sustained, long-term research to maintain data integrity and inform effective conservation strategies (wild. Synchronicity Earth IUCN SSC Amphibian Specialist Group, 2023). In a regional context, India has seen a near doubling of amphibian species between 2006 and 2022, highlighting the need for proactive conservation measures and disease monitoring due to a significant lack of assessment data.

Recent studies have begun to address some of the identified gaps. A preliminary assessment of Bhutan's reptilian fauna by Tenzin et al. (2022) revealed a scincid lizard species and a checklist of 34 species for the Sarpang District. This study also highlighted how proximity to national highway systems and farm roads influences herpetofauna distribution. Earlier work by Wangyal (2012) also documented ten snake and two lizard species in the Sarpang District, advancing our understanding of the area's herpetofauna (Phuntsho et al., 2022).

The field of herpetology in Bhutan has also been significantly enhanced by citizen science. A study by Wangyal (2020) unveiled 48 previously undocumented species, showcasing the potential of this approach to expand knowledge of poorly studied fauna. This collaborative effort, along with the discovery of Anderson's Bubble-nest Frog (*Raorchestes andersoni*) in Bhutan (Wangyal & Jamtsho, 2023), underscores the ongoing importance of research in this less-explored field. While a baseline herpetofauna inventory for the present study location is currently lacking, this report represents a crucial initial step, building upon the limited but foundational information available.

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5 Annexures

5.1 FLORAL SPECIES BY STATION AND HABITAT

1.1 Vegetation Assessment Protocol for Trees

Data sheet (Tree Vegetation > 1.3m)	Plot type(square): Trees (20 x 20 m)
Dzongkhag: Chukha	Altitude: 1394.1
Locality: Tala dam	Aspect: North
Transect name: Above Tala Dam	Slope%: 25
Plot no: 1	Canopy cover: partial shade
North: 27.047908333	Forest type: CBLF
East: 89.580216667	

SN	Family	Scientific name	Common name	DBH(cm)	Height(m)
1	Canabaceae	<i>Celtis tetranda</i>	Nilgiri elm	51	15
2	Canabaceae	<i>Celtis tetranda</i>	Nilgiri elm	41	10
3	Canabaceae	<i>Celtis tetranda</i>	Nilgiri elm	44	10
4	Canabaceae	<i>Celtis tetranda</i>	Nilgiri elm	44	11
5	Canabaceae	<i>Celtis tetranda</i>	Nilgiri elm	49	13
6	Lauraceae	<i>Actinodaphne obovata</i>		51	13
7	Lauraceae	<i>Actinodaphne obovata</i>		44	10
8	Araliaceae	<i>Brassiopsis hainla</i>	Seto chuletro	53	8
9	Araliaceae	<i>Brassiopsis hainla</i>	Seto chuletro	51	5
10	Araliaceae	<i>Brassiopsis hainla</i>	Seto chuletro	51	5

1.2 Vegetation Assessment Protocol for Shrubs

Data Sheet (Shrub Vegetation)			Plot type (Square): Shrubs (20x20)		
SN	Family	Scientific name	Common name	DBH(cm)	Height(m)
1	Thymelaeaceae	<i>Edgeworthia gardneri</i>	Indian paper tree	1.5	5
2	Araliaceae	<i>Brassiopsis hainla</i>	Seto chuletro tree	3	1
3	Lauraceae	<i>Persea spp</i>	wild avocado	3	2
4	Myrtaceae	<i>Syzygium cumini</i>	Java plum	2	3

5	Araliaceae	<i>Eleutherococcus cissifolium</i>	Siberian Ginseng	1	1
6	Primulaceae	<i>Maesa chisia</i>	Chisia wild berry	3	2
7	Primulaceae	<i>Ardisia macrocarpa</i>	Himalayan coralberry	0.5	3
8	Elaeagnaceae	<i>Elaeagnus parvifolia</i>	Oleaster	1	2
1.3	Epiphytic				
SN	Family	Scientific name	Common name	Number	
1	Orchidaceae	<i>Dendrobium chrysanthum</i>			
1.4	Vegetation assessment protocol for herbs				
	Data Sheet (herb Vegetation)		Plot type (Square): herbs (2mx2m)		
SN	Family name	Scientific name	Common name	Cover% or number	
1	Urticaceae	<i>Girardinia diversifolia</i>	Himalayan nettle		2
2	Urticaceae	<i>Pouzolzia hirta</i>	Oyik		5
3	Piparaceae	<i>Piper pedicellatum</i>	Long pipila		6
1.5	Other plants by Recce				
SN	Family name	Scientific name	Common name	Type of plant	
1	Acanthaceae	<i>Thunbergia coccinea</i>		Climbing shrub	
2	Gesneriaceae	<i>Rhynchoglossum obliquum</i>		Herb	
3	Ericaceae	<i>Agapetes variegata</i>		Shrub	

1.1 Vegetation Assessment Protocol for Trees

Data sheet (Tree Vegetation > 1.3m)

Dzongkhag: Chukha

Locality: Dam area

Transect name: Below Dam

Plot no: 2

North: 27.109285

Plot type(square): Trees (20 x 20 m)

Altitude: 1809.9 m

Aspect: SouthEast

Slope%: 15

Forset canopy%: partial shade

Habitat type: CBLF

East:
89.53004

SN	Family	Scientific name	Common name	DBH(cm)	Height(m)
1	Betulaceae	<i>Alnus nepalensis</i>	Himalayan Alder	116	16
2	Betulaceae	<i>Betula alnoides</i>	Himalayan birch	113	15
3	Betulaceae	<i>Alnus nepalensis</i>	Himalayan Alder	83	10
4	Betulaceae	<i>Alnus nepalensis</i>	Himalayan Alder	83	10
5	Salicaceae	<i>Populus ciliata</i>	Himalayan poplar	41	15
6	Araliaceae	<i>Brassiopsis hainla</i>	Seto chuletro tree	53	7
7	Betulaceae	<i>Betula alnoides</i>	Himalayan birch	88	9
8	Betulaceae	<i>Alnus nepalensis</i>	Himalayan Alder	129	18
9	Betulaceae	<i>Alnus nepalensis</i>	Himalayan Alder	132	15
10	Betulaceae	<i>Alnus nepalensis</i>	Himalayan Alder	109	12
11	Betulaceae	<i>Alnus nepalensis</i>	Himalayan Alder	171	20
12	Betulaceae	<i>Alnus nepalensis</i>	Himalayan Alder	136	19

1..2 Vegetation Assessment Protocol for Shrubs

Data Sheet (Shrub Vegetation)

Plot type (Square): Shrubs(20x20)

SN	Family	Scientific name	Common name	Ht(m)	number
1	Urticaceae	<i>Debregeasia longifolia</i>	Orange wild rhea	4	1
2	Theaceae	<i>Eurya acuminata</i>	Tapering leaf eurya	6	1
3	Ericaceae	<i>Lyonia ovalifolia</i>	Fetterbush	5	1
4	Sapindaceae	<i>Acer oblongum</i>	Evergreen maple	3	2
5	Polygonaceae	<i>Aconogonum molle</i>	Soft knotweed	4	15
6	Acanthaceae	<i>Strobilanthes capitata</i>		1	50

1.3 Epiphytic

SN	Family	Scientific name	Common name	Number
1	Orchidaceae	<i>Phalaenopsis taenialis</i>		3

1.4 Data sheet (Herbs)

Plot type(square): Herb (2x 2m)

SN	Family name	Scientific name	Common name	Cover% or number
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1	Poaceae	<i>Oplismenus hirtellus</i>	Basket grass	20
2	Urticaceae	<i>Girardinia diversifolia</i>		4
3	Urticaceae	<i>Urtica dioica</i>		3

1.1 Vegetation Assessment Protocol for Trees

Data sheet (Tree Vegetation > 1.3m)
 Dzongkhag: Chukha
 Locality: Chanachen
 Transect name: Above old road
 Plot no: 3
 North: 27.119606667
 East: 89.52974

Plot type(square): Trees (20 x 20 m)
 Altitude: 2133.3
 Aspect: South
 Slope%: 15
 Forset canopy%: Partial shade
 Habitat type: CBLF

SN	Family	Scientific name	Common name	DBH(cm)	Height(m)
1	Symplocaceae	<i>Symplocos ramosissima</i>	Sapphire berry	67	9
2	Fagaceae	<i>Quercus oxyodon</i>	Sharp-toothed oak	64	10
3	Anacardiaceae	<i>Rhus spp</i>	Tanners	56	10
4	Anacardiaceae	<i>Rhus spp</i>	Tanners	41	5
5	Symplocaceae	<i>Symplocos ramosissima</i>	Sapphire berry	41	7
6	Lauraceae	<i>Dodecadenia grandiflora</i>	Tailiya	125	15
7	Lauraceae	<i>Dodecadenia grandiflora</i>	Tailiya	104	17
8	Symplocaceae	<i>Symplocos ramosissima</i>	Sapphire berry	46	10
9	Symplocaceae	<i>Symplocos sumuntia</i>	Shan fan	129	17
10	Symplocaceae	<i>Quercus oxyodon</i>	Sharp-toothed oak	129	15
11	Symplocaceae	<i>Populus ciliata</i>	Himalayan poplar	194	15
12	Symplocaceae	<i>Quercus lanata</i>	Ban oak	232	20
13	Symplocaceae	<i>Quercus oxyodon</i>	Sharp-toothed oak	33	10
14	Symplocaceae	<i>Quercus oxyodon</i>	Sharp-toothed oak	118	18

15	Symplocaceae	<i>Eurya acuminata</i>	Tapering eurya	73	16
16	Symplocaceae	<i>Prunus carmesina</i>	Wild himalayan cherry	183	25
17	Symplocaceae	<i>Symplocos ramosissima</i>	Sapphire berry	63	10
18	Symplocaceae	<i>Symplocos racemosa</i>	Lodh tree	51	7
19	Symplocaceae	<i>Quercus oxyodon</i>	Sharp-toothed oak	190	21

1.2 Vegetation Assessment Protocol for Shrubs

Data sheet(Shrub Vegetation)

Plot Type(square): Shrub(20x20m)

SN	Family	Scientific name	Common name	DBH(cm)	Height(m)
1	Thymelaeaceae	<i>Daphne bholua</i>	Australian cheesewood	1	3
2	Primulaceae	<i>Ardisia macrocarpa</i>	Himalayan coralberry	0.2	7
3	Symplocaceae	<i>Symplocos racemosa</i>	Lodh tree	2	20
4	Lauraceae	<i>Cinnamomum glanduliferum</i>	Cinnamon	0.3	1
5	Adoxaceae	<i>Viburnum erubescens</i>	reddish viburnum	3	1
6	Oleaceae	<i>Ligustrum confusum</i>	Indian privet	0.2	1
7	Poaceae	<i>Chimonobambusa callosa</i>		2	50

1.4 Data sheet (Herbs)

Plot type(square): Herb (2x 2m)

SN	Family name	Scientific name	Common name	Cover% or number
1	Urticaceae	<i>Pilea spp</i>		3
2	Poaceae	<i>Oplismenus hirtellus</i>		4
3	Dryopteridaceae	<i>Polystichum spp</i>		2

1.1 Vegetation Assessment Protocol for Trees

Data sheet (Tree Vegetation > 1.3m)

Dzongkhag: Chukha

Locality: Chanachen junction

Transect name: Above road

Plot no: 4

North:

27.118288333

East: 89.538913333

Plot type(square): Trees (20 x 20 m)

Altitude: 1961.4

Aspect: West

Slope%: 10

Forstst canop partial shade

Habitat type: CBLF

SN	Family name	Scientific name	Common name	DBH(cm)	Height(m)
1	Symplocaceae	<i>Symplocos ramosissima</i>		45	7
2	Ericaceae	<i>Rhododendron arboreum</i>		52	8
3	Fagaceae	<i>Quercus lanata</i>		353	15
4	Schoepfiaceae	<i>Schoepfia jasminodora</i>		100	10
5	Symplocaceae	<i>Symplocos ramosissima</i>		145	17
6	Symplocaceae	<i>Symplocos ramosissima</i>		68	11
7	Magnoliaceae	<i>Michelia doltsapa</i>		161	15
8	Fagaceae	<i>Quercus glauca</i>		27	10

1..2 Vegetation Assessment Protocol for Shrubs

SN	Family	Scientific name	Common name	DBH(cm)	Height(m)
1	Symplocaceae	<i>Symplocos ramosissima</i>		1	17
2	Theaceae	<i>Eurya acuminata</i>		1	20
3	Lauraceae	<i>Cinnamomum spp</i>		1	3
4	Poaceae	<i>Yushania spp</i>		1	50
5	Moraceae	<i>Morus spp</i>		0.2	3

Data sheet (Herbs)

Plot type(square): Herb (2x 2m)

SN	Family name	Scientific name	Common name	Cover% or number
1	Compositae	<i>Anaphalis nepalensis</i>		

2	Compositae	<i>Bidens pilosa</i>		
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1.1 Vegetation Assessment Protocol for Trees

Data sheet (Tree Vegetation > 1.3m) Plot type(square): Trees (20 x 20 m)

Dzongkhag:

Chukha

Altitude: 1883.8

Locality:

Chanchen

Aspect: SE

Transect name:above bridge

Slope%: 20%

Plot no: 5

Forset canopy%: partial shade

North:

27.127935

Habitat type: CBLF

East:

89.539278333

SN	Family	Scientific name	Common name	DBH(cm)	Height(m)
1	Betulaceae	<i>Carpinus viminea</i>	Himalayan hornbeam	138	16
2	Betulaceae	<i>Carpinus viminea</i>	Himalayan hornbeam	35	12
3	Betulaceae	<i>Carpinus viminea</i>	Himalayan hornbeam	55	10
4	Betulaceae	<i>Carpinus viminea</i>	Himalayan hornbeam	56	13
5	Betulaceae	<i>Carpinus viminea</i>	Himalayan hornbeam	74	13
6	Betulaceae	<i>Carpinus viminea</i>	Himalayan hornbeam	93	15
7	Fagaceae	<i>Quercus griffithii</i>	Oak	170	15
8	Fagaceae	<i>Quercus lanata</i>	Ban oak	170	15
9	Fagaceae	<i>Quercus lanata</i>	Ban oak	255	17
10	Pinaceae	<i>Pinus wallichiana</i>	Blue pine	310	45
11	Ericaceae	<i>Rhododendron arboreum</i>	Rhodo	25	5
12	Ericaceae	<i>Rhododendron arboreum</i>	Rhodo	39	9
13	Salicaceae	<i>Populus ciliata</i>	Himalayan poplar	147	15
14	Fagaceae	<i>Quercus lanata</i>	Ban oak	117	9

1..2 Vegetation Assessment Protocol for Shrubs

Data sheet(Shrub Vegetation) Plot Type(square):
Shrub(20x20m)

SN	Family	Scientific name	Common name	DBH(cm)	Height(m)
1	Theaceae	<i>Eurya acuminata</i>	Tapering leaf eurya	1	25
2	Myrsinaceae	<i>Ardisia macrocarpa</i>	Himalayan coralberry	0.3	5
3	Leguminosae	<i>Desmodium spp</i>		0.5	20

Epiphyte

SN	Family name	Scientific name	Common name	number
1	Orchidaceae	<i>Eria coronaria</i>		2
2	Orchidaceae	<i>Bulbophyllum retusiusculum</i>		7
3	Ericaceae	<i>Vaccinium vacciniaceum</i>		1
4	Ericaceae	<i>Agapetes serpens</i>		1

1.1 Vegetation Assessment Protocol for Trees

Data sheet (Tree Vegetation > 1.3m)

Dzongkhag: Chukha

Locality: Chanachen

Transect name: Labour camp-2 and stock pile 2

Plot no: 6

North: 27.137031667

East: 89.539318333

Plot type(square): Trees (20 x 20 m)

Altitude: 1889.8

Aspect: South

Slope%: 15

Forest canopy%: Partia shade

Habitat type: CBLF

S N	Family	Scientific name	Common name	DBH(cm)	Height(m)
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1	Lauraceae	<i>Dodecadenia grandiflora</i>	Tailiya	86	15
2	Lauraceae	<i>Dodecadenia grandiflora</i>	Tailiya	61	7
3	Salicaceae	<i>Populus ciliata</i>	Himalayan poplar	212	17
4	Lauraceae	<i>Dodecadenia grandiflora</i>	Tailiya	85	12
5	Lauraceae	<i>Dodecadenia grandiflora</i>	Tailiya	68	7
6	Betulaceae	<i>Alnus nepalensis</i>	Himalayan Alder	358	27
7	Symplocaceae	<i>Symplocos sumuntia</i>	Shan fan	40	5
8	Betulaceae	<i>Betula alnoides</i>	Himalayan birch	190	21
9	Lauraceae	<i>Dodecadenia grandiflora</i>	Tailiya	65	10
10	Betulaceae	<i>Alnus nepalensis</i>	Himalayan Alder	120	15
11	Betulaceae	<i>Carpinus viminea</i>	Himalayan hornbeam	90	15

1.2 Vegetation Assessment Protocol for Shrubs

Data sheet(Shrub Vegetation)

Plot Type(square): Shrub(20x20m)

SN	Family	Scientific name	Common name	ht(m)	Number
1	Buxaceae	<i>Sarcococca saligna</i>	Christmas box	0.5	30
2	Berberidaceae	<i>Berberis spp</i>	Barberry	2	8
3	Myrsinaceae	<i>Ardisia macrocarpa</i>	Himalayan coralberry	0.5	15
4	Thymelaeaceae	<i>Daphne bholua</i>	Australian cheesewood	1	11
5	Berberidaceae	<i>Mahonia napalensis</i>	Nepal barberry	1	2
6	Acanthaceae	<i>Strobilanthes spp</i>		1	50

Data sheet (Herbs)

Plot type(square): Herb (2x2m)

SN	Family name	Scientific name	Common name	Cover% or number
1	Poaceae	<i>Opismenus hirtellus</i>	Basket grass	25

2	Solanaceae	<i>Solanum viarum</i>	Tropical soda apple	25
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1.1 Vegetation Assessment Protocol for Trees

Data sheet (Tree Vegetation > 1.3m)

Dzongkhag: Chukha

Locality: Bunagu

Transect name: Labour camp-4

Plot no: 7

North: 27.138536667

East: 89.545085

Plot type(square): Trees (20 x 20 m)

Altitude: 2088.8 m

Aspect: South

Slope%: 5

Forest canopy cover%: Partial shade

Habitat type: CBLF

SN	Family	Scientific name	Common name	DBH(cm)	Height(m)
1	Symplocaceae	<i>Symplocos sumuntia</i>	Shan fan	94	10
2	Betulaceae	<i>Corylus ferox</i>		90	10
3	Ericaceae	<i>Lyonia ovalifolia</i>		246	15
4	Symplocaceae	<i>Symplocos sumuntia</i>	Shan fan	76	12
5	Ericaceae	<i>Pieris formosa</i>		30	7
6	Ericaceae	<i>Pieris formosa</i>		31	7
7	Fagaceae	<i>Quercus glauca</i>		90	12
8	Ericaceae	<i>Rhododendron griffithianum</i>		78	9
9	Lauraceae	<i>Cinnamomum glanduliferum</i>	Cinnamon	480	15
10	Symplocaceae	<i>Symplocos ramosissima</i>	Sapphire berry	45	7
11	Fagaceae	<i>Quercus griffithii</i>	Oak	360	17
12	Symplocaceae	<i>Symplocos ramosissima</i>	Sapphire berry	48	5
13	Symplocaceae	<i>Symplocos ramosissima</i>	Sapphire berry	30	4
14	Ericaceae	<i>Lyonia ovalifolia</i>		30	5
15	Ericaceae	<i>Rhododendron griffithianum</i>		145	10
16	Betulaceae	<i>Corylus ferox</i>		38	9

1.2 Vegetation Assessment Protocol for Shrubs

Data sheet(Shrub Vegetation)

Plot Type(square): Shrub(20x20m)

SN	Family	Scientific name	Common name	DBH(cm)	Height(m)
1	Myrsinaceae	<i>Ardisia macrocarpa</i>	Himalayan coralberry	1	50
2	Thymelaeaceae	<i>Daphne bholua</i>	Australian cheesewood	1	6
3	Berberidaceae	<i>Berberis aristata</i>		1	5
4	Symplocaceae	<i>Symplocos ramosissima</i>		2	7
5	Symplocaceae	<i>Symplocos sumuntia</i>		2	4
6	Oleaceae	<i>Ligustrum confusum</i>	Chinese privet	1	2
7	Berberidaceae	<i>Mahonia nepalensis</i>		0.3	1

Data sheet (Herbs)

Plot type(square): Herb (2x 2m)

SN	Family name	Scientific name	Common name	Cover% or number
1	Gramineae	<i>Oplismenus histellus</i>		25

1.1 Vegetation Assessment Protocol for Trees

Data sheet (Tree Vegetation > 1.3m)

Plot type(square): Trees (20 x 20 m)

Dzongkhag: Chukha

Locality: Chanachen

Transect name: Near village

Plot no: 8

North: 27.14623

East: 89.52884

Altitude: 2243.7 m

Aspect: SE

Slope%:25

Forest canopy%:CBLF

Habitat type: CBLF

SN	Family	Scientific name	Common name	DBH(cm)	Height(m)
1	Betulaceae	<i>Alnus nepalensis</i>	Himalayan Alder	73	13
2	Betulaceae	<i>Alnus nepalensis</i>	Himalayan Alder	108	20

3	Betulaceae	<i>Alnus nepalensis</i>	Himalayan Alder	70	15
4	Betulaceae	<i>Alnus nepalensis</i>	Himalayan Alder	71	15
5	Betulaceae	<i>Alnus nepalensis</i>	Himalayan Alder	216	17
6	Betulaceae	<i>Alnus nepalensis</i>	Himalayan Alder	141	20
7	Betulaceae	<i>Alnus nepalensis</i>	Himalayan Alder	170	25
8	Betulaceae	<i>Corylus ferox</i>	Hazel tree	53	10
9	Lauraceae	<i>Dodecadenia grandiflora</i>	Tailiya	71	9
10	Symplocaceae	<i>Symplocos ramosissima</i>	Sapphire berry	29	7
11	Symplocaceae	<i>Symplocos ramosissima</i>	Sapphire berry	30	7
12	Symplocaceae	<i>Symplocos ramosissima</i>	Sapphire berry	40	9
13	Betulaceae	<i>Betula alnoides</i>	Himalayan birch	59	12
14	Salicaceae	<i>Populus ciliata</i>	Himalayan poplar	220	25

1.2 Vegetation Assessment Protocol for Shrubs

Data sheet(Shrub Vegetation)

Plot Type(square): Shrub(20x20m)

SN	Family	Scientific name	Common name	DBH(cm)	Height(m)
1	Adoxaceae	<i>Viburnum erubescens</i>	reddish viburnum	2	8
2	Theaceae	<i>Eurya acuminata</i>	Tapering leaf eurya	2	2
3	Symplocaceae	<i>Symplocos ramosissima</i>	Sapphire berry	2	30
4	Thymelaeaceae	<i>Daphne bholua</i>	Australian cheesewood	1	3
5	Myrsinaceae	<i>Ardisia macrocarpa</i>	Himalayan coralberry	0.3	2
6	Berberidaceae	<i>Berberis spp</i>	Barberry	0.1	2

1.3 Data sheet (Herbs)

Plot type(square): Herb (2x 2m)

2	Urticaceae	<i>Urtica dioica</i>		
3	Urticaceae	<i>Lecanthus peduncularis</i>		
4	Urticaceae	<i>Pilea bracteosa</i>		

1.1 Vegetation Assessment Protocol for Trees

Data sheet (Tree Vegetation > 1.3m)

Plot type(square): Trees (20 x 20 m)

Dzongkhag: Chukha

Altitude: 1983.1 m

Locality: Bunagu

Aspect: SW

Transect name: Below road

Slope%: 35

Plot no: 9

Forest canopy%: Pattial shade

North: 27.145088333

Habitat type: CBLF

East: 89.536455

SN	Family	Scientific name	Common name	DBH(cm)	Height(m)
1	Fagaceae	<i>Quercus lanata</i>	Ban oak	140	15
2	Fagaceae	<i>Quercus lanata</i>	Ban oak	118	12
3	Fagaceae	<i>Quercus lanata</i>	Ban oak	36	7
4	Fagaceae	<i>Quercus lanata</i>	Ban oak	225	17
5	Fagaceae	<i>Quercus lanata</i>	Ban oak	28	5
6	Fagaceae	<i>Quercus lanata</i>	Ban oak	160	15
7	Fagaceae	<i>Quercus griffithii</i>	Oak	136	15
8	Fagaceae	<i>Quercus griffithii</i>	Oak	37	6
9	Fagaceae	<i>Quercus griffithii</i>	Oak	47	7
10	Fagaceae	<i>Quercus griffithii</i>	Oak	145	10
11	Fagaceae	<i>Quercus griffithii</i>	Oak	51	7

1.2 Vegetation Assessment Protocol for Shrubs

Data sheet(Shrub Vegetation)

Plot Type(square): Shrub(20x20m)

SN	Family	Scientific name	Common name	DBH(cm)	Height(m)
1	Elaeagnaceae	<i>Elaeagnus parvifolia</i>	Silver thorn	1	2
2	Berberidaceae	<i>Berberis aristata</i>		1	5
3	Theaceae	<i>Eurya acuminata</i>		2	13
4	Poaceae	<i>Yushania spp</i>		2	20

1.3 Data sheet (Herbs)

Plot type(square): Herb (2x 2m)

SN	Family name	Scientific name	Common name	Cover% or number
1	Zingiberaceae	<i>Hedychium spicatum</i>		5
2	Compositae	<i>Ainsliaea aptera</i>		3

1.1 Vegetation Assessment Protocol for Trees

Data sheet (Tree Vegetation > 1.3m)

Plot type(square): Trees (20 x 20 m)

Dzongkhag: Chukha

Locality: Near Bunakha

Transect name: Below road- MD-5

Plot no: 10

North: 27.154858333

East: 89.5389

Altitude: 1974.6

Aspect: SW

Slope%: 15

Forest canopy cover%: partial shade

Habitat type:

CBLF

SN	Family	Scientific name	Common name	DBH(cm)	Height(m)
1	Betulaceae	<i>Carpinus viminea</i>		50	15
2	Toricelliaceae	<i>Toricellia tiliifolia</i>		55	6
3	Toricelliaceae	<i>Toricellia tiliifolia</i>		63	5
4	Salicaceae	<i>Populus ciliata</i>	Himalayan poplar	106	20
5	Salicaceae	<i>Populus ciliata</i>	Himalayan poplar	120	20
6	Salicaceae	<i>Populus ciliata</i>	Himalayan poplar	123	20
7	Salicaceae	<i>Populus ciliata</i>	Himalayan poplar	183	22
8	Salicaceae	<i>Populus ciliata</i>	Himalayan poplar	127	20

9	Salicaceae	<i>Populus ciliata</i>	Himalayan poplar	73	15
10	Fagaceae	<i>Quercus lanata</i>	Ban oak	55	9
11	Fagaceae	<i>Quercus lanata</i>	Ban oak	35	7
12	Fagaceae	<i>Quercus lanata</i>	Ban oak	69	10

1.2 Vegetation Assessment Protocol for Shrubs

Data sheet(Shrub Vegetation)

Plot Type(square): Shrub(20x20m)

SN	Family	Scientific name	Common name	DBH(cm)	Height(m)
1	Myrsinaceae	<i>Ardisia macrocarpa</i>	Himalayan coralberry	0.5	6
2	Thymelaeaceae	<i>Daphne bholua</i>	Australian cheesewood	1	5
3	Theaceae	<i>Eurya acuminata</i>	Tapering leaf eurya	2	20

1.3 Data sheet (Herbs)

Plot type(square): Herb (2x 2m)

SN	Family name	Scientific name	Common name	Cover% or number
1	Zingiberaceae	<i>Hedychium spicatum</i>		3

1.1 Vegetation Assessment Protocol for Trees

Data sheet (Tree Vegetation > 1.3m)

Plot type(square): Trees (20 x 20 m)

Dzongkhag: Chukha

Locality: Below Geeling Goenpa

Transect name: Below road

Plot no: 11

North: 27.16369

East: 89.524815

Altitude: 2476.7

Aspect: SouthEast

Slope%: 25

Forest canopy cover%: partial shade

Habitat type: CBLF

SN	Family	Scientific name	Common name	DBH(cm)	Height(m)
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1	Pinaceae	<i>Pinus wallichiana</i>	Blue pine	64	15
2	Pinaceae	<i>Pinus wallichiana</i>	Blue pine	99	20
3	Pinaceae	<i>Pinus wallichiana</i>	Blue pine	124	20
4	Pinaceae	<i>Pinus wallichiana</i>	Blue pine	160	22
5	Pinaceae	<i>Pinus wallichiana</i>	Blue pine	83	15
6	Betulaceae	<i>Alnus nepalensis</i>	Himalayan Alder	90	15
7	Betulaceae	<i>Alnus nepalensis</i>	Himalayan Alder	80	10
8	Betulaceae	<i>Alnus nepalensis</i>	Himalayan Alder	83	15
9	Betulaceae	<i>Alnus nepalensis</i>	Himalayan Alder	89	15
10	Ericaceae	<i>Rhododendron arboreum</i>	Rhodo	38	5
11	Ericaceae	<i>Rhododendron arboreum</i>	Rhodo	59	10
12	Ericaceae	<i>Rhododendron arboreum</i>	Rhodo	37	5
13	Ericaceae	<i>Rhododendron arboreum</i>	Rhodo	39	5
14	Ericaceae	<i>Rhododendron arboreum</i>	Rhodo	35	7
15	Fagaceae	<i>Lithocarpus fenestratus</i>	Stone oak	90	13
16	Fagaceae	<i>Lithocarpus fenestratus</i>	Stone oak	73	12
17	Fagaceae	<i>Lithocarpus fenestratus</i>	Stone oak	90	13
18	Fagaceae	<i>Lithocarpus fenestratus</i>	Stone oak	58	10
19	Ericaceae	<i>Pieris formosa</i>		28	5
20	Symplocaceae	<i>Symplocos sumuntia</i>	Shan fan	35	9
21	Betulaceae	<i>Carpinus viminea</i>	Himalayan hornbeam	89	15
22	Betulaceae	<i>Carpinus viminea</i>	Himalayan hornbeam	50	9
23	Betulaceae	<i>Carpinus viminea</i>	Himalayan hornbeam	52	9

1.2 Vegetation Assessment Protocol for Shrubs

Data sheet(Shrub Vegetation)

Plot Type(square): Shrub(20x20m)

SN	Family	Scientific name	Common name	DBH(cm)	Height(m)
1	Symplocaceae	<i>Symplocos sumantia</i>	Shan fan	1	6

2	Theaceae	<i>Eurya acuminata</i>	Tapering eurya	2	7
3	Ericaceae	<i>Pieris formosa</i>		0.5	4
4	Berberidaceae	<i>Berberis wallichiana</i>		1	4
5	Symplocaceae	<i>Symplocos ramosissima</i>	Sapphire berry	5	3
6	Rosaceae	<i>Rubus acuminatus</i>		5	3
7	Lauraceae	<i>Dodecadenia grandiflora</i>	Tailiya	1	2
8	Smilacaceae	<i>Smilax spp</i>		0.5	10
9	Poaceae	<i>Yushiania spp</i>		3	50
10	Rutaceae	<i>Zanthoxylum armatum</i>	Rattan pepper	2	1

Data sheet (Herbs)

1.3 Plot type(square): Herb (2x 2m)

SN	Family name	Scientific name	Common name	Cover% or number
1	Vitaceae	<i>Tetrastigma serrulatum</i>		3
2	Violaceae	<i>Viola spp</i>		7

1.1 Vegetation Assessment Protocol for Trees

Data sheet (Tree Vegetation > 1.3m)

Plot type(square): Trees (20 x 20 m)

Dzongkhag: Chukha

Altitude: 1975.1

Aspect:

Locality: Tanalum area

SW

Slope%:

Transect name: below road

25

Plot no: 12

Forest canopy cover:%:partial shade

North: 27.173816667

Habitat type: CBLF

East: 89.532875

SN	Family	Scientific name	Common name	DBH(cm)	Height(m)
1	Fagaceae	<i>Quercus lanata</i>	Ban oak	151	15

2	Fagaceae	<i>Quercus lanata</i>	Ban oak	148	15
3	Fagaceae	<i>Quercus lanata</i>	Ban oak	112	15
4	Fagaceae	<i>Quercus lanata</i>	Ban oak	130	15
5	Fagaceae	<i>Quercus lanata</i>	Ban oak	46	7
6	Fagaceae	<i>Quercus lanata</i>	Ban oak	167	20
7	Fagaceae	<i>Quercus lanata</i>	Ban oak	49	8
8	Fagaceae	<i>Quercus lanata</i>	Ban oak	28	8
9	Fagaceae	<i>Quercus lanata</i>	Ban oak	250	17
10	Fagaceae	<i>Quercus lanata</i>	Ban oak	239	15
11	Fagaceae	<i>Quercus lanata</i>	Ban oak	110	12
12	Fagaceae	<i>Quercus lanata</i>	Ban oak	115	12
13	Pinaceae	<i>Pinus wallichiana</i>	Bluepine	34	6
14	Toricelliaceae	<i>Toricellia tiliifolia</i>		69	7

1.2 Vegetation Assessment Protocol for Shrubs

Data sheet(Shrub Vegetation)

Plot Type(square): Shrub(20x20m)

SN	Family	Scientific name	Common name	DBH(cm)	Height(m)
1	Theaceae	<i>Eurya acuminata</i>	Tapering eurya	2	25
2	Ericaceae	<i>Lyonia ovalifolia</i>		2	3
3	Fagaceae	<i>Quercus lanata</i>	Ban oak	1	4

1.3 Data sheet (Herbs)

Plot type(square): Herb (2x 2m)

SN	Family name	Scientific name	Common name	Cover% or number
1	Compositae	<i>Ainsliaea aptera</i>		6

1.1 Plot type(square): Trees (20 x 20 m)

Dzongkhag: Chukha

Altitude: 2007.3

Locality: Tanalum

Aspect: South

Transect name: above new bridge Slope%: 45
 Plot no: 13 Forest canopy cover%: Partial shade
 North: 27.184211667 Habitat type: CBLF
 East: 89.527851667

SN	Family name	Scientific name	Common name	DBH(cm)	Height(m)
1	Fagaceae	<i>Quercus lanata</i>	Ban oak	60	10
2	Fagaceae	<i>Quercus lanata</i>	Ban oak	68	10
3	Fagaceae	<i>Quercus lanata</i>	Ban oak	77	10
4	Fagaceae	<i>Quercus lanata</i>	Ban oak	23	4
5	Fagaceae	<i>Quercus lanata</i>	Ban oak	78	9
6	Fagaceae	<i>Quercus lanata</i>	Ban oak	86	9
7	Fagaceae	<i>Quercus lanata</i>	Ban oak	86	11
8	Fagaceae	<i>Quercus lanata</i>	Ban oak	99	11
9	Fagaceae	<i>Quercus lanata</i>	Ban oak	93	11
10	Fagaceae	<i>Quercus lanata</i>	Ban oak	72	10

1.2 Vegetation Assessment Protocol for Shrubs

Data sheet(Shrub Vegetation)

Plot Type(square): Shrub(20x20m)

SN	Family	Scientific name	Common name	DBH(cm)	Height(m)
1	Ericaceae	<i>Lyonia ovalifolia</i>		1	20
2	Fagaceae	<i>Quercus lanata</i>		1	15
3	Pinaceae	<i>Pinus wallichiana</i>		1	3
4	Fabaceae	<i>Indigofera tinctoria</i>		0.5	3

1.3 Data sheet (Herbs)

Plot type(square): Herb (2x 2m)

SN	Family name	Scientific name	Common name	Cover% or number
1	Compositae	<i>Ainsliaea aptera</i>		25
2	Poaceae	<i>Opismenus hirtellus</i>		40

1.4 Regeneration

SN	Family name	Scientific name	Common name	Number
1	Fagaceae	<i>Quercus lanata</i>		30
1.5	Other Plants by RECEE			
SN	Family name	Scientific name	Common Name	Type of plant
1	Saxifragaceae	<i>Bergenia ciliata</i>		Herb
2	Ericaceae	<i>Rhododendron maddenii</i>		Shrub

1.1 Vegetation Assessment Protocol for Trees

**Data sheet (Tree Vegetation >
1.3m)**

**Plot type(square): Trees (20 x
20 m)**

Dzongkhag: Paro
Locality: Bjishigang
Transect name: River
Plot no: 14
North:
27.19362333
East: 89.48658667

Altitude:
2024.900 m
Aspect:
Slope%:
Forest canopy cover%:
Habitat type: CBLF

sl	Family	Scientific name	Common name	DBH(cm)	Height(m)
1	Betulaceae	<i>Carpinus viminea</i>		173	8
2	Betulaceae	<i>Carpinus viminea</i>		95	11
3	Betulaceae	<i>Carpinus viminea</i>		98	12
4	Betulaceae	<i>Carpinus viminea</i>		92	12
5	Pinaceae	<i>Pinus wallichiana</i>	Blue pine	60	9
6	Pinaceae	<i>Pinus wallichiana</i>	Blue pine	58	8

7	Pinaceae	<i>Pinus wallichiana</i>	Blue pine	61	9
8	Pinaceae	<i>Pinus wallichiana</i>	Blue pine	58	7
9	Pinaceae	<i>Pinus wallichiana</i>	Blue pine	59	7
10	Lauraceae	<i>Dodecadenia grandiflora</i>	Tailiya	127	13
11	Cornaceae	<i>Benthamedia capitata</i>		48	8
12	Fagaceae	<i>Quercus griffithii</i>		103	13

1.2 Vegetation Assessment Protocol for Shrubs

Data sheet(Shrub Vegetation)

Plot Type(square): Shrub(20x20m)

SN	Family	Scientific name	Common name	Ht(m)	Number
1	Elaeagnaceae	<i>Elaeagnus parvifolia</i>	Silverthorn	2	30
2	Berberidaceae	<i>Berberis aristata</i>		1	3

1.3 Data sheet (Herbs)

Plot type(square): Herb (2x 2m)

No herbs as ground covered with sand

1.4 Other Plants by RECEE

SN	Family name	Scientific name	Common name	Type of plant
1	Berberidaceae	<i>Mahonia nepalensis</i>		Shrub
2	Araliaceae	<i>Brassaiopsis mitis</i>		Shrub
3	Aceraceae	<i>Acer campbellii</i>		Tree

1.1 Vegetation Assessment Protocol for Trees

Data sheet (Tree Vegetation > 1.3m)

Plot type(square): Trees (20 x 20 m)

Dzongkhag: Paro

Locality: Haa confluence

Transect name: Near river

Altitude: 1956.4

Aspect: East

Slope%: 35

Plot no: 15

North: 27.20056

Forest canopy cover%: Partial shade

Habitat type: CBLF

SN	Family name	Scientific name	Common name	DBH(cm)	Height(m)
1	Fagaceae	<i>Quercus griffithii</i>	Oak	201	18
2	Fagaceae	<i>Quercus griffithii</i>	Oak	145	15
3	Fagaceae	<i>Quercus griffithii</i>	Oak	210	20
4	Fagaceae	<i>Quercus griffithii</i>	Oak	240	20
5	Fagaceae	<i>Quercus griffithii</i>	Oak	279	18
6	Fagaceae	<i>Quercus griffithii</i>	Oak	198	16
7	Lauraceae	<i>Dodecadenia grandiflora</i>	Tailiya	167	13
8	Lauraceae	<i>Dodecadenia grandiflora</i>	Tailiya	68	7
9	Lauraceae	<i>Dodecadenia grandiflora</i>	Tailiya	67	7
10	Betulaceae	<i>Carpinus viminea</i>		26	5
11	Betulaceae	<i>Carpinus viminea</i>		28	5

1.2 Vegetation Assessment Protocol for Shrubs

Data sheet(Shrub Vegetation)

Plot Type(square): Shrub(20x20m)

SN	Family	Scientific name	Common name	DBH(cm)	Height(m)
1	Oleaceae	<i>Ligustrum compactum</i>		2	3
2	Betulaceae	<i>Carpinus viminea</i>		1	3
3	Smilicaceae	<i>Smilax spp</i>		0.5	5
4	Berberidaceae	<i>Berberis aristata</i>		0.5	3
5	Poaceae	<i>Yushania spp</i>		2	15
6	Theaceae	<i>Eurya acuminata</i>		2	30
7	Berberidaceae	<i>Mahonia nepalensis</i>		0.7	2
8	Elaeagnaceae	<i>Elaeagnus parvifolia</i>	Silverthorn	3	4
9	Anacardiaceae	<i>Rhus spp</i>		0.5	2

1.3 Data sheet (Herbs)

Plot type(square): Herb (2x 2m)

SN	Family name	Scientific name	Common name	Cover% or number
1	Cyperaceae	<i>Carex spp</i>		

1.1 Vegetation Assessment Protocol for Trees

Data sheet (Tree Vegetation > 1.3m)

Plot type(square): Trees (20 x 20 m)

Dzongkhag: Paro Altitude: 1959

Locality: Ha Confluence Aspect: East

Transect name: Near

bridge Slope%: 5

Plot no: 16 Forest canopy cover%: partial

North: 27.204848333 shade

East: 89.518766667 Habitat ype: CBLF

SN	Family name	Scientific name	Common name	DBH(cm)	Height(m)
	Betulaceae	<i>Carpinus viminea</i>		25	5
	Pinaceae	<i>Pinus wallichiana</i>	Bluepine	70	15
	Pinaceae	<i>Pinus wallichiana</i>	Bluepine	55	10
	Pinaceae	<i>Pinus wallichiana</i>	Bluepine	54	10
	Pinaceae	<i>Pinus wallichiana</i>	Bluepine	43	9
	Pinaceae	<i>Pinus wallichiana</i>	Bluepine	55	10
	Cornaceae	<i>Benthamedia capitata</i>	Dogwood	30	7
	Fagaceae	<i>Quercus griffithii</i>	Oak	290	18
	Fagaceae	<i>Quercus griffithii</i>	Oak	220	17
	Fagaceae	<i>Quercus griffithii</i>	Oak	138	15
	Fagaceae	<i>Quercus griffithii</i>	Oak	235	15
	Fagaceae	<i>Quercus griffithii</i>	Oak	105	15
	Fagaceae	<i>Quercus griffithii</i>	Oak	125	15

1.2 Vegetation Assessment Protocol for Shrubs

Data sheet(Shrub Vegetation)

Plot Type(square): Shrub(20x20m)

SN	Family	Scientific name	Common name	DBH(cm)	Height(m)
1	Elaeagnaceae	<i>Elaeagnus parvifolia</i>	silverthorn	3	19
2	Theaceae	<i>Eurya acuminata</i>		2	10
3	Lauraceae	<i>Cinnamomum glanduliferum</i>	Cinnamon	2	1
4	Berberidaceae	<i>Berberis aristata</i>		2	4
5	Pinaceae	<i>Pinus wallichiana</i>	Bluepine	2	6

1.3 Data sheet (Herbs)

Plot type(square): Herb (2x
2m)

SN	Family name	Scientific name	Common name	Cover% or number
1	Asteraceae	<i>Eupatorium adenophorum</i>		9
2	<i>Bidens pilosa</i>	Compositae		4
3	Lamiaceae	<i>Salvia spp</i>		6

1.4 Other plants by Reece

SN	Family name	Scientific name	Common name	Type of plant
1	Oleaceae	<i>Fraxinus floribunda</i>		Tree
2	Orchidaceae	<i>Cephalanthera longifolia</i>		Orchid

1.1 Vegetation Assessment Protocol for Tree

Data sheet(Shrub Vegetation)

Plot Type(square): Shrub(20x20m)

Dzongkhag: Chukha

Altitude: 2049.1

Locality: Watsa

Aspect: West

Transect name:
below Slope%: 35
Forest canopy cover:
Plot no: 17 Open
North: 27.227985 Habitat type: CBLF
East: 89.517805

SN	Family name	Scientific name	Common name	DBH(cm)	Height(m)
1	Fagaceae	<i>Quercus griffithii</i>	Oak	187	8

- 1.2 Vegetation Assessment Protocol for Shrubs
Data sheet(Shrub Vegetation)
Plot Type(square): Shrub(20x20m)

SN	Family name	Scientific name	Common name	Ht(M)	number
1	Rosacea	<i>Rosa sericea</i>		2	20
2	Berberidaceae	<i>Berberis asiatica</i>		2	20
3	Oleaceae	<i>Ligustrum compactum</i>		1	3
4	Rutaceae	<i>Zanthoxylum armatum</i>		1	3

- 1.3 Data sheet (Herbs)

Plot type(square): Herb (2x 2m)

SN	Family name	Scientific name	Common name	Cover% or number
1	Asparagaceae	<i>Asparagus racemosus</i>		3
2	Rubiaceae	<i>Galium aparine</i>		5
3	Gramineae	<i>Imperata cylindrica</i>		20

- 1.4 Other Plants by RECEE

SN	Family name	Scientific name	Common name	Type of plant
1	Leguminosae	<i>Lespedeza juncea</i>		shrub
2	Elaeagnaceae	<i>Elaeagnus parvifolia</i>		shrub
3	Coriariaceae	<i>Coriaria napalensis</i>		shrub

1.1 Vegetation Assessment Protocol for Trees

Data sheet(Tree vegetation >1.3m)

Plot type (square): Trees (20x20)

Altitude:

Dzongkhag: Chukha

1975.7

Locality: Damchu

Aspect: 35%

Transect name: Below road

Slope%: Northwest

Plot no: 18

Canopy cover: partial shade

North: 27.262568333

Habitat type: CBLF

East: 89.528373333

SN	Family	Scientific name	Common name	DBH(cm)	Height(m)
1	Pinaceae	<i>Pinus wallichiana</i>		124	20
2	Adoxaceae	<i>Viburnum cylindricum</i>		20	6
3	Salicaceae	<i>Salix wallichiana</i>		65	5
4	Salicaceae	<i>Salix wallichiana</i>		45	3
5	Salicaceae	<i>Salix wallichiana</i>		58	4
6	Salicaceae	<i>Salix wallichiana</i>		62	4
7	Salicaceae	<i>Salix wallichiana</i>		48	3
8	Salicaceae	<i>Salix wallichiana</i>		41	7
9	Aceraceae	<i>Acer campbellii</i>		36	4
10	Aceraceae	<i>Acer campbellii</i>		34	4
11	Aceraceae	<i>Acer campbellii</i>		107	9
12	Aceraceae	<i>Acer campbellii</i>		8	5

1.2 Vegetation Assessment Protocol for Shrubs

Data sheet(Shrub Vegetation)

Plot Type(square): Shrub(20x20m)

3SN	Family name	Scientific name	Common name	DBH(cm)	Height(m)
1	Rutaceae	<i>Zanthoxylum armatum</i>		0.7	2

2	Caprifoliaceae	<i>Lonicera quinquelocularis</i>		3	7
3	Oleaceae	<i>Ligustrum compactum</i>		1	3
4	Pinaceae	<i>Pinus wallichiana</i>		3	3
5	Coriariaceae	<i>Coriaria nepalensis</i>		3	1
6	Rosaceae	<i>Rosa brunonii</i>		3	4
7	Aceraceae	<i>Acer oblongum</i>		1	1
8	Rosaceae	<i>Rosa sericea</i>		1	3

1.3 Data sheet (Herbs)

Plot type(square): Herb (2x 2m)

SN	Family name	Scientific name	Common name	Cover% or number
1	Plumbaginaceae	<i>Ceratostigma griffithii</i>		4
2	Asteraceae	<i>artemisia vulgaris</i>		3
3	Asteraceae	<i>Artemesia scoparia</i>		7

1.4 Other plants by Reccee

SN	Family name	Scientific name	Common name	Type of plant
	Luaraceae	<i>Cinnamomum glanduliferum</i>		Tree

1.1 Vegetation Assessment Protocol for Trees

Data sheet (Tree Vegetation > 1.3m)

Plot type(square): Trees (20 x 20 m)

Altitude: 1975.7

Dzongkhag: Chukha

m

Locality: Bunagu

Aspect: NE

Transect name: Below road

Slope%: 35

Plot no: 19

Canopy cover: partial shade

North: 27.131851667
East: 89.54199

abitat type: CBLF

SN	Family name	Scientific name	Common name	DBH(cm)	Height(m)
1	Fagaceae	<i>Quercus glauca</i>		87	15
2	Fagaceae	<i>Quercus glauca</i>		98	15
3	Fagaceae	<i>Quercus glauca</i>		355	20
4	Fagaceae	<i>Quercus glauca</i>		67	11
5	Fagaceae	<i>Quercus glauca</i>		95	20
6	Fagaceae	<i>Quercus glauca</i>		65	15
7	Betulaceae	<i>Carpinus vimenea</i>		27	9

1.2 Vegetation Assessment Protocol for Shrubs

Data sheet(Shrub Vegetation)
Plot Type(square): Shrub(20x20m)

SN	Family	Scientific name	Common name	ht(m)	Number
1	Myrsinaceae	<i>Ardisia macrocarpa</i>		0.5	10
2	Symplocaceae	<i>Symplocos ramosissima</i>		0.5	15
3	Thymelaeaceae	<i>Daphne bholua</i>		1	4
4	Gramineae	<i>Yushania spp</i>		2	20

1.3 Data sheet (Herbs)

Plot type(square): Herb (2x 2m)

SN	Family name	Scientific name	Common name	Cover% or number
1	Zingiberaceae	<i>Hedygium spicatum</i>		4
2	Convallariaceae	<i>Ophiopogon intermedius</i>		3
3	Gramineae	<i>Oplismenus histellus</i>		8

1.1 Data sheet (Tree Vegetation > 1.3m)

Plot type(square): Trees (20 x 20 m)

Dzongkhag: Chukha

Locality: Chanachen

Transect name: Near bridge

Plot no: 20

North: 27.227985

East: 89.517805

Altitude: 2049.1

Aspect: W

Slope%: 5

Canopy cover:partial shade

Habitat type: CBLF

SN	Family name	Scientific name	Common name	DBH(cm)	Height(m)
1	Fagaceae	<i>Quercus griffithii</i>	Oak	103	10
2	Fagaceae	<i>Quercus glauca</i>	Japanese Blue oak	64	9
3	Fagaceae	<i>Quercus glauca</i>	Japanese Blue oak	198	20
4	Fagaceae	<i>Quercus glauca</i>	Japanese Blue oak	66	15
5	Betulaceae	<i>Betula alnoides</i>	Himalayan birch	281	20
6	Betulaceae	<i>Carpinus viminea</i>	Himalayan hornbeam	79	15
7	Betulaceae	<i>Betula alnoides</i>	Himalayan birch	250	23
8	Betulaceae	<i>Betula alnoides</i>	Himalayan birch	220	20
9	Pinaceae	<i>Pinus wallichiana</i>	Bluepine	270	35
10	Betulaceae	<i>Betula alnoides</i>	Himalayan birch	218	18
11	Pinaceae	<i>Pinus wallichiana</i>	Bluepine	282	30

1.2 Vegetation Assessment Protocol for Shrubs

Data sheet(Shrub Vegetation)

Plot Type(square): Shrub(20x20m)

SN	Family	Scientific name	Common name	DBH(cm)	Height(m)
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1	Lauraceae	<i>Dodecadenia grandiflora</i>	Tailiya		
2	Lauraceae	<i>Persea spp</i>	Wild avacado		
3	Gramineae	<i>Yushania spp</i>	Bamboo		
4	Myrsinaceae	<i>Ardisia macrocarpa</i>	Himalayan coralberry		
5	Thymelaeaceae	<i>Daphne bholua</i>	Australian cheesewood		
6	Symplocaceae	<i>Symplocos ramosissima</i>	Lodh tree		
7	Theaceae	<i>Eurya acuminata</i>	Tapering leaf eurya		

1.3 Plot type(square): Herb (2x 2m)

SN	Family name	Scientific name	Common name	Cover% or number
1	Gramineae	<i>Optismenus histellus</i>		3
2	Convallariaceae	<i>Tupistra wattii</i>		7
3	Convallariaceae	<i>Ophiopogon intermedius</i>		4

1.1 Vegetation Assessment Protocol for Trees

Data sheet (Tree Vegetation > 1.3m)

Plot type(square): Trees (20 x 20 m)

Dzongkhag:

Chukha Altitude: 1956.6m

Locality:

Bunagu Aspect: NE

Transect name:

Below road Slope%: 10

Plot no: 21 Canopy cover: partial shade

North:

27.136941667 Habitat type: CBLF

East:
89.54355667

SN	Family name	Scientific name	Common name	DBH(cm)	Height(m)
1	Pinaceae	<i>Pinus wallichiana</i>	Bluepine	150	20
2	Fagaceae	<i>Quercus griffithii</i>	Oak	120	15
3	Ericaceae	<i>Rhododendron arboreum</i>		70	7
4	Ericaceae	<i>Lyonia ovalifolia</i>		70	7
5	Pinaceae	<i>Pinus wallichiana</i>	Bluepine	134	15
6	Ericaceae	<i>Lyonia ovalifolia</i>		54	7
7	Ericaceae	<i>Rhododendron arboreum</i>		52	6
8	Fagaceae	<i>Quercus lanata</i>		35	6
9	Pinaceae	<i>Pinus wallichiana</i>	Bluepine	146	20
10	Fagaceae	<i>Quercus lanata</i>	Ban oak	48	6
11	Fagaceae	<i>Quercus lanata</i>	Ban oak	84	7
12	Pinaceae	<i>Pinus wallichiana</i>	Bluepine	121	20
13	Fagaceae	<i>Quercus lanata</i>	Ban oak	114	7
14	Ericaceae	<i>Rhododendron arboreum</i>	Rhodo	103	7
15	Ericaceae	<i>Lyonia ovalifolia</i>		105	8
16	Ericaceae	<i>Lyonia ovalifolia</i>		28	5
17	Fagaceae	<i>Quercus lanata</i>	Ban oak	68	10
18	Schoepfiaceae	<i>Schoepfia jasminodora</i>		70	7

1.2 Vegetation Assessment Protocol for Shrubs

Data sheet(Shrub Vegetation)

Plot Type(square): Shrub(20x20m)

SN	Family	Scientific name	Common name	Ht	Number
1	Ericaceae	<i>Rhododendron maddenii</i>		2	20
2	Ericaceae	<i>Rhododendron arboreum</i>		1	5
3	Betulaceae	<i>Carpinus viminea</i>		1	5
4	Ericaceae	<i>Vaccinium vacciniaceum</i>		0.5	10

Epiphyte

SN	Family	Scientific name	Common name	Number
1	Orchidaceae	<i>Phalaenopsis taenialis</i>		10
2	Orchidaceae	<i>Bulbophyllum reptans</i>		1
3	Orchidaceae	<i>Bulbophyllum retusiusculum</i>		5

1.4 Data sheet (Herbs)

Plot type(square): Herb (2x 2m)

SN	Family name	Scientific name	Common name	Cover% or number
1	Cyperaceae	<i>Carax spp</i>		3

1.1 Vegetation Assessment Protocol for Trees

Data sheet (Tree Vegetation > 1.3m)

Plot type(square): Trees (20 x 20 m)

Dzongkhag: Chukha Altitude: 2793

Locality: Paga goenpa Aspect: west

Transect name: Below

goenpa Slope%: 5

Plot no: 22 Canopy cover: partial shade

North: 27.286031667 Habitat type:CBLF

East: 89.562053333

SN	Family name	Scientific name	Common name	DBH(cm)	Height(m)
1	Salicaceae	<i>Populus ciliata</i>		47	11
2	Salicaceae	<i>Populus ciliata</i>		94	14
3	Salicaceae	<i>Populus ciliata</i>		68	13
4	Salicaceae	<i>Populus ciliata</i>		85	13
5	Salicaceae	<i>Populus ciliata</i>		71	12
6	Salicaceae	<i>Populus ciliata</i>		84	16
7	Salicaceae	<i>Populus ciliata</i>		98	18
8	Pinaceae	<i>Pinus wallichiana</i>	Bluepine	105	19
9	Pinaceae	<i>Pinus wallichiana</i>	Bluepine	143	19

10	Pinaceae	<i>Pinus wallichiana</i>	Bluepine	54	7
11	Pinaceae	<i>Pinus wallichiana</i>	Bluepine	136	18
12	Pinaceae	<i>Pinus wallichiana</i>	Bluepine	145	19
13	Pinaceae	<i>Pinus wallichiana</i>	Bluepine	37	6

1.2 Vegetation Assessment Protocol for Shrubs

Data sheet(Shrub Vegetation)

Plot Type(square): Shrub(20x20m)

SN	Family	Scientific name	Common name	DBH(cm)	Height(m)
1	Buxaceae	<i>Sarcococca saligna</i>	Christmas Box	0.3	50
2	Scrophulariaceae	<i>Buddleja crispa</i>	Butterflybush	1.5	11
3	Celastraceae	<i>Euonymus tingens</i>		0.5	2
4	Rosaceae	<i>Rubus biflorus</i>		0.3	6
5	Labiatae	<i>Colquhounia coccinea</i>		1	3
6	Oleaceae	<i>Jasminum humile</i>		0.5	4
7	Rosaceae	<i>Principia utilis</i>		0.2	3
8	Elaeagnaceae	<i>Elaeagnus parvifolia</i>	Autumn Olive	1	4

1.3 Data sheet (Herbs)

Plot type(square): Herb (2x
2m)

SN	Family name	Scientific name	Common name	Cover% or number
1	Pteridaceae	<i>Onychium spp</i>		50
2	Rubiaceae	<i>Rubia manjith</i>		25
3	Rosaceae	<i>Rubus calycinus</i>		15
4	Ranunculaceae	<i>Clematis montana</i>		10

1.4 Regeneration

SN	Family name	Scientific name	Common name	Number
1	Pinaceae	<i>Pinus wallichiana</i>	Bluepine	18

1.1 Other Plants by RECEE

SN	Family name	Scientific name	Common name	Type of plant
1	Compositae	<i>Cissampelopsis cordifolia</i>		Climbing Shrub
2	Vitaceae	<i>Parthenocissus semicordata</i>		Climbing Shrub
3	Umbelliferae	<i>Selinum wallichianum</i>		Herb
4	Araliaceae	<i>Hedera nepalensis</i>		Climbing Shrub
5	Rosaceae	<i>Rosa brunonii</i>		Climbing Shrub
6	Ranunculaceae	<i>Clematis buchananiana</i>		Climbing Shrub
7	Lamiaceae	<i>Salvia spp</i>		Herb
8	Asteraceae	<i>Ligularia spp</i>		
6	Compositae	<i>Conyza bonariensis</i>		Herb
7	Compositae	<i>Conyza stricta</i>		Herb
8	Umbelliferae	<i>Angelica sikkimensis</i>		Herb

1.1 Data sheet (Tree Vegetation > 1.3m)

Plot type(square): Trees (20 x 20 m)

Dzongkhag: Chukha

Altitude: 2858.5

Locality: Shame Goenpa

Aspect:

Transect name: Near Goenpa

Northwest

Plot no: 23

Slope%: 10

North: 27.22141667

Canopy cover: partial shade

East: 89.54740833

Habitat type:CBLF

SN	Family	Scientific name	Common name	DBH(cm)	Height(m)
1	Pinaceae	<i>Pinus walllichiana</i>	Blue pine	85	13
2	Pinaceae	<i>Pinus walllichiana</i>	Blue pine	87	13
3	Pinaceae	<i>Pinus walllichiana</i>	Blue pine	75	13
4	Pinaceae	<i>Pinus walllichiana</i>	Blue pine	40	11
5	Pinaceae	<i>Pinus walllichiana</i>	Blue pine	165	18

6	Pinaceae	<i>Pinus wallichiana</i>	Blue pine	95	15
7	Pinaceae	<i>Tsuga dumosa</i>	Hemlock	65	7
8	Pinaceae	<i>Tsuga dumosa</i>	Hemlock	144	13
9	Pinaceae	<i>Picea spinulosa</i>	Spruce	60	12
10	Pinaceae	<i>Picea spinulosa</i>	Spruce	38	7
11	Symplocaceae	<i>Symplocos paniculata</i>	Sapphire berry	55	9
12	Fagaceae	<i>Quercus semecarpifolia</i>	Brown oak	45	5

1.2 Vegetation Assessment Protocol for Shrubs

Data sheet(Shrub

Vegetation)

Plot Type(square):

Shrub(20x20m)

SN	Family	Scientific name	Common name	DBH(cm)	Height(m)
1	Aquifoliaceae	<i>Ilex dipyrena</i>	Himalayan holly	1	3
2	Betulaceae	<i>Carpinus viminea</i>	Himalayan hornbeam	1	3
3	Rosaceae	<i>Rosa sericea</i>	Silky rose	2	8
4	Ericaceae	<i>Pieris formosa</i>	Taipei pieris	1	30
5	Symplocaceae	<i>Symplocos paniculata</i>	Sapphire berry	0.5	2
6	Rosaceae	<i>Cotoneaster spp</i>		1	3
7	Pinaceae	<i>Picea spinulosa</i>	Spruce	1	4
8	Adoxaceae	<i>Viburnum erubescens</i>	reddish viburnum	1.5	3
9	Hydrangeaceae	<i>Philadelphus spp</i>		1	1
10	Berberidaceae	<i>Berberis aristata</i>		1	3
11	Thymelaeaceae	<i>Daphne bholua</i>	Australian cheesewood	1	4
12	Ericaceae	<i>Rhododendron triflorum</i>		1	4
13	Ericaceae	<i>Rhododendron arboreum</i>		2	3
14	Pinaceae	<i>Tsuga dumosa</i>	Hemlock	1	11

1.3 Data sheet (Herbs)

Plot type(square): Herb (2x 2m)

SN	Family name	Scientific name	Common name	Cover% or number
1	Rosaceae	<i>Rubus calycinus</i>		7
2	Ericaceae	<i>Pyrola spp</i>		11

1.4 Other Plants by RECEE

SN	Family name	Scientific name	Common name	Type of plant
1	Rosaceae	<i>Sorbus microphylla</i>		Shrub
2	Betulaceae	<i>Corylus ferox</i>		Shrub
3	Asteraceae	<i>Senecio scandens</i>		Limbing herb
4	Ericaceae	<i>Enkianthus deflexus</i>		Shrub
5	Rosaceae	<i>Malus baccata</i>	Crap apple	Shub

1.1 Data sheet (Tree Vegetation > 1.3m)

Plot type(square): Trees (20 x 20 m)

Dzongkhag: Chukha Altitude: 1646

Locality: Wangkha Aspect: North

Transect name: above road Slope%: 15

Plot no: 24 Canopy cover: partial shade

North: 27.057935 Habitat type:CBLF

East: 89.555745

SN	Family	Scientific name	Common name	DBH(cm)	Height(m)
1	Betulaceae	<i>Carpinus viminea</i>		65	10
2	Fagaceae	<i>Quercus glauca</i>		66	10
3	Betulaceae	<i>Carpinus viminea</i>		34	8
4	Betulaceae	<i>Carpinus viminea</i>		28	7
5	Betulaceae	<i>Carpinus viminea</i>		34	8
6	Fagaceae	<i>Quercus glauca</i>		121	11

7	Betulaceae	<i>Carpinus viminea</i>		63	10
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1.2 Vegetation Assessment Protocol for Shrubs

Data sheet(Shrub Vegetation)

Plot Type(square): Shrub(20x20m)

SN	Family	Scientific name	Common name	DBH(cm)	Height(m)
1	Myrsinaceae	<i>Ardisia macrocarpa</i>		1	8
2	Poaceae	<i>Yushania maling</i>		2	50
3	Oleaceae	<i>Fraxinus floribunda</i>		1	4

1.3 Epiphyte

SN	Family	Scientific name	Common name	Number
1	Orchidaceae	<i>Agrostophyllum callosum</i>		2

1.4 Data sheet (Herbs)

Plot type(square): Herb (2x 2m)

SN	Family name	Scientific name	Common name	Cover% or number
1	Dryopteridaceae	<i>Polysticum spp</i>		3
2	Poaceae	<i>Ophiopogon</i>		4
3	Piperaceae	<i>Piper spp</i>		2

1.1 Data sheet (Tree Vegetation > 1.3m)

Plot type(square): Trees (20 x 20 m)

Dzongkhag:

Chukha Altitude: 2633.2

Locality: Lobnekha Aspect: south

Transect name:

Above school Slope%: 5

Plot no: 25 Canopy cover: open

North: 27.175115 Habitat type: Meadow
 East: 89.54522

SN	Family name	Scientific name	Common name	DBH(cm)	Height(m)
	No tree				

- 1.2 Vegetation Assessment Protocol for Shrubs
 Data sheet(Shrub Vegetation)
 Plot Type(square): Shrub(20x20m)

SN	Family	Scientific name	Common name	DBH(cm)	Height(m)
1	Rosaceae	<i>Cotoneaster microphyllus</i>		0.5	30
2	Pinaceae	<i>Pinus wallichiana</i>	Blue pine	0.5	18
3	Berberidaceae	<i>Berberis aristata</i>		0.5	15

- 1.3 Data sheet (Herbs)
 Plot type(square): Herb (2x 2m)

SN	Family name	Scientific name	Common name	Cover% or number
1	Dennstaedtiaceae	<i>Pteridium aquilinum</i>		10
2	Compositae	<i>Anaphalis nepalensis</i>		5
3	Rosaceae	<i>Potentilla peduncularis</i>		7

- 1.4 Other Plants by RECEE

SN	Family name	Scientific name	Common name	Type of plant
1	Caprifoliaceae	<i>Viburnum cylindricum</i>		shrub
2	Caprifoliaceae	<i>Viburnum mullaha</i>		shrub
3	Philadelphaceae	<i>Philadelphus tomentosus</i>		shrub
4	Rosaceae	<i>Spiraea spp</i>		

5	Ericaceae	<i>Rhododendron maddenii</i>		shrub
6	Cornaceae	<i>Benthamedia capitata</i>		shrub
7	Rosaceae	<i>Prinsepia utilis</i>		shrub
8	Hypericaceae	<i>Hypericum spp</i>		shrub

1.1 Data sheet (Tree Vegetation > 1.3m)

Plot type(square): Trees (20 x 20 m)

Dzongkhag: Chukha Altitude: 2509.3

Locality: Nyakha Aspect: 10%

Transect name:

Above road Slope%: Southwest

Plot no: 26 Canopy cover,: partial shade

North:

27.147836667 Habitat type: CBLF

East: 89.51308500

SN	Family	Scientific name	Common name	DBH(cm)	Height(m)
1	Fagaceae	<i>Lithocarpus elegans</i>	Spike oak	156	18
2	Fagaceae	<i>Lithocarpus fenestratus</i>	Stone oak	293	20
3	Theaceae	<i>Eurya acuminata</i>	Tapering leaf eurya	115	10
4	Theaceae	<i>Eurya acuminata</i>	Tapering leaf eurya	75	9
5	Pinaceae	<i>Tsuga dumosa</i>	Hemlock	289	25
6	Pinaceae	<i>Tsuga dumosa</i>	Hemlock	520	30
7	Aceraceae	<i>Acer campbellii</i>	Himalayan Maple	220	15
8	Rosaceae	<i>Prunus nepalensis</i>	wild cherry	255	13
9	Lauraceae	<i>Dodecadenia grandiflora</i>	Tailiya	174	10

10	Symplocaceae	<i>Symplocos sumuntia</i>	Shan fan	65	10
11	Salicaceae	<i>Populus ciliata</i>	Himalayan poplar	521	25
12	Lauraceae	<i>Cinnamomum glanduliferum</i>	Cinnamon tree	95	8

1.2 Vegetation Assessment Protocol for Shrubs

Data sheet(Shrub Vegetation)

Plot Type(square): Shrub(20x20m)

SN	Family	Scientific name	Common name	DBH(cm)	Height(m)
1	Poaceae	<i>Yushania spp</i>	Bamboo	4	100
2	Smilacaceae	<i>Smilax spp</i>		0.3	5
3	Buxaceae	<i>Sarcococca saligna</i>	Christmas box	0.5	100
4	Aceraceae	<i>Acer campbellii</i>	Himalayan Maple	2	2
5	Adoxaceae	<i>Viburnum erubescens</i>	reddish viburnum	2	12
6	Thymelaeaceae	<i>Daphne bholua</i>	Australian cheesewood	1	13
7	Berberidaceae	<i>Mahonia napalensis</i>	Nepal barberry	0.5	4
8	Aquifoliaceae	<i>Ilex dipyrena</i>	Himalayan holly	2	2
9	Berberidaceae	<i>Berberis spp</i>		4	2

1.3

Data sheet (Herbs)

Plot type(square): Herb (2x 2m)

SN	Family name	Scientific name	Common name	Cover% or number
1	Rosaceae	<i>Rubus calycinus</i>		6
2	Urticaceae	<i>Elatostema spp</i>		10

1.1 Vegetation Assessment Protocol for Trees

Data sheet (Tree Vegetation > 1.3m)

Plot type(square): Trees (20 x 20 m)

Dzongkhag: Chukha Altitude: 2042.9
 Locality: Damchu Aspect: South
 Transect name: above
 road Slope%: 15
 Plot no: 27 Canopy cover: open
 North: 27.24179 Habitat type: Shrub
 East: 89.524695

SN	Family name	Scientific name	Common name	DBH(cm)	Height(m)
1	Anacardiaceae	<i>Rhus spp</i>		55	6
2	Anacardiaceae	<i>Rhus spp</i>		32	5
3	Fagaceae	<i>Quercus lanata</i>	Ban oak	93	5
4	Fagaceae	<i>Quercus lanata</i>	Ban oak	134	7
5	Rutaceae	<i>Zanthoxylum armatum</i>		32	5
6	Rutaceae	<i>Zanthoxylum armatum</i>		23	4
7	Rutaceae	<i>Zanthoxylum armatum</i>	Prickly ash tree	24	4

1.2 Vegetation Assessment Protocol for Shrubs

Data sheet(Shrub Vegetation)

Plot Type(square): Shrub(20x20m)

SN	Family	Scientific name	Common name	DBH(cm)	Height(m)
1	Caprifoliaceae	<i>Lonicera quinquelocularis</i>	Honey suckle	2	9
2	Berberidaceae	<i>Berberis aristata</i>		2	7
3	Rosaceae	<i>Cotoneaster spp</i>		3	5
4	Rosaceae	<i>Rosa sericea</i>		1	6

1.3 Data sheet (Herbs)

Plot type(square): Herb (2x 2m)

SN	Family name	Scientific name	Common name	Cover% or number
1	Crassulaceae	<i>Sedum griffithii</i>		6
2	Cyperaceae	<i>Carex spp</i>		4
3	Orobanchaceae	<i>Pterygiella tenuisecta</i>		3

1.4 Other Plants by RECEE

SN	Family name	Scientific name	Common name	Type of plant
1	Compositae	<i>Bidens pilosa</i>		Herb
2	Compositae	<i>Tagetes minuta</i>		Herb
3	Cannabaceae	<i>Cannabis sativa</i>		Herb
4	Solanaceae	<i>Datura stramonium</i>		Herb
5	Meliaceae	<i>Melia azedarach</i>		Tree
6	Polygonaceae	<i>Aconogonon molle</i>		Shrub
7	Amaranthaceae	<i>Chenopodium spp</i>		Herb

1.1 Vegetation Assessment Protocol for Trees

Data sheet (Tree Vegetation > 1.3m)

Plot type(square): Trees (20 x 20 m)

Dzongkhag: Paro Altitude: 2308.4m

Locality: Wanakha Aspect: East

Transect name: Below

road Slope%: 15

Plot no: 28 Canopy cove: open

North: 27.215698333 Habitat type: Shrub

East: 89.509630000

SN	Family	Scientific name	Common name	DBH(cm)	Height(m)
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1	Fagaceae	<i>Quercus lanata</i>	Ban oak	65	3
2	Fagaceae	<i>Quercus lanata</i>	Ban oak	20	2
3	Fagaceae	<i>Quercus lanata</i>	Ban oak	120	4
4	Fagaceae	<i>Quercus semecarpifolia</i>		85	5
5	Fagaceae	<i>Quercus semecarpifolia</i>		43	2
6	Fagaceae	<i>Quercus lanata</i>	Ban oak	156	5
7	Fagaceae	<i>Quercus lanata</i>	Ban oak	40	3
8	Fagaceae	<i>Quercus lanata</i>	Ban oak	45	3

1.2 Vegetation Assessment Protocol for Shrubs

Data sheet(Shrub Vegetation)

Plot Type(square): Shrub(20x20m)

SN	Family	Scientific name	Common name	DBH(cm)	Height(m)
1	Ericaceae	<i>Rhododendron maddenii</i>		1	7
2	Rosaceae	<i>Malus baccata</i>		1	1
3	Rosaceae	<i>Rosa brunonii</i>		2	1
4	Pinaceae	<i>Pinus wallichiana</i>		2	6
5	Fagaceae	<i>Quercus semicarpifolia</i>		2	7
6	Fagaceae	<i>Quercus lanata</i>	Ban oak	1	10
7	Theaceae	<i>Eurya acuminata</i>		2	15

1.3 Data sheet (Herbs)

Plot type(square): Herb (2x 2m)

SN	Family name	Scientific name	Common name	Cover% or number
1	Poaceae	<i>Carex spp</i>		3

1.4 Other Plants by RECEE

SN	Family name	Scientific name	Common name	Type of plant
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1	Saxifragaceae	<i>Bergenia ciliata</i>		Herb
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1.1 Vegetation Assessment Protocol for Trees

Data sheet (Tree Vegetation > 1.3m)

Plot type(square): Trees (20 x 20 m)

Dzongkhag: Chukha Altitude: 2117.9

Locality: Chanachen Aspect: East

Transect name: NRQ 1

& 2 Slope%: 15

Plot no: 29 Canopy cover: partial shade

North: 27.125251667 Habitat type: CBLF

East: 89.533115

SN	Family name	Scientific name	Common name	DBH(cm)	Height(m)
1	Salicaceae	<i>Populus ciliata</i>	Himalayan poplar	114	25
2	Lauraceae	<i>Persea spp</i>		45	10
3	Fagaceae	<i>Quercus glauca</i>		70	15
4	Lauraceae	<i>Persea spp</i>		30	12
5	Salicaceae	<i>Populus ciliata</i>	Himalayan poplar	80	20
6	Lauraceae	<i>Persea spp</i>		12	7
7	Symplocaceae	<i>Symplocos sumantia</i>		12	7

1.2 Vegetation Assessment Protocol for Shrubs

Data sheet(Shrub Vegetation)

Plot Type(square): Shrub(20x20m)

SN	Family	Scientific name	Common name	Ht(M)	Number
1	Gramineae	<i>Chimonobambusa callosa</i>		2	100
2	Thymelaeaceae	<i>Daphne spp</i>		0.5	2
3	Myrsinaceae	<i>Ardisia macrocarpa</i>		0.5	4

1.3 Data sheet (Herbs)

Plot type(square): Herb (2x 2m)

SN	Family name	Scientific name	Common name	Cover% or number
1	Compositae	<i>Adenostemma lavenia</i>		3
2	Rubiaceae	<i>Rubia manjith</i>		2
3	Poaceae	<i>Carax spp</i>		3

1.1 Vegetation Assessment Protocol for Trees

Data sheet (Tree Vegetation > 1.3m)

Plot type(square): Trees (20 x 20 m)

Dzongkhag: Chukha Altitude: 2093.5

Locality: Dam area Aspect: South

Transect name: MD-2 Slope%: 12

Canopy cover:

Plot no: 30 partial shade

North: 27.117151667 Habitat type: CBLF

East: 89.531488333

SN	Family name	Scientific name	Common name	DBH(cm)	Height(m)
1	Symplocaceae	<i>Symplocus sumantia</i>		43	15
2	Symplocaceae	<i>Symplocus sumantia</i>		41	11
3	Symplocaceae	<i>Symplocus sumantia</i>		26	10
4	Symplocaceae	<i>Symplocus sumantia</i>		32	10
5	Fagaceae	<i>Quercus glauca</i>		95	25
6	Fagaceae	<i>Quercus glauca</i>		50	16
7	Lauraceae	<i>Persea spp</i>		12	6
8	Symplocaceae	<i>Symplocos ramosissima</i>		16	7
9	Lauraceae	<i>Persea spp</i>		45	15

1.2 Vegetation Assessment Protocol for Shrubs

Data sheet(Shrub Vegetation)

Plot Type(square): Shrub(20x20m)

SN	Family	Scientific name	Common name	Ht(m)	Number
1	Symplocaceae	<i>Symplocus sumantia</i>		3	7
2	Caprifoliaceae	<i>Viburnum erubescens</i>		2	7
3	Berberidaceae	<i>Berberis spp</i>		1	6
4	Theaceae	<i>Eurya acuminata</i>		1	10
5	Berberidaceae	<i>Mahonia nepalensis</i>		1	8
6	Elaeagnaceae	<i>Elaeagnus parvifolia</i>		1	4
7	Theaceae	<i>Eurya acuminata</i>		1	10
8	Myrsinaceae	<i>Ardisia macrocarpa</i>		0.5	6
9	Thymelaeaceae	<i>Daphne bholua</i>		1	8

1.3 Epiphyte

SN	Family	Scientific name	Number
1	Orchidaceae	<i>Eria coronaria</i>	3 clusters
2	Ericaceae	<i>Agapetes serpens</i>	1
3	Orchidaceae	<i>liparis bootanensis</i>	2 clusters

1.4 Data sheet (Herbs)

Plot type(square): Herb (2x
2m)

SN	Family name	Scientific name	Common name	Cover% or number
1	Pteridaceae	<i>Onychium spp</i>		2
2	Pteridaceae	<i>Coniogramme pubescens</i>		4
3	Orchidaceae	<i>Calanthe spp</i>		6

1.5 Other Plants by RECEE

SN	Family name	Scientific name	Common name	Type of plant
1	Orchidaceae	<i>Cymbidium erythraeum</i>		Orchid
2	Gentianaceae	<i>Swertia bimaculata</i>		Herb
3	Geraniaceae	<i>Geranium nepalense</i>		Herb
4	Lardizabalaceae	<i>Holboellia latifolia</i>		Climber

5	Polygonaceae	<i>Aconogonon molle</i>		Shrub
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1.1 Vegetation Assessment Protocol for Trees

Data sheet (Tree Vegetation >
1.3m)

Plot type(square): Trees (20 x 20
m)

Dzongkhag: Chukha

Altitude: 2164.3 m

Locality:

Bunakha

Aspect: South

Transect

name: (Above Lhakhang)

Slope%: 5

Plot no: 31

Canopy cover: partial shade

North: 27.147238333

Habitat type:

East: 89.544001667

SN	Family	Scientific name	Common name	DBH(cm)	Height(m)
1	Pinaceae	<i>Pinus wallichiana</i>	Blue pine	45	15
2	Pinaceae	<i>Pinus wallichiana</i>	Blue pine	45	15
3	Pinaceae	<i>Pinus wallichiana</i>	Blue pine	45	15
4	Fagaceae	<i>Quercus lanata</i>		35	7
5	Fagaceae	<i>Quercus lanata</i>		15	5
6	Fagaceae	<i>Quercus lanata</i>		15	5
7	Ericaceae	<i>Lyonia ovalifolia</i>		15	5
8	Ericaceae	<i>Lyonia ovalifolia</i>		25	5
9	Fagaceae	<i>Quercus lanata</i>		40	10
10	Ericaceae	<i>Rhododendron arboreum</i>		12	5

1.2 Vegetation Assessment Protocol for Shrubs

Data sheet(Shrub Vegetation)

Plot Type(square): Shrub(20x20m)

SN	Family	Scientific name	Common name	DBH(cm)	Height(m)
1	Lauraceae	<i>Cinnamomum glanduliferum</i>	Cinnamon tree	0.5	1
2	Aquifoliaceae	<i>Ilex dipyrena</i>		0.5	1
3	Ericaceae	<i>Lyonia ovalifolia</i>		1	15
4	Symplocaceae	<i>Symplocos paniculata</i>		0.5	1
5	Theaceae	<i>Eurya acuminata</i>		0.5	3
6	Smilacaceae	<i>Smilax spp</i>		0.5	5
7	Hamamelidaceae	<i>Corylopsis himalayana</i>		1	1
8	Thymelaeaceae	<i>Daphne bholua</i>		0.5	1

1.3 Epiphyte

SN	Family	Scientific name	Number
1	Orchidaceae	<i>Phalaenopsis taenialis</i>	1

1.4 Data sheet (Herbs)

Plot type(square): Herb (2x 2m)

SN	Family name	Scientific name	Common name	Cover% or number
1	Poaceae	<i>Oplismenus hirtellus</i>	Basket grass	4
2	Lycopodiaceae	<i>Lycopodium clavatum</i>	Stag's horn club moss	2
3	Zingibaraceae	<i>Hedychium spp</i>		3

1.1 Vegetation Assessment Protocol for Trees

Data sheet (Tree Vegetation > 1.3m)

Plot type(square): Trees (20 x 20 m)

Dzongkhag: Chukha

Altitude: 2194.2 m

Locality: Bunakha

Aspect:SW

Transect name: Client office

Slope%: 7

Plot no: 32

Canopy cover: partial shade

North: 27.148668333

Habitat type: CBLF

East: 89.543636667

SN	Family	Scientific name	Common name	DBH(cm)	Height(m)
1	Ericaceae	<i>Rhododendron arboreum</i>		15	7
2	Ericaceae	<i>Rhododendron arboreum</i>		15	7
3	Ericaceae	<i>Rhododendron arboreum</i>		15	7
4	Ericaceae	<i>Rhododendron arboreum</i>		15	7
5	Ericaceae	<i>Rhododendron arboreum</i>		15	7
6	Ericaceae	<i>Rhododendron arboreum</i>		15	7
7	Ericaceae	<i>Lyonia ovalifolia</i>		14	7
8	Ericaceae	<i>Lyonia ovalifolia</i>		14	7
9	Ericaceae	<i>Lyonia ovalifolia</i>		14	7
10	Fagaceae	<i>Quercus lanata</i>		35	10
11	Fagaceae	<i>Quercus lanata</i>		35	10
12	Fagaceae	<i>Quercus lanata</i>		35	10
13	Fagaceae	<i>Quercus lanata</i>		35	10
14	Fagaceae	<i>Quercus lanata</i>		35	10
15	Ericaceae	<i>Lyonia ovalifolia</i>		60	10
16	Ericaceae	<i>Lyonia ovalifolia</i>		60	10
17	Ericaceae	<i>Lyonia ovalifolia</i>		60	10
18	Ericaceae	<i>Lyonia ovalifolia</i>		60	10
19	Pinaceae	<i>Pinus wallichiana</i>		45	15
20	Pinaceae	<i>Pinus wallichiana</i>		45	15
21	Pinaceae	<i>Pinus wallichiana</i>		45	15

1.2 Vegetation Assessment Protocol for Shrubs
Data sheet(Shrub Vegetation)

Plot Type(square): Shrub(20x20m)

SN	Family	Scientific name	Common name	Ht(m)	Number
1	Ericaceae	<i>Enkianthus deflexus</i>		3	20
2	Ericaceae	<i>Rhododendron maddenii</i>		2	20
3	Berberidaceae	<i>Berberis spp</i>		1	5
4	Caprifoliaceae	<i>Viburnum cylindricum</i>		2	10
5	Theaceae	<i>Eurya acuminata</i>		3	15
6	Olacaceae	<i>Schoepfia jasminodora</i>		2	1
7	Smilacaceae	<i>Smilax spp</i>		0.5	7

1.3 Epiphyte

SN	Family	Scientific name	Number
1	Orchidaceae	<i>liparis bootanensis</i>	1 cluster
2	Orchidaceae	<i>Bulbophyllum retusiusculum</i>	3 clusters
3	Dryopteridaceae	<i>Drynaria propinqua</i>	10 clusters

1.4 Data sheet (Herbs)

Plot type(square): Herb (2x 2m)

SN	Family name	Scientific name	Common name	Cover% or number
1	Compositae	<i>Ainsliaea aptera</i>		3
2	Poaceae	<i>Carex spp</i>		2

1.1 Vegetation Assessment Protocol for Trees

Data sheet (Tree Vegetation > 1.3m)

Plot type(square): Trees (20 x 20 m)

Dzongkhag: Altitude: 1963.6

Chukha m

Locality: Bunagu Aspect: SW
 Transect name:
 New PC client
 camp 1 below
 hotel Slope%: 5
 Plot no: 33 Canopy cover: Partial shade
 North: Habitat type:
 27.144223333 CBLF
 East: 89.537515

SN	Family	Scientific name	Common name	DBH(cm)	Height(m)
1	Fagaceae	<i>Quercus lanata</i>		115	20
2	Fagaceae	<i>Quercus lanata</i>		110	20
3	Fagaceae	<i>Quercus lanata</i>		65	15
4	Fagaceae	<i>Quercus lanata</i>		60	15
5	Fagaceae	<i>Quercus lanata</i>		60	15
6	Fagaceae	<i>Quercus lanata</i>		20	13
7	Fagaceae	<i>Quercus lanata</i>		15	10
8	Fagaceae	<i>Quercus lanata</i>		110	20
9	Fagaceae	<i>Quercus lanata</i>		35	15
10	Fagaceae	<i>Quercus lanata</i>		30	10

1.2 Vegetation Assessment Protocol for Shrubs

SN	Family	Scientific name	Common name	Ht(m)	number
1	Theaceae	<i>Eurya acuminata</i>		2	30
2	Ericaceae	<i>Rhododendron maddenii</i>		3	1
3	Ericaceae	<i>Lyonia ovalifolia</i>		2	3
4	Berberidaceae	<i>Berberis spp</i>		1	5
5	Ericaceae	<i>Rhododendron arboreum</i>		1	1

1.3 Data sheet (Herbs)

Plot type(square): Herb (2x 2m)

SN	Family name	Scientific name	Common name	Cover% or number
1	Poaceae	Carax spp		6

1.1 Vegetation Assessment Protocol for Trees

Data sheet (Tree Vegetation > 1.3m)

Plot type(square): Trees (20 x 20 m)

Dzongkhag:

Chukha Altitude: 2023.300 m

Locality: Bunakha Aspect:: S

Transect name:

Above road Slope%: 5

Plot no: 34 Canopy cover: partial
shade

North:

27.143325000 Habitat type: CBLF

East: 89.541656667

SN	Family	Scientific name	Common name	Height(m)
1	Fagaceae	<i>Quercus lanata</i>		15
2	Fagaceae	<i>Quercus lanata</i>		12
3	Fagaceae	<i>Quercus lanata</i>		10
4	Fagaceae	<i>Quercus lanata</i>		10
5	Fagaceae	<i>Quercus griffithii</i>		15
6	Fagaceae	<i>Quercus griffithii</i>		15
7	Fagaceae	<i>Quercus griffithii</i>		10
8	Fagaceae	<i>Quercus griffithii</i>		10
9	Fagaceae	<i>Quercus griffithii</i>		10
10	Ericaceae	<i>Rhododendron arboreum</i>		10
11	Symplocaceae	<i>Symplocos sumuntia</i>		10

1..2 Vegetation Assessment Protocol for Shrubs

SN	Family	Scientific name	Common name	Height(m)	Number
1	Caprifoliaceae	<i>Viburnum cylindricum</i>		1	15
2	Caprifoliaceae	<i>Viburnum erubescens</i>		1	3
3	Theaceae	<i>Eurya acuminata</i>		2	4
4	Thymelaeaceae	<i>Daphne bholua</i>		1	7
5	Myrsinaceae	<i>Ardisia macrocarpa</i>		0.5	10
6	Hamamelidaceae	<i>Corylopsis himalayana</i>		2	4
7	Ericaceae	<i>Rhododendron maddenii</i>		2	10
8	Ericaceae	<i>Lyonia ovalifolia</i>		1	3
9	Berberidaceae	<i>Berberis spp</i>		1	6

1.3 Data sheet (Herbs)

Plot type(square): Herb (2x 2m)

SN	Family name	Scientific name	Common name	Cover% or number
1	Zingiberaceae	<i>Roscoea spp</i>		3
2	Compositae	<i>Ainsliaea aptera</i>		2
3	Compositae	<i>Anaphalis margaritacea</i>		2

1.1 Vegetation Assessment Protocol for Trees

Data sheet (Tree Vegetation > 1.3m)

Plot type(square): Trees (20 x 20 m)

Dzongkhag: Chukha Altitude: 2035.1

Locality: Bunagu Aspect: west

Transect name: CCF

Cluster below road Slope%: 10

Plot no: 35 Canopy cover: partial shade

North: 27.138785 Habitat type: CBLF

East: 89.543241667

SN	Family name	Scientific name	Common name	DBH(cm)	Height(m)
1	Fagaceae	<i>Quercus lanata</i>		40	15
2	Fagaceae	<i>Quercus lanata</i>		115	20
3	Betulaceae	<i>Alnus nepalensis</i>		65	17
4	Betulaceae	<i>Alnus nepalensis</i>		65	17
5	Betulaceae	<i>Alnus nepalensis</i>		40	12
6	Betulaceae	<i>Alnus nepalensis</i>		15	10
7	Fagaceae	<i>Quercus griffithii</i>		35	7
8	Ericaceae	<i>Lyonia ovalifolia</i>		13	5
9	Ericaceae	<i>Lyonia ovalifolia</i>		13	5

1.2 Vegetation Assessment Protocol for Shrubs

Data sheet(Shrub Vegetation)

Plot Type(square): Shrub(20x20m)

SN	Family	Scientific name	Common name	Ht(M)	Number
1	Symplocaceae	<i>Symplocos sumantia</i>		2	10
2	Hamamelidaceae	<i>Corylopsis himalayana</i>		5	15
3	Thymelaeaceae	<i>Daphne bholua</i>		0.5	3
4	Berberidaceae	<i>Berberis spp</i>		1	5
5	Caprifoliaceae	<i>Viburnum erubescens</i>		1	5
6	Myrsinaceae	<i>Ardisia macrocarpa</i>		0.2	10

1.3 Epiphyte

SN	Family	Scientific name	Common name	Number
1	Dryopteridaceae	<i>Drynaria propinqua</i>		5
2	Orchidaceae	<i>Phalaenopsis taenialis</i>		2

1.4 Data sheet (Herbs)

SN	Family name	Scientific name	Common name	Cover% or number
1	Poaceae	<i>Oplismenus hirtellus</i>	Basket grass	6
2	Zingiberaceae	<i>Hedychium spicatum</i>		3
3	Convallariaceae	<i>Ophiopogon spp</i>		2

1.1 Vegetation Assessment Protocol for Trees

Data sheet (Tree Vegetation > 1.3m)

Plot type(square): Trees (20 x 20 m)

Dzongkhag: Chukha

Altitude: 2004.7

Locality: Chanachen

Aspect: East

Transect name: Stock pile 1 &

2

Slope%: 10

Canopy cover: Partial shade

Plot no: 36

North: 27.129763333

Habitat type: CBLF

East: 89.535958333

SN	Family name	Scientific name	Common name	DBH(cm)	Height(m)
1	Lauraceae	<i>Cinnamomum glanduliferum</i>	Cinnamon tree	45	15
2	Fagaceae	<i>Quercus glauca</i>		50	16
3	Fagaceae	<i>Quercus glauca</i>		31	15
4	Fagaceae	<i>Quercus griffithii</i>		51	15
5	Rutaceae	<i>Rhus spp</i>		37	15
6	Rutaceae	<i>Tetradium fraxinifolium</i>		12	10
7	Rutaceae	<i>Tetradium fraxinifolium</i>		12	10
8	Fagaceae	<i>Quercus griffithii</i>		75	15

9	Betulaceae	Betula alnoides		30	12
10	Magnoliaceae	Michelia doltsopa		14	11
11	Symplocaceae	Symplocos ramosissima		15	7

1.2 Vegetation Assessment Protocol for Shrubs

SN	Family	Scientific name	Common name	ht(m)	number
1	Symplocaceae	Symplocos ramosissima		1	60
2	Symplocaceae	Symplocos sumantia		1	4
3	Caprifoliaceae	Viburnum erubescens		2	30
4	Thymelaeaceae	Daphne bholua		1	4
5	Theaceae	Eurya acuminata		1	4

1.3 Epiphyte

SN	Family	Scientific name	Common name	Number
1	Dryopteridaceae	Drynaria propinqua		2
2	Ericaceae	Agapetes serpens		1

1.4 Data sheet (Herbs)

Plot type(square): Herb (2x 2m)

SN	Family name	Scientific name	Common name	Cover% or number
1	Compositae	Adenostemma lavenia		10
2	Compositae	Bidens pilosa		10
3	Zingiberaceae	Hedychium spicatum		10
4	Compositae	Crassocephalum crepidioides		10
	Polygonaceae	Fagopyrum dibotrys	Herb	

1.1 Vegetation Assessment Protocol for Trees

Data sheet (Tree Vegetation > 1.3m)
 Plot type(square): Trees (20 x 20 m)

Dzongkhag: Chukha Altitude: 1952.4
 Locality: Bunakha Aspect: NW
 Transect name: HM
 store Slope% 35:
 Plot no: 37 Canopy cover: partial shade
 North:27.12483333 Habitat type: CBLF
 East: 89.541148333

SN	Family name	Scientific name	Common name	DBH(cm)	Height(m)
1	Betulaceae	<i>Alnus nepalensis</i>		20	15
2	Betulaceae	<i>Alnus nepalensis</i>		12	15
3	Betulaceae	<i>Alnus nepalensis</i>		25	15
4	Betulaceae	<i>Alnus nepalensis</i>		15	15
5	Betulaceae	<i>Alnus nepalensis</i>		20	15
6	Betulaceae	<i>Alnus nepalensis</i>		30	15
7	Betulaceae	<i>Alnus nepalensis</i>		40	15
8	Betulaceae	<i>Alnus nepalensis</i>		45	15
9	Betulaceae	<i>Alnus nepalensis</i>		15	15
10	Betulaceae	<i>Alnus nepalensis</i>		25	15

1.2 Vegetation Assessment Protocol for Shrubs

Data sheet(Shrub Vegetation)
 Plot Type(square): Shrub(20x20m)

SN	Family	Scientific name	Common name	Height(m)	Number
1	Gramineae	<i>Yushania maling</i>		2	15
2	Polygonaceae	<i>Aconogonon molle</i>		3	5

1.3 Data sheet (Herbs)

Plot type(square): Herb (2x 2m)

SN	Family name	Scientific name	Common name	Cover% or number
1	Urticaceae	<i>Pilea spp</i>		6
2	Urticaceae	<i>Elatostema lineolatum</i>		8
3	Urticaceae	<i>Lecanthus peduncularis</i>		5
4	Oxalidaceae	<i>Oxalis corniculata</i>		3
4	Polygonaceae	<i>Fagopyrum dibotrys</i>		Herb

1.1 Vegetation Assessment Protocol for Trees

Data sheet (Tree Vegetation > 1.3m)

Plot type(square): Trees (20 x 20 m)

Altitude: 1841.7

Dzongkhag:

Chukha Aspect: west

Locality:

Chanachen

junction Slope%: 25

Transect name:

Explosive

Magazine Canopy cover: partial shade

Plot no: 38 Habitat type:CBLF

North: 27.119335

East: 89.538055

SN	Family name	Scientific name	Common name	DBH(cm)	Height(m)
1	Lauraceae	<i>Persea spp</i>		50	17
2	Lauraceae	<i>Persea spp</i>		55	20

3	Rutaceae	<i>Tetradium fraxinifolium</i>		35	12
4	Rutaceae	<i>Rhus spp</i>		30	10
5	Symplocaceae	<i>Symplocos ramosissima</i>		12	5
6	Symplocaceae	<i>Symplocos ramosissima</i>		12	5

1.2 Vegetation Assessment Protocol for Shrubs

Data sheet(Shrub Vegetation)

Plot Type(square): Shrub(20x20m)

SN	Family	Scientific name	Common name	HT(M)	Number
1	Theaceae	<i>Eurya acuminata</i>		0.5	10
2	Gramineae	<i>Chimonobambusa callosa</i>		2	100

1.3 Data sheet (Herbs)

Plot type(square): Herb (2x 2m)

SN	Family name	Scientific name	Common name	Cover% or number
1	Pteridaceae	<i>Coniogramme pubescens</i>		3
2	Dryopteridaceae	<i>Polystichum spp</i>		2
3	Orchidaceae	<i>Calanthe spp</i>		1
4	Zingibaraceae	<i>Hedychium spp</i>		4

1.1 Vegetation Assessment Protocol for Trees

Data sheet (Tree Vegetation > 1.3m)

Plot type(square): Trees (20 x 20 m)

Dzongkhag: Chukha Altitude: 1892.6

Locality: Below

Tshimasham Aspect:W

Transect name: MD 4 Slope%: 35

Plot no: 39 Canopy cover: partial shade, close

North: 27.096495 Habitat type: CBLF

East: 89.52731000

SN	Family	Scientific name	Common name	DBH(cm)	Height(m)
1	Lauraceae	<i>Persea spp</i>		45	12
2	Magnoliaceae	<i>Michelia doltsopa</i>		60	17
3	Magnoliaceae	<i>Michelia doltsopa</i>		35	15
4	Fagaceae	<i>Quercus lamellosa</i>	Bull oak	110	20
5	Symplocaceae	<i>Symplocus sumantia</i>		21	7
6	Symplocaceae	<i>Symplocus sumantia</i>		35	8
7	Symplocaceae	<i>Symplocus sumantia</i>		45	12
8	Fagaceae	<i>Castanopsis spp</i>		40	20

1.2 Vegetation Assessment Protocol for Shrubs

Data sheet(Shrub Vegetation)

Plot Type(square): Shrub(20x20m)

SN	Family	Scientific name	Common name	Ht(M)	Number
1	Symplocaceae	<i>Symplocus sumantia</i>		2	5
2	Symplocaceae	<i>Symplocos ramosissima</i>		2	3
3	Rutaceae	<i>Zanthoxylum armatum</i>		2	1
4	Araliaceae	<i>Brassaiopsis hainla</i>		3	2
5	Gramineae	<i>Chimonobambusa callosa</i>		2	50
6	Araliaceae	<i>Hedera nepalensis</i>		4	1
7	Rosaceae	<i>Rubus acuminatus</i>		5	1

1.3 Data sheet (Herbs)

Plot type(square): Herb (2x 2m)

SN	Family name	Scientific name	Common name	Cover% or number
1	Urticaceae	<i>Elatostema spp</i>		2
2	Urticaceae	<i>Girardinia diversifolia</i>		1

3	Urticaceae	<i>Pilea spp</i>		5
4	Acanthaceae	<i>Strobilanthes spp</i>		10

1.4 Other Plants by RECEE

SN	Family name	Scientific name	Common name	Type of plant
1	Elaeocarpaceae	<i>Sloanea tomentosa</i>		Tree
2	Urticaceae	<i>Boehmeria cylindrica</i>	False nettle	Shrub
3	Urticaceae	<i>Zanthoxylum asiaticum</i>		Climber
4	Urticaceae	<i>Lecanthus peduncularis</i>		Herb
5	Polygonaceae	<i>Aconogonon molle</i>		Herb
6	Compositae	<i>Adenostemma lavenia</i>		Herb
7	Compositae	<i>Gynura nepalensis</i>		shrub
8	Urticaceae	<i>Girardinia diversifolia</i>		Herb
9	Polygonaceae	<i>Fagopyrum dibotrys</i>		Herb
10	Ranunculaceae	<i>Anemone vitifolia</i>		Herbs
11	Balanophoraceae	<i>Balanophora dioica</i>		Herb

5.2 STATUS OF FLORA AS PER NATIONAL LEGISLATION, IUCN STATUS AND CITES LISTING

	Tree							
Sl no	Family name	Botanical name	Comon name	Local name	Uses	National legislation	CITES listing	IUCN status
1	Aceraceae	<i>Acer campbellii</i>	Himalayan Maple	Chalam(Dz), Sermaling shing(Sh), Kapasey(Lh)	Ph, Co, Arts & craft, Fe	Schedule-II		LC
2	Adoxaceae	<i>Viburnum erubescens</i>	Reddish viburnum		Ph, Fo, Fe			LC
3	Anacardiaceae	<i>Rhus spp</i>	Tanners	Choka shing(Dz), Roptang shing(Sh)	Ph, Fo			LC
4	Araliaceae	<i>Brassiopsis hainla</i>	Seto chuletro tree		Fo			LC
5	Betulaceae	<i>Alnus nepalensis</i>	Himalayan Alder	Gama(Dz), Utis(Lh)	Ph, Fe, Co, Dy	Schedule-III		LC
6	Betulaceae	<i>Betula alnoides</i>	Himalayan birch	Taab(Dz), Charr Shing(Sh), Saur(Lh)	Ph, Fo, CO,	Schedule-II		LC
7	Betulaceae	<i>Carpinus viminea</i>	Himalayan hornbeam	Rootoshing(Dz), Loong shing(sh)	Ph, Co, En,	Schedule-II		LC
8	Betulaceae	<i>Corylus ferox</i>	Himalayam hazelnut		Fo, Co, Arts& craft			LC
9	Canabaceae	<i>Celtis tetranda</i>	Nilgiri elm	Sok sokpa shing(Sh), Khari(Lh)	Ph, fo, Co			LC
10	Fagaceae	<i>Castonopsis spp</i>		Sokey(Dz)	Ph, En,			LC
11	Cornaceae	<i>Benthamedia capitata</i>	Dogwood	Phoetse(Dz), Ramkattar(Lh)	Ph, Fo, Arts & craft			LC
12	Ericaceae	<i>Rhododendron arboreum</i>	Rhodo	Aeto meto(Dz), Gurass(Lh)	Ph, Fo, Dy, Arts & crafts	Schedule-III		LC
13	Ericaceae	<i>Lyonia ovalifolia</i>	Fetterbush	Zentu shing(Dz), Shajur shing(Sh), Angeri(Lh)	Ph, En	Schedule-III		LC
14	Ericaceae	<i>Rhododendron griffithianum</i>		Tag-shar-meto(Dz), Seto chimal(Lh),	Ph, Arts & crafts	Schedule-III		LC
15	Ericaceae	<i>Pieris formosa</i>	Himalayan andromeda	Kheppchhey(Dz), Balu(Lh)	Ph			LC
16	Fagaceae	<i>Quercus oxyodon</i>	Sharp-toothed oak	Thomp shing(Dz), Thongpa shing(Sh)	Fe, En	Schedule-III		LC

17	Fagaceae	<i>Quercus lamellosa</i>	Bull oak	Dhom sokey(Dz), Fangkhio shing(Sh)	Fe, En	Schedule-III		LC
18	Fagaceae	<i>Quercus glauca</i>	Japanese blue oak	Thomp(Dz), Thongpa shing(Sh), Musre phalant(Lh)	Ph, Fe, En	Schedule-III		LC
19	Fagaceae	<i>Quercus lanata</i>	Ban oak	Goom shing(Dz), Betsinang shing(Sh), Banj(Lh)	Ph, Fe, En	Schedule-III		LC
20	Fagaceae	<i>Lithocarpus elegans</i>		Shakor shing(Sh), Arkaula(Lh)	Fe, En	Schedule-III		LC
21	Fagaceae	<i>Lithocarpus fenestratus</i>	Stone oak	Shakor shing(Sh), Arkaula(Lh)	Arts & craft, Dy, En	Schedule-III		LC
22	Lauraceae	<i>Actinodaphne obovata</i>		Runchey pat(Lh)	Ph, Fe			LC
23	Lauraceae	<i>Persea spp</i>	Wild avocado	Golee shing(Sh), Chiplicawla(Lh)	Ph, Fo	Schedule-III		LC
24	Lauraceae	<i>Dodecadenia grandiflora</i>	One flowered litsea		Ph, Fo, Co, Fe			LC
25	Lauraceae	<i>Cinnamomum glanduliferum</i>	Cinnamon tree	Kipchu shing(Sh), Kawla(Lh)	Ph, Co			LC
26	Magnoliaceae	<i>Michelia doltsapa</i>	Temple magnolia	Champe shing(Sh), Champ(Lh)	Ph, Co, Arts & crafts			LC
27	Pinaceae	<i>Pinus wallichiana</i>	Bluepine	Tongphu(Dz), Changshing(Sh), Dhupi(Lh)	Ph, Fo, Arts & crafts, Co, En	Schedule-II		LC
28	Pinaceae	<i>Tsuga dumosa</i>	Hemlock	Sey shing(Dz), Threngre salla	Ph, Co, En,			LC
29	Pinaceae	<i>Picea spinulosa</i>	Spruce	Ba shing(Dz), Kalo salla(Lh)	Ph, Co, En,	Schedule-III		LC
30	Rosaceae	<i>Prunus carmesina</i>	Wild himalayan cherry		Ph, Fo			LC
31	Rosaceae	<i>Prunus nepalensis</i>	wild cherry	Khamgo shing(Dz), Arupate(Lh)	Ph, Fo			LC
32	Rutaceae	<i>Zanthoxylum armatum</i>	Prickly ash	Khaigee(Sh), Bale timbur(Lh)	Ph, Fo			LC

33	Salicaceae	<i>Salix spp</i>	Willow	Changma(Dz)	Ph			LC
34	Salicaceae	<i>Populus ciliata</i>	Himalayan poplar	Kashing(Dz)	Co, Ph, Arts & crafts, Fe			LC
35	Schoepfiaceae	<i>Schoepfia jasminodora</i>	Green bark tree		Ph			LC
36	Symplocaceae	<i>Symplocos ramosissima</i>	Many branched sapphire berry		Ph, Fo, Co			LC
37	Symplocaceae	<i>Symplocos racemosa</i>	Lodh tree		Ph			LC
38	Symplocaceae	<i>Symplocos sumuntia</i>	Shan fan		Ph, Dy, Fo			LC
39	Symplocaceae	<i>Symplocos paniculata</i>	Sapphire berry	Pang tse shing(Dz),	Ph, Fo, Dy			LC
40	Theaceae	<i>Eurya acuminata</i>	Tapering leaf eurya		Ph, Fo			LC
41	Toricelliaceae	<i>Toricellia tiliifolia</i>	Linden leaf	Dhengboor-laga(Sh)	Ph			LC
42	Fagaceae	<i>Quercus semicarpifolia</i>	Brown oak	Bji Shing(Dz), Betsnang shing(Sh)	Ph, Fo, Fe, Co, En	Schedule-III		LC
43	Fagaceae	<i>Quercus griffithii</i>	Oak	Sisi shing(Dz), Bainang shing(Sh), Kasru(Lh)	Ph, Fo, Fe, En	Schedule-III		LC
44	Salicaceae	<i>Salix wallichiana</i>	Willow	Changma(Dz)	Ph, Fo, Arts & crafts			LC

Shrub

Sl No.	Family name	Botanical name	Comon name	Local name	Uses	National legislation	CITES listing	IUCN status
1	Thymelaeaceae	<i>Edgeworthia gardneri</i>	Indian paper tree	Dheykap(Dz), Argayle(Lh)	Ph, Arts & crafts	Schedule-III		LC
2	Myrtaceae	<i>Syzygium cumini</i>	Java plum	Nyasse shing(Dz), Menntse shing(Sh),Jamuna(Lh)	Ph, Fo, Fe, En			LC
3	Araliaceae	<i>Eleutherococcus cissifolium</i>	Siberian Ginseng		Ph			LC
4	Primulaceae	<i>Maesa chisia</i>	Chisia wild berry		Fe			LC
5	Primulaceae	<i>Ardisia macrocarpa</i>	Himalayan coralberry	Ressim(Dz), Damai phal(Lh)	Ph, Fo			LC
6	Elaeagnaceae	<i>Elaeagnus parvifolia</i>	Oleaster	Bji(Dz), Dhang-boor zoo(Sh)	Ph, Fo			LC
7	Thymelaeaceae	<i>Daphne bholua</i>	Paper daphne	Dheynap(Dz), Shogo shing(Sh), Kagate(Lh)	Ph, Arts & crafts	Schedule-III		LC
8	Balsaminaceae	<i>Jasminum dispersum</i>	Pink jasmine		Ph			LC
9	Lardizabalaceae	<i>Holbelia latifolia</i>	Sausage vine	Trogchangsey(Sh)	Ph, Fo			LC
10	Urticaceae	<i>Debregaesia longifolia</i>	Orange wild rhea	Chammbatang boning(Sh), Tusare(Lh)	Ph, Fo, Arts & crafts			LC
11	Sapindaceae	<i>Acer oblongum</i>	Evergreen maple	Chibla shing(Dz), Phirphiri(Lh)	Ph, Co	Schedule-II		LC
12	Polygonaceae	<i>Aconogonum molle</i>	Soft knotweed	Kochoma(Sh), Thohtney(Lh)	Ph, Fo, Fe, En			LC
13	Poaceae	<i>Chimonobambusa callosa</i>	Bamboo	Rashi(Sh)	Co, Fe, Fo Arts & crafts			LC
14	Poaceae	<i>Yushania spp</i>	Bamboo	Mingma(Dz),	Co			LC

15	Moraceae	<i>Morus spp</i>	Mulberries	Shakhongma shing(Sh), sanu kimbu(Lh)	Ph, Fo, Fe,		LC
16	Buxaceae	<i>Sarcococca saligna</i>	Willow-leaf sweet box	Jaheom goenhoe(Dz)	Ph, Arts & crafts		LC
17	Berberidaceae	<i>Berberis spp</i>	Barberry	Kapia tsang(Dz), Kerpa zoo(Sh)	Ph, Arts & crafts		LC
18	Berberidaceae	<i>Mahonia napalensis</i>	Nepal mahonia	Kesari(Lh)	Ph, Arts & crafts,		LC
19	Trochodendraceae	<i>Tetracentron sinense</i>	Qing pi tree	Yangdar shing(Sh),	Ph, Arts & crafts	Appendix -III	DD
20	Adoxaceae	<i>Viburnum cylindricum</i>	Tube-flower viburnum	Nom shing(Sh),	Ph, Fo, Arts & crafts		LC
21	Caprifoliaceae	<i>Lycesteria formosa</i>	Pheasant berry		Ph, Fe		LC
22	Rosaceae	<i>Rubus acuminatus</i>	Giant bramble	Komatsang(Sh), Sanu aselu(Lh)	Ph		LC
23	Smilacaceae	<i>Smilax spp</i>	Prickly ivy	Kukoor zoo(Sh), Runche(Lh)	Ph		LC
24	Oleaceae	<i>Fraxinus spp</i>	Common ash	Draythub(Dz), Lakuri(Lh)	Co		LC
25	Rosaceae	<i>Rosa sericea</i>	Silky rose	Sew meto(Dz), Sisi(Lh)	Ph, Arts & crafts		LC
26	Rosaceae	<i>Cotoneaster spp</i>	Rockspray cotoneaster	Katragpa roo(Sh)	Ph, Arts & crafts		LC
27	Caprifoliaceae	<i>Lonicera quinquelocularis</i>	Honey suckle		Ph, En		LC
28	Coriariaceae	<i>Coriaria nepalensis</i>	Masuri berry	Limphu shing(Dz), Thabshing(Sh)	Ph, Fo		LC
29	Rosaceae	<i>Rosa brunonii</i>	Himalayan musk rose	Tagtsher(Dz),	Ph, Fo, Arts & crafts		LC
30	Ericaceae	<i>Rhododendron maddenii</i>	Pink trumpets	Saga meto(Dz)	Arts & crafts		LC

31	Ericaceae	<i>Vaccinium vacciniaceum</i>	Tibetan blueberry		Ph, Fo			LC
32	Scrophulariaceae	<i>Buddleja crispa</i>	Himalayan butterfly bush	Omsa nesma(Sh)	Ph			LC
33	Celastraceae	<i>Euonymus tingens</i>	Purple veined spindle tree	Nga pa meto shing(Dz)	Ph, Fe, Arts & crafts			LC
34	Rosaceae	<i>Rubus biflorus</i>	Himalayan raspberry	Thulu gong sey(Sh)	Fo, Dye			LC
35	Aquifoliaceae	<i>Ilex dipyrena</i>	Himalayan holly	Ratsa shing(Sh), Ilse(Lh)	Ph			LC
36	Hydrangeaceae	<i>Philadelphus spp</i>	Mock orange		Ph, Arts & crafts			LC
37	Berberidaceae	<i>Berberis aristata</i>	Indian barberry	Kerpa zoo(Sh), Chutro(Lh)	Ph			LC
38	Ericaceae	<i>Rhododendron triflorum</i>		Pahenle Chimal(Lh)	Ph, Arts & crafts	Scheduel-III		LC
39	Rosaceae	<i>Malus baccata</i>	Siberian crap apple	Nyera leetong(Sh)	Fo, Arts & crafts			LC

Herbs

SN	Family name	Botanical name	Comon name	Local name	Uses	National legislation	CITES listing	IUCN status
1	Acanthaceae	<i>Strobilanthes spp</i>	Persian shield	Khamkha nagma(Sh)	Ph			LC
2	Araliaceae	<i>Hedera nepalensis</i>	Himalayan ivy	Loyee mekha(Dz), Pan roo(Sh)	Ph, Fe			LC
3	Asparagaceae	<i>Ophiopogon spp</i>	Lily turf		Arts & crafts			LC
4	Asparagaceae	<i>Asparagus racemosus</i>	Buttermilk root	Reege nya khagchu(Dz), Borang nga-la nyom(Sh)	Ph, Fo			LC
5	Asparagaceae	<i>Tupistra spp</i>		Nakima(Lh)	Ph			LC
6	Asteraceae	<i>Laggera crispata</i>	Curly blumea		Ph			LC

7	Asteraceae	<i>Bidens pilosa</i>	Plackjack	Zoompee thoorpang(Sh), Kuro(Lh)	Ph			LC
8	Asteraceae	<i>Ainsliaea aptera</i>	Wingless ainsliaea		Ph			LC
9	Asteraceae	<i>Senecio diversifolia</i>	Mexican sunflower		Ph			LC
10	Asteraceae	<i>Artemisia vulgaris</i>	Mugwort	Khempa(Dz)	Ph			LC
11	Athyriaceae	<i>Diplazium esculentum</i>	Fern	Nakay(Dz), Dawia(Sh)	Ph, Fo, Fe			LC
12	Balsaminaceae	<i>Impatiens spp</i>	Busy lizzie	Nakay(Dz), Dawia(Sh)	Ph, Dy			LC
13	Dennstaedtiaceae	<i>Pteridium aquilinum</i>	Bracken fern	Nakay(Dz), Dawia(Sh)	Ph, Fe, Dy, Arts & crafts			LC
14	Dryopteridaceae	<i>Polystichum spp</i>	Shield fern	Nakay(Dz), Dawia(Sh)	Ph			LC
15	Equisetaceae	<i>Equisetum diffusum</i>	Horsetail	Tentso(Sh), Salley(Lh)	Ph			LC
16	Ericaceae	<i>Pyrola spp</i>	Wintergreen		Ph			LC
17	Euphorbiaceae	<i>Euphorbia griffithii</i>	Griffith's spurge	Dhoor-jeedh(DZ)	Arts & crafts			DD
18	Fabaceae	<i>Desmodium spp</i>	Begger's lice		Ph, Fe			LC
19	Hypoxidaceae	<i>Curculigo capitulata</i>	Palm grass		Ph			LC
20	Lamiaceae	<i>Perilla frutescens</i>	Beefsteak plant		Ph, Arts & crafts			LC
21	Lamiaceae	<i>Salvia spp</i>	Sage	Jipshi karmo(Dz)	Ph			LC
22	Melanthiaceae	<i>Paris polyphylla</i>	Himalayan Paris	Dochu kewa(Dz), Thogsampa(Sh), satuwa(Lh)	Ph	Schedule-III		VU
23	Piparaceae	<i>Piper pedicellatum</i>	Long pipla	Peepeeling(Sh), Pipla(Lh)	Ph, Fo			VU
24	Plumbaginaceae	<i>Ceratostigma griffithii</i>	Burmese plumbago	Yoodroen meto(Sh)	Arts & crafts			LC
25	Poaceae	<i>Oplismenus hirtellus</i>	Basket grass		Arts & crafts, Fe			LC

26	Poaceae	<i>Carex spp</i>	Sedge		Ph, Fe			LC
27	Polygonaceae	<i>Rumex nepalensis</i>	Nepal Dock	Sheylempa(Sh)	Ph, Dy, Fo			LC
28	Polygonaceae	<i>Persicaria capitata</i>	Pink knotweed	Lha lop(Dz), Gangchimeen(Sh)	Ph, Arts & crafts			LC
29	Ranunculaceae	<i>Clematis spp</i>	Old man's beard		Ph, Arts & crafts			LC
30	Rosaceae	<i>Potentilla spp</i>	Barren strawberries	Chiriya(Lh)	Ph, Fo, Fe			LC
31	Rosaceae	<i>Rubus calycinus</i>	Wild raspberry	Gong zoo(Sh), Tsoey(Dz), La-nye-roo(Sh)	Ph, Dye			LC
32	Rubiaceae	<i>Rubia spp</i>	Madder		Ph, Dy			LC
33	Rubiaceae	<i>Galium spp</i>	Bedstraw	Roo-roba(Sh)	Ph, Fo			LC
34	Solanaceae	<i>Solanum viarum</i>	Tropical soda apple		Ph			LC
35	Urticaceae	<i>Girardinia diversifolia</i>	Himalayan nettle	Zocha(Dz), Zangroo(Sh)	Ph, Fo, Arts & crafts			LC
36	Urticaceae	<i>Pouzolzia hirta</i>	Oyik	Mizuma laga ngon(Sh)	Ph, Fo			LC
37	Urticaceae	<i>Urtica dioica</i>	common nettle	Zocha(Dz), Khee jazoo(Sh)	Ph			LC
38	Urticaceae	<i>Pilea spp</i>	Friendship plant	Jazoo boning(Sh)	Ph, Arts & crafts			LC
39	Violaceae	<i>Viola spp</i>	Pansy	Mamphoong ngon(Sh)	Ph			LC
40	Vitaceae	<i>Tetrastigma spp</i>	Chestnut vine		Ph			LC

5.3 STATIONWISE MAMMAL DATA FOR BUNAKHA HPP

Plot No.	Locality	North	East	Altitude(m)	Family name	Scientific name	Comm on name	Direct observation	No. of pellets	Other evidence
ST-1	Tala dam upper end reservoir	27.048001667	89.580333333	1344.4	Cervidae	<i>Muntiacus muntjak</i>	Barking Deer	-	2	-
		27.048001667	89.580333333	1344.4	Bovidae	<i>Naemorhedus goral</i>	Himalayan Goral	-	-	Foot print
		27.046821667	89.575578333	1344.4	Cercopithecidae	<i>Semnopithecus entellus</i>	Grey Langur	10	-	-
ST-2	Chukha dam	27.119678333	89.529593333	1833.7	Bovidae	<i>Naemorhedus goral</i>	Himalayan Goral	-	-	Foot print
ST-3	Chanachan above road)	27.119678333	89.529593333	2129.6	Cervidae	<i>Muntiacus muntjak</i>	Barking Deer	-	2	-
		27.118823333	89.53119	2129.6	Cercopithecidae	<i>Macaca assamensis</i>	Assam macaque	-	2	-
		27.117828333	89.530896667	2129.6	Ursidae	<i>Ursus thibetanus</i>	Asiatic Black Bear	-	-	4 scats
		27.118168333	89.530926667	2129.6	Suidae	<i>Sus scrofa</i>	Wild pig	-	-	Rooting
		27.118215	89.530905	2129.6	Cervidae	<i>Rusa unicolor</i>	Sambar	-	2	-
ST-4	Chanachan junction above road	27.118271667	89.538893333	1998.8	Cervidae	<i>Rusa unicolor</i>	Sambar	-	2-	-
					Cervidae	<i>Muntiacus muntjak</i>	Barking Deer	-	3	-

Plot No.	Locality	North	East	Altitude(m)	Family name	Scientific name	Common name	Direct observation	No. of pellets	Other evidence
ST-5	Chanachan above bridge	27.127926667	89.539291667	1892.3	Suidae	<i>Sus scrofa</i>	Wild pig	-	-	Rooting
		27.12865	89.539196667	1892.3	Felidae	<i>Prionalurus bengalensis</i>	Leopard Cat	-	-	2 scats
		27.128595	89.538773333	1892.3	Ursidae	<i>Ursus thibetanus</i>	Asiatic Black Bear			1 scat
ST-6	Chanachen below village	27.136976667	89.539168333	1887	Suidae	<i>Sus scrofa</i>	Wild pig	-	-	5 poop & roosting
				1887	Cervidae	<i>Muntiacus muntjak</i>	Barking Deer	-	3	-
				1887	Ursidae	<i>Ursus thibetanus</i>	Asiatic Black Bear	-	-	2 scats
				1887	Cervidae	<i>Rusa unicolor</i>	Sambar	-	2	-
ST-7	Bunagu Labour camp-4	27.13836	89.544878333	2052.4	Suidae	<i>Sus scrofa</i>	Wild Pig	-	-	Wallowing & rooting
					Cervidae	<i>Rusa unicolor</i>	Sambar	-	2	-
					Cervidae	<i>Muntiacus muntjak</i>	Barking Deer	-	1	-
		27.137195	89.539396667	2052.4	Suidae	<i>Sus scrofa</i>	Wild Pig	=	-	3 poops
		27.13681	89.538541667	2052.4	Felidae	<i>Prionalurus bengalensis</i>	Leopard Cat	-	-	2 scats
ST-8	Chanachan near village	27.14615	89.528828333	2202.4	Suidae	<i>Sus scrofa</i>	Wild Pig	-	-	Rooting

Plot No.	Locality	North	East	Altitude(m)	Family name	Scientific name	Comm on name	Direct observation	No. of pellets	Other evidence
		27.146361667	89.527966667	2202.4	Ursidae	<i>Ursus thibetanus</i>	Asiatic Black Bear	-	-	1 scat
ST-9	Bunagu below road	27.145143333	89.536536667	1943.9	Suidae	<i>Sus scrofa</i>	Wild Pig	-	-	2 poops
					Cervidae	<i>Muntiacus muntjak</i>	Barking Deer	-	5	-
					Bovidae	<i>Naemorhedus goral</i>	Himalayan Goral	-	6	-
ST-10	Tanalum below MD-5	27.154955	89.536881667	1975.5	Suidae	<i>Sus scrofa</i>	Wild Pig	-	-	Roosting
					Cervidae	<i>Rusa unicolor</i>	Sambar	2	2	-
					Cervidae	<i>Muntiacus muntjak</i>	Barking Deer	4	4	-
		27.154961667	89.537071667	1975.5	Cervidae	<i>Rusa unicolor</i>	Sambar	3	3	-
		27.155238333	89.537645	1975.5	Suidae	<i>Sus scrofa</i>	Wild Pig	-	-	Rooting & foot print
ST-11	Geling Goenpa	27.163686667	89.524838333	2466.1	Suidae	<i>Sus scrofa</i>	Wild Pig	-	-	Rooting
		27.146361667	89.527966667	2466.1	Ursidae	<i>Ursus thibetanus</i>	Asiatic Black Bear	-	-	1 scat

Plot No.	Locality	North	East	Altitude(m)	Family name	Scientific name	Comm on name	Direct observation	No. of pellets	Other evidence
		27.139251667	89.529565	2466.1	Cervidae	<i>Muntiacus muntjak</i>	Barking Deer	1	-	-
		27.12398	89.533795	2466.1	Cervidae	<i>Muntiacus muntjak</i>	Barking Deer	1	-	-
		27.149438333	89.513176667	2466.1	Suidae	<i>Sus scrofa</i>	Wild Pig	-	-	Rooting
		27.155663333	89.517405	2466.1	Canidae	<i>Cuon alpinus</i>	Dhole	2	-	-
ST-12	Tanalum below road	27.173821667	89.532875	1977.9	Suidae	<i>Sus scrofa</i>	Wild Pig	-	-	Rooting
					Cervidae	<i>Rusa unicolor</i>	Sambar	-	2	-
		27.1739	89.533043333	1977.9	Bovidae	<i>Naemorhedus goral</i>	Himalayan Goral	-	2	-
		27.173868333	89.533225	1977.9	Cervidae	<i>Rusa unicolor</i>	Sambar	-	-	Rubbing tree
ST-13	Tanalum new bridge	27.183976667	89.527931667	2062.1	Suidae	<i>Sus scrofa</i>	Wild Pig	-	-	Rooting & foot print
					Bovidae	<i>Naemorhedus goral</i>	Himalayan Goral	-	5	-
ST-14	Bjishigang below village	27.193711667	89.486603333	2464.300	Ursidae	<i>Ursus thibetanus</i>	Asiatic Black Bear	2	-	-
					Suidae	<i>Sus scrofa</i>	Wild pig	-	-	2 poops & Rootng
		27.195073333	89.486081667		Cervidae	<i>Muntiacus muntjak</i>	Barking Deer	-	3	-

Plot No.	Locality	North	East	Altitude(m)	Family name	Scientific name	Comm on name	Direct observation	No. of pellets	Other evidence
		27.195121667	89.48597		Ursidae	<i>Ursus thibetanus</i>	Asiatic Black Bear	-	-	6 scats & tree broken
		N27.195181667	E89.485883333		Cercopithecidae	<i>Macaca assamensis</i>	Assam macaque	10	-	-
		27.19554	89.485948333		Suidae	<i>Sus scrofa</i>	Wild pig	-	-	2 poops
		27.19542	89.4896		Mustelidae	<i>Martes flavigula</i>	Yellow throated Marten	-	-	1 scat
		27.195395	89.489681667		Bovidae	<i>Naemorhedus goral</i>	Himalayan Goral	-	1	-
ST-15	Haachhu confluence	:27.200556667	89.520806667	1953.5	Ursidae	<i>Ursus thibetanus</i>	Asiatic Black Bear	-	-	4 scats
					Suidae	<i>Sus scrofa</i>	Wild pig	-	-	3 poops & rooting
		27.200885	89.520693333		Ursidae	<i>Ursus thibetanus</i>	Asiatic Black Bear	-	-	1 scat
		27.201715	89.520646667		Bovidae	<i>Naemorhedus goral</i>	Himalayan Goral	-	1	-
		27.202106667	89.520743333		Suidae	<i>Sus scrofa</i>	Wild pig	-	-	Rooting
		27.202785	89.520353333		Suidae	<i>Sus scrofa</i>	Wild pig	-	-	Nest

Plot No.	Locality	North	East	Altitude(m)	Family name	Scientific name	Common name	Direct observation	No. of pellets	Other evidence
		27.203256667	27.203256667		Cervidae	<i>Muntiacus muntjak</i>	Barking Deer	1	-	-
		27.203393333	89.51955		Bovidae	<i>Naemorhedus goral</i>	Himalayan Goral	-	-	Nesting
ST-16	Near Haa chhu confluence	27.204945	89.51878	1925.2	Suidae	<i>Sus scrofa</i>	Wild pig	-	-	3 poops & rooting
					Ursidae	<i>Ursus thibetanus</i>	Asiatic Black Bear			10 scats & broken trees
		27.204328333	89.518871667		Cercopithecidae	<i>Macaca assamensis</i>	Assam macaque	-	2	-
		27.203003333	89.518758333		Ursidae	<i>Ursus thibetanus</i>	Asiatic Black Bear	-	-	Feeding on corns
ST-17	Watsa	27.227973333	89.517726667	2022.6	Cervidae	<i>Muntiacus muntjak</i>	Barking Deer	-	3	-
					Cercopithecidae	<i>Macaca assamensis</i>	Assamese macaque	-	-	1 dung
ST-18	Damchu below road	27.262636667	89.528403333	1984.3	-	-	-	-	-	-
ST-19	Bunagu below road	27.131671667	89.542108333	1955.6	Cervidae	<i>Muntiacus muntjak</i>	Barking Deer	-	2	Footprint
					Cervidae	<i>Muntiacus muntjak</i>	Barking Deer	-	-	Rooting

Plot No.	Locality	North	East	Altitude(m)	Family name	Scientific name	Common name	Direct observation	No. of pellets	Other evidence
					Suidae	<i>Sus scrofa</i>	Wild Pig			4 Poops
ST-20	Chanachan near bridge)	27.129901667	89.540313333	1914.7	Cervidae	<i>Muntiacus muntjak</i>	Barking Deer	-	2	-
ST-21	Bunagu below road	27.136796667	89.543263333	2007.1	Cervidae	<i>Muntiacus muntjak</i>	Barking Deer	-	2	-
					Cercopithecidae	<i>Macaca assamensis</i>	Assam macaque	10	-	-
ST-22	Paga Goenpa	27.286155	89.562053333	2708.5	Cervidae	<i>Muntiacus muntjak</i>	Barking Deer	-	-	Soil dug with hoofs
					Suidae	<i>Sus scrofa</i>	Wild pig	-	-	Rubbing tree
ST-23	Shame Goenpa	27.221001667	: 89.547593333	2812.4	Suidae	<i>Sus scrofa</i>	Wild pig	-	-	Rooting
ST-24	Wanakha above	27.057876667	89.555756667	1637	Cervidae	<i>Muntiacus muntjak</i>	Barking Deer	-	2	-
		27.058091667	89.555965		Cervidae	<i>Muntiacus muntjak</i>	Barking Deer	-	2	-
		27.05821	89.556305		Cervidae	<i>Muntiacus muntjak</i>	Barking Deer	-	-	Foot print
ST-25	Lobnekha above school	27.175038333	89.54522	2633.2	-	-	-	-	-	-
ST-26	Naykha above road	27.147923333	89.513361667	2585.9	Suidae	<i>Sus scrofa</i>	Wild pig	-	-	Rooting and footprint

Plot No.	Locality	North	East	Altitude(m)	Family name	Scientific name	Common name	Direct observation	No. of pellets	Other evidence
ST-27	Damchu above road	27.136948333	89.543318333	2007.100	Bovidae	<i>Naemorhedus goral</i>	Himalayan Goral	-	1	Hoof print
					Mustelidae	<i>Martes flavigula</i>	Yellow throated Marten	-	-	1 scat
ST-28	Wanakha below road	27.215726667	89.5096	2292.	-	-	-	-	-	-
ST-29	Chanachan INRQ 1&2	27.125255	89.532963333	2070.8	Suidae	<i>Sus scrofa</i>	Wild pig	-	-	Rooting
					Cervidae	<i>Muntiacus muntjak</i>	Barking Deer	-	2	-
ST-30	Chukha dam MD-2	27.117276667	89.531356667	2049.7	Suidae	<i>Sus scrofa</i>	Wild pig	-	-	Rooting
					Ursidae	<i>Ursus thibetanus</i>	Asiatic Black Bear	-	-	3 dungs
ST-31	Bunakha above Lhakhang	27.147283333	89.543985	2162	Cervidae	<i>Muntiacus muntjak</i>	Barking Deer	-	3	-
					Suidae	<i>Sus scrofa</i>	Wild pig	-	-	Wallowing
ST-32	Bunakha client office	27.14882	89.543595	2190.2	Cervidae	<i>Muntiacus muntjak</i>	Barking Deer	-	2	-
		27.148033333	89.543601667		Ursidae	<i>Ursus thibetanus</i>	Himalayan Black Bear	-	-	1 dung

Plot No.	Locality	North	East	Altitude(m)	Family name	Scientific name	Comm on name	Direct observation	No. of pellets	Other evidence
ST-33	Bunagu below hotel	27.144156667	89.537568333	1973.2	Suidae	<i>Sus scrofa</i>	Wild pig	-	-	Rooting & footprint
					Cercopith ecidae	<i>Macaca assamen sis</i>	Assam macaqu e	-	-	3 poops
					Cervidae	<i>Rusa unicolor</i>	Sambar	-	2	-
					Cervidae	<i>Muntiacu s muntjak</i>	Barking Deer	1	-	-
ST-34	Bunagu above road	27.143331667	89.541681667	2058.9	Suidae	<i>Sus scrofa</i>	Wild pig	-	-	3 dung & rooting
					Cervidae	<i>Muntiacu s muntjak</i>	Barking Deer	-	1	-
ST-35	Bunagu below road	27.1387	89.543303333	1999.9	Suidae	<i>Sus scrofa</i>	Suidae	-	-	Rootig
ST-36	Chanahcna stockpile 1 and MD-1	27.129565	89.53621	2045.6	Cervidae	<i>Muntiacu s muntjak</i>	Barking Deer	-	1	-
					Suidae	<i>Sus scrofa</i>	Wild pig	-	-	Rooting
		27.129623333	89.535786667		Ursidae	<i>Ursus thibetan us</i>	Asiatic Black Bear	-	-	2 dungs
					Ursidae	<i>Ursus thibetanu s</i>	Himalay an Black Bear	-	-	3 dungs
ST-37	Bunakha HM store	27.124688333	89.541188333	1971.8	Suidae	<i>Sus scrofa</i>	Wild pig	-	-	Rooting
ST-38	Chanachan junction	27.119281667	89.537931667	1914.6	-	-	-	-	-	-

Plot No.	Locality	North	East	Altitude(m)	Family name	Scientific name	Common name	Direct observation	No. of pellets	Other evidence
	explosive magazine									
ST-39	Below Tsimasham MD-4	27.096486667	89.527246667	1868.8	Cervidae	<i>Muntiacus muntjak</i>	Barking Deer	-	3	-

5.4 STATUS OF MAMMALS AS PER NATIONAL LEGISLATION, IUCN RED LIST AND CITES LISTING

SN	Family name	Scientific name	Common name	National legislation	CITES listing	IUCN Red list
1	Cervidae	<i>Muntiacus muntjak</i>	Barking Deer	FNCA III	II	LC
2	Cervidae	<i>Rusa unicolor</i>	Sambar	FNCA II	II	VU
3	Suidae	<i>Sus scrofa</i>	Wild Pig	FNCA III	II	LC
4	Cercopithecidae	<i>Semnopithecus schistaceus</i>	Grey Langur	FNCA II	I	LC
5	Cercopithecidae	<i>Macaca assamensis</i>	Assamese macaque	FNCA III	II	NT
6	Bovidae	<i>Nemorhaedus goral</i>	Himalayan Goral	FNCA II	I	NT
7	Ursidae	<i>Ursus thibetanus</i>	Asiatic Black Bear	FNCA II	I	VU
8	Canidae	<i>Cuon alpinus</i>	Dhole	FNCA-II	II	Endangered
9	Felidae	<i>Prionailurus bengalensis</i>	Leopard Cat	FNCA II	II	LC
	Mustelidae	<i>Martes flavigula</i>	Yellow throated Marten	FNCA III	III	LC

5.5 THIRD SEASON STATION-WISE BIRD SURVEY DATA SHEET FOR BUNAKHA HPP (will update)

Second season (monsoon) birds surveyed for Bunakha HPP											GPS Coordinate		Time		Altitude
ST No.	SL No	Common name	Species	M	F	Juv	Count	Total	Locality	Habitat	Northing	Easting	Start	End	Meter (m)
1	1	Ashy-throated Warbler	<i>Phylloscopidae</i>	0	0	0	1	1	Tala Dam	R	27.047908333°	89.580216667°	2.21PM	3:00 PM	1394
	2	Brown Dipper	<i>Cinclus pallasii</i>	0	1	0	0	1	Tala Dam	R	27.047908333°	89.580216667°	2.21PM	3:00 PM	1394
	3	White-capped Water Redstart	<i>Chaimarromis leucocephalus</i>	1	0	0	0	1	Tala Dam	R	27.047908333°	89.580216667°	2.21PM	3:00 PM	1394
	4	Scarlet Minivet	<i>Pericrocotus flammeus</i>	0	0	0	1	1	Tala Dam	R	27.047908333°	89.580216667°	2.21PM	3:00 PM	1394
	5	White-throated Laughingthrush	<i>Garrulax albogularis</i>	6	5	0	0	11	Tala Dam	R	27.047908333°	89.580216667°	2.21PM	3:00 PM	1394
2	1	White Wagtail	<i>Motacilla alba</i>	1	0	0	0	1	Chukha Dam	R	27.109285000°	89.530040000°	10.00AM	11:00PM	1809
	2	Green-backed Tit	<i>Parus monticolus</i>	2	2	0	0	4	Chukha Dam	R	27.109285000°	89.530040000°	10.00AM	11:00PM	1809
	3	Whiskered Yuhina	<i>Yuhina flavicollis</i>	5	4	0	0	9	Chukha Dam	R	27.109285000°	89.530040000°	10.00AM	11:00PM	1809
	4	Black - throated Tit	<i>Aegithalos concinnus</i>	2	3	0	0	5	Chukha Dam	R	27.109285000°	89.530040000°	10.00AM	11:00PM	1809
	5	Striated Laughingthrush	<i>Garrulax striatus</i>	2	2	0	0	4	Chukha Dam	R	27.109285000°	89.530040000°	10.00AM	11:00PM	1809
	6	Scarlet Minivet	<i>Pericrocotus flammeus</i>	1	0	0	0	1	Chukha Dam	R	27.109285000°	89.530040000°	10.00AM	11:00PM	1809
3	1	Rufous Sibia	<i>Heterophasia capistrata</i>	0	1	1	0	2	Chanachen	CBLF	27.1190606667°	89.529740000°	1.3PM	1.30PM	2133
	2	Black - throated Tit	<i>Aegithalos concinnus</i>	1	2	0	0	3	Chanachen	CBLF	27.1190606667°	89.529740000°	1.3PM	1.30PM	2133
	3	White-tailed Nuthatch	<i>Sitta himalayensis</i>	1	0	0	0	1	Chanachen	CBLF	27.1190606667°	89.529740000°	1.3PM	1.30PM	2133
	4	Red-tailed Minla	<i>Minla ignotincta</i>	4	3	0	0	7	Chanachen	CBLF	27.1190606667°	89.529740000°	1.3PM	1.30PM	2133
	5	Greater Yellowape	<i>Picus flavinucha</i>	1	0	0	0	1	Chanachen	CBLF	27.1190606667°	89.529740000°	1.3PM	1.30PM	2133

4	1	Whiskered Yuhina	<i>Yuhina flavicollis</i>	3	2	0	0	5	Chanachen	CBLF	27.118288333°	89.538913333°	1.10PM	1.30PM	1961
	2	White-tailed Nuthatch	<i>Sitta himalayensis</i>	1	0	0	0	1	Chanachen	CBLF	27.118288333°	89.538913333°	1.10PM	1.30PM	1961
	3	Ashy Drongo	<i>Dicrurus leucophaeus</i>	1	1	0	0	2	Chanachen	CBLF	27.118288333°	89.538913333°	1.10PM	1.30PM	1961
	4	Rufous Sibia	<i>Heterophasia capistrata</i>	1	1	2	0	4	Chanachen	CBLF	27.118288333°	89.538913333°	1.10PM	1.30PM	1961
5	1	White-throated Laughingthrush	<i>Garrulax albogularis</i>	1	1	0	0	2	Chanachen	CBLF	27.127935000°	89.539278333°	2.40PM	3.00PM	1883
	2	Greater Yellow-nape	<i>Picus flavinucha</i>	1	1	0	0	2	Chanachen	CBLF	27.127935000°	89.539278333°	2.40PM	3.00PM	1883
	3	Whiskered Yuhina	<i>Yuhina flavicollis</i>	2	3	1	0	6	Chanachen	CBLF	27.127935000°	89.539278333°	2.40PM	3.00PM	1883
	4	Verditer Flycatcher	<i>Eumyias thalassina</i>	1	0	0	0	1	Chanachen	CBLF	27.127935000°	89.539278333°	2.40PM	3.00PM	1883
	5	Chestnut-bellied Rock Thrush	<i>Monticola rufiventris</i>	0	1	0	0	1	Chanachen	CBLF	27.127935000°	89.539278333°	2.40PM	3.00PM	1883
6	1	Oriental White-eye	<i>Zosterops palpebrosus</i>	2	1	2	0	5	Chanachen	CBLF	27.137031667°	89.539318333°	12.35PM	1.20PM	1889
	2	Green-tailed Sunbird	<i>Aethopyga nipalensis</i>	0	1	0	0	1	Chanachen	CBLF	27.137031667°	89.539318333°	12.35PM	1.20PM	1889
	3	White-throated Laughingthrush	<i>Garrulax albogularis</i>	1	1	0	0	2	Chanachen	CBLF	27.137031667°	89.539318333°	12.35PM	1.20PM	1889
	4	Yellow-billed Blue Magpie	<i>Urocissa flavirostris</i>	0	0	1	0	1	Chanachen	CBLF	27.137031667°	89.539318333°	12.35PM	1.20PM	1889
7	1	Rufous Sibia	<i>Heterophasia capistrata</i>	0	0	0	2	2	Bunakha	CBLF	27.138536667°	89.54508500°	5.9PM	5.30PM	2088
	2	Kalij Pheasant	<i>Lophura leucomelanos</i>	2	1	0	0	3	Bunakha	CBLF	27.138536667°	89.54508500°	5.9PM	5.30PM	2088
	3	Lemon-rumped Warbler	<i>Phylloscopus chloronotus</i>	1	1	0	0	2	Bunakha	CBLF	27.138536667°	89.54508500°	5.9PM	5.30PM	2088
	4	Green-tailed Sunbird	<i>Aethopyga nipalensis</i>	1	0	0	0	1	Bunakha	CBLF	27.138536667°	89.54508500°	5.9PM	5.30PM	2088
8	1	Ashy Bulbul	<i>Hemixos flava</i>	0	1	0	0	1	Chanachen	CBLF	27.146240000°	89.528710000°	2.5PM	2.35PM	2213
	2	Rufous Sibia	<i>Heterophasia capistrata</i>	3	2	0	0	5	Chanachen	CBLF	27.146240000°	89.528710000°	2.5PM	2.35PM	2213

	3	Great Barbet	<i>Megalaima virens</i>	0	0	0	2	2	Chanachen	CBLF	27.146240000°	89.528710000°	2.5PM	2.35PM	2213
	4	Red-tailed Minla	<i>Minla ignotincta</i>	5	6	3	0	14	Chanachen	CBLF	27.146240000°	89.528710000°	2.5PM	2.35PM	2213
	5	Grey-backed Shrike	<i>Lanius tephronotus</i>	0	1	2	0	3	Tanalung	CBLF	27.146240000°	89.528710000°	2.5PM	2.35PM	2213
9	1	Rufous Sibia	<i>Heterophasia capistrata</i>	0	0	0	3	3	Tanalung/below high way	CBLF	27.145088333°	89.536455000°	2.00PM	2.29PM	1983
	2	Kalij Pheasant	<i>Lophura leucomelanos</i>	0	0	0	1	1	Tanalung/below high way	CBLF	27.145088333°	89.536455000°	2.00PM	2.29PM	1983
	3	Long-tailed Minivet	<i>Pericrocotus ethologus</i>	1	2	0	0	3	Tanalung/below high way	CBLF	27.145088333°	89.536455000°	2.00PM	2.29PM	1983
	4	White-throated Fantail	<i>Rhipidura albicollis</i>	1	1	0	0	2	Tanalung/below high way	CBLF	27.145088333°	89.536455000°	2.00PM	2.29PM	1983
	1	Hume's Warbler	<i>Phylloscopus humei</i>	1	0	0	0	1	Tanalung/below high way	CBLF	27.254858333°	89.536900000°	12.15PM	12.40PM	1974
10	2	Greater Yellownape	<i>Picus flavinucha</i>	0	0	0	2	2	Tanalung/below high way	CBLF	27.254858333°	89.536900000°	12.15PM	12.40PM	1974
	3	Rufous-bellied Woodpecker	<i>Dendrocopos hyperythrus</i>	1	1	0	0	2	Tanalung/below high way	CBLF	27.254858333°	89.536900000°	12.15PM	12.40PM	1974
11	1	Scarlet Minivet	<i>Pericrocotus flammeus</i>	1	2	1	0	4	Zheling Goenpa	CBLF	27.163690000°	89.524815000°	11.50PM 12.23PM		2476
	2	Green-tailed Sunbird	<i>Aethopyga nipalensis</i>	1	0	0	0	1	Zheling Goenpa	CBLF	27.163690000°	89.524815000°	11.50PM	12.23pm	2476
	3	Rufous-vented Yuhina	<i>Yuhina occipitalis</i>	2	2	0	0	4	Zheling Goenpa	CBLF	27.163690000°	89.524815000°	11.50PM	12.23pm	2476
	4	White-browed Shrike Babbler	<i>Pteruthius flaviscapis</i>	1	1	0	0	1	Zheling Goenpa	CBLF	27.163690000°	89.524815000°	11.50PM	12.23pm	2476
	5	Striated Laughingthrush	<i>Garrulax striatus</i>	1	2	0	0	3	Zheling Goenpa	CBLF	27.163690000°	89.524815000°	11.50PM	12.23pm	2476
12	1	White-throated Laughingthrush	<i>Garrulax albogularis</i>	6	4	1	0	11	Tanalung / below high way	CBLF	27.173816667°	89.532931667°	11.20PM	11.45PM	1979
	2	Whiskered Yuhina	<i>Yuhina flavicollis</i>	2	2	0	0	4	Tanalung / below high way	CBLF	27.173816667°	89.532931667°	11.20PM	11.45PM	1979
	3	Green-tailed Sunbird	<i>Aethopyga nipalensis</i>	1	0	0	0	1	Tanalung / below high way	CBLF	27.173816667°	89.532931667°	11.20PM	11.45PM	1979
	4	Great Barbet	<i>Megalaima virens</i>	1	1	1	0	3	Tanalung / below high way	CBLF	27.173816667°	89.532931667°	11.20PM	11.45PM	1979

13	1	Whiskered Yuhina	<i>Yuhina flavicollis</i>	4	6	1	0	11	Chanachen	CBLF	27.184211667°	89.527851667°	3.18PM	3.45PM	2007
	2	Blue Whistling Thrush	<i>Myophonus caeruleus</i>	1	0	0	0	1	Chanachen	CBLF	27.184211667°	89.527851667°	3.18PM	3.45PM	2007
14	1	Brown Parrotbill	<i>Paradoxornis unicolor</i>	6	5	0	0	11	Zhishigang/Bank of Haa chu	CBLF	27.193623333°	89.486586667°	11.00PM	11.30PM	2024
	2	White-throated Fantail	<i>Rhipidura albicollis</i>	1	0	0	0	1	Zhishigang/Bank of Haa chu	CBLF	27.193623333°	89.486586667°	11.00PM	11.30PM	2024
	3	Great Barbet	<i>Megalaima virens</i>	0	0	0	1	1	Zhishigang/Bank of Haa chu	CBLF	27.193623333°	89.486586667°	11.00PM	11.30PM	2024
	4	White-throated Laughingthrush	<i>Garrulax albogularis</i>	0	0	0	2	2	Zhishigang/Bank of Haa chu	CBLF	27.193623333°	89.486586667°	11.00PM	11.30PM	2024
15	1	Plumbeous Water Redstart	<i>Rhyacomis fuliginosus</i>	1	1	0	0	2	Below Damchu Bridge	R	27.200560000°	89.520838333°	3.00PM	3.51PM	1956
	2	White-capped Water Redstart	<i>Chaimarornis leucocephalus</i>	0	0	0	1	1	Below Damchu Bridge	R	27.200560000°	89.520838333°	3.00PM	3.51PM	1956
	3	Great Barbet	<i>Megalaima virens</i>	0	0	1	1	2	Below Damchu Bridge	R	27.200560000°	89.520838333°	3.00PM	3.51PM	1956
16	1	Rufous-bellied Woodpecker	<i>Dendrocopos hyperythrus</i>	1	0	0	0	1	Below Damchu Bridge/Bank Wangchu chu	R	27.204848333°	89.518766667°	4.15PM	4.40PM	1959
	2	Plumbeous Water Redstart	<i>Rhyacomis fuliginosus</i>	1	1	0	0	2	Below Damchu Bridge/Bank Wangchu chu	R	27.204848333°	89.518766667°	4.15PM	4.40PM	1959
	3	Blue Whistling Thrush	<i>Myophonus caeruleus</i>	1	0	0	0	1	Below Damchu Bridge/Bank Wangchu chu	R	27.204848333°	89.518766667°	4.15PM	4.40PM	1959
17	1	Oriental White-eye	<i>Zosterops palpebrosus</i>	1	1	0	0	2	Watsha	SL	27.227985000°	89.517805000°	2.30PM	2.50PM	2049
	2	Green-backed Tit	<i>Parus monticolus</i>	0	0	0	3	3	Watsha	SL	27.227985000°	89.517805000°	2.30PM	2.50PM	2049
18	1	Plumbeous Water Redstart	<i>Rhyacomis fuliginosus</i>	0	1	0	0	1	Damchu	R	27.262568333°	89.528373333°	1.10PM	1.30PM	1975
	2	Ashy Bulbul	<i>Hemixos flava</i>	0	0	0	1	1	Damchu	R	27.262568333°	89.528373333°	1.10PM	1.30PM	1975
	3	Green-backed Tit	<i>Parus monticolus</i>	2	1	0	0	3	Damchu	R	27.262568333°	89.528373333°	1.10PM	1.30PM	1975
19	1	Greater Yellownape	<i>Picus flavinucha</i>	0	0	0	1	1	Bunagu	CBLF	27.131851667°	89.541990000°	3.14PM	3.45PM	2025

	2	Mrs Gould's Sunbird	<i>Aethopyga gouldiae</i>	1	0	0	0	1	Bunagu	CBLF	27.131851667°	89.541990000°	3.14PM	3.45PM	2025
	3	Common Stonechat	<i>Saxicola torquata</i>	1	0	0	0	1	Bunagu	CBLF	27.131851667°	89.541990000°	3.14PM	3.45PM	2025
	4	Maroon Oriole	<i>Oriolus traillii</i>	0	0	0	2	2	Bunagu	CBLF	27.131851667°	89.541990000°	3.14PM	3.45PM	2025
20	1	Blue Whistling Thrush	<i>Myophonus caeruleus</i>	1	0	0	0	1	Chanachen	CBLF	27.129905000°	89.540391667°	4.20PM	4.50PM	1855
	2	White-throated Laughingthrush	<i>Garrulax albogularis</i>	3	3	0	0	6	Chanachen	CBLF	27.129905000°	89.540391667°	4.20PM	4.50PM	1855
	3	Wedge-tailed Green Pigeon	<i>Treron sphenura</i>	1	0	0	0	1	Chanachen	CBLF	27.129905000°	89.540391667°	4.20PM	4.50PM	1855
21	1	Rufous Sibia	<i>Heterophasia capistrata</i>	0	0	0	1	1	Bunagu	CBLF	27.136941667°	89.543556667°	3.30PM	4.00PM	1956
	2	Kalij Pheasant	<i>Lophura leucomelanos</i>	0	0	0	1	1	Bunagu	CBF	27.136941667°	89.543556667°	3.30PM	4.00PM	1956
	3	Oriental Turtle Dove	<i>Streptopelia orientalis</i>	1	1	0	0	2	Bunagu	CBF	27.136941667°	89.543556667°	3.30PM	4.00PM	1956
	4	Grey-headed Woodpecker	<i>Picus canus</i>	1	0	0	0	1	Bunagu	CBF	27.136941667°	89.543556667°	3.30PM	4.00PM	1956
	5	Grey-winged Blackbird	<i>Turdus boulboul</i>	0	1	0	0	1	Bunagu	CBF	27.136941667°	89.543556667°	3.30PM	4.00PM	1956
22	1	Green-backed Tit	<i>Parus monticolus</i>	1	1	0	0	2	Paga Goenpa	CF	27.286031667°	89.561640000°	9.56PM	10.20PM	2793
	2	Eurasian Jay	<i>Garrulus glandarius</i>	0	0	0	3	3	Paga Goenpa	CF	27.286031667°	89.561640000°	9.56PM	10.20PM	2793
	3	Black Bulbul	<i>Hypsipetes leucocephalus</i>	2	1	0	0	3	Paga Goenpa	CF	27.286031667°	89.561640000°	9.56PM	10.20PM	2793m
	4	Yellow-browed Warbler	<i>Phylloscopus inornatus</i>	4	1	0	0	5	Paga Goenpa	CF	27.286031667°	89.561640000°	9.56PM	10.20PM	2793
	5	Whiskered Yuhina	<i>Yuhina flavicollis</i>	2	0	0	0	2	Paga Goenpa	CF	27.286031667°	89.561640000°	9.56PM	10.20PM	2793
	6	Spotted Nutcracker	<i>Nucifraga caryocatactes</i>	0	0	0	1	1	Paga Goenpa	CF	27.286031667°	89.561640000°	9.56PM	10.20PM	2793
	7	Spotted Forktail	<i>Enicurus maculatus</i>	0	0	0	1	1	Paga Goenpa	CF	27.286031667°	89.561640000°	9.56PM	10.20PM	2793
	8	Rufous Sibia	<i>Heterophasia capistrata</i>	0	0	0	1	1	Paga Goenpa	CF	27.286031667°	89.561640000°	9.56PM	10.20PM	2793
23	1	Grey-backed Shrike	<i>Lanius tephronotus</i>	1	1	0	0	2	Sema Goenpa	MC	27.221111667°	89.547408333°	12.11PM	12.35PM	2858

	2	Common Stonechat	<i>Saxicola torquata</i>	1	0	0	0	1	Sema Goenpa	MC	27.221111667°	89.547408333°	12.11PM	12.35PM	2858
	3	Oriental White-eye	<i>Zosterops palpebrosus</i>	1	1	0	0	2	Sema Goenpa	MC	27.221111667°	89.547408333°	12.11PM	12.35PM	2858
	4	Black Bulbul	<i>Hypsipetes leucocephalus</i>	0	0	0	0	1	Sema Goenpa	MC	27.221111667°	89.547408333°	12.11PM	12.35PM	2858
24	1	Grey-headed Canary Flycatcher	<i>Culicicapa ceylonensis</i>	1	1	0	0	2	Tala Dam	CBLF	27.057935000°	89.555745000°	11.30PM	12.30PM	1646
	2	Verditer Flycatcher	<i>Eumyias thalassina</i>	1	1	0	0	2	Tala Dam	CBLF	27.057935000°	89.555745000°	11.30PM	12.30PM	1646
	3	Oriental Turtle Dove	<i>Streptopelia orientalis</i>	1	1	0	0	2	Tala Dam	CBLF	27.057935000°	89.555745000°	11.30PM	12.30PM	1646
	4	Striated Laughingthrush	<i>Garrulax striatus</i>	1	2	0	0	3	Tala Dam	CBLF	27.057935000°	89.555745000°	11.30PM	12.30PM	1646
25	1	Rufous Sibia	<i>Heterophasia capistrata</i>	1	1	0	0	2	Loknaykha	M	27.175115000°	89.545215000°	3.16PM	3.45PM	2635
	2	Green-backed Tit	<i>Parus monticolus</i>	1	3	0	0	4	Loknaykha	M	27.175115000°	89.545215000°	3.16PM	3.45PM	2635
	3	Grey-backed Shrike	<i>Lanius tephronotus</i>	0	0	1	0	1	Loknaykha	M	27.175115000°	89.545215000°	3.16PM	3.45PM	2635
26	1	Whiskered Yuhina	<i>Yuhina flavicollis</i>	3	2	0	0	5	Nayakha	CBLF	27.147963333°	89.513306667°	10.59PM	11.25AM	2533
	2	Scarlet Minivet	<i>Pericrocotus flammeus</i>	2	4	1	0	7	Nayakha	CBLF	27.147963333°	89.513306667°	10.59PM	11.25AM	2533
	3	Rufous Sibia	<i>Heterophasia capistrata</i>	0	0	0	2	2	Nayakha	CBLF	27.147963333°	89.513306667°	10.59PM	11.25AM	2533
	4	Mrs Gould's Sunbird	<i>Aethopyga gouldiae</i>	1	0	0	0	1	Nayakha	CBLF	27.147963333°	89.513306667°	10.59PM	11.25AM	2533
	5	White-spectacled Warbler	<i>Seicercus affinis</i>	1	1	0	0	2	Nayakha	CBLF	27.147963333°	89.513306667°	10.59PM	11.25AM	2533
	6	Cutia	<i>Cutia nipalensis</i>	1	0	0	0	1	Nayakha	CBLF	27.147963333°	89.513306667°	10.59PM	11.25AM	2533
	7	Maroon Oriole	<i>Oriolus traillii</i>	2	1	0	0	3	Nayakha	CBLF	27.147963333°	89.513306667°	10.59PM	11.25AM	2533
	8	Blyth's Leaf Warbler	<i>Phylloscopus reguloides</i>	1	0	0	0	1	Nayakha	CBLF	27.147963333°	89.513306667°	10.59PM	11.25AM	2533

27	1	Oriental White-eye	<i>Zosterops palpebrosus</i>	0	0	0	4	4	Damchu/Near stone quarry	CBLF	27.241790000°	89.524695000°	1.47PM	2.00AM	2042
	2	Stripe-throated Yuhina	<i>Yuhina gularis</i>	3	1	1	0	5	Damchu/Near stone quarry	CBLF	27.241790000°	89.524695000°	1.47PM	2.00AM	2042
28	1	Green-tailed Sunbird	<i>Aethopyga nipalensis</i>	0	1	0	0	1	Wangkha	CBLF	27.215716667°	89.509673333°	5.10PM	5.40PM	2287
	2	Russet Sparrow	<i>Passer rutilans</i>	4	3	0	1	8	Wangkha	CBLF	27.215716667°	89.509673333°	5.10PM	5.40PM	2287
	3	Rufous Sibia	<i>Heterophasia capistrata</i>	0	0	0	1	1	Wangkha	CBLF	27.215716667°	89.509673333°	5.10PM	5.40PM	2287
29	1	Rufous Sibia	<i>Heterophasia capistrata</i>	1	1	0	0	2	Chanachen	CBLF	27.1252516667°	89.533115000°	4.9PM	4.45PM	2117
	2	Red-tailed Minla	<i>Minla ignotincta</i>	2	1	0	0	3	Chanachen	CBLF	27.1252516667°	89.533115000°	4.9PM	4.45PM	2117
	3	Scarlet Minivet	<i>Pericrocotus flammeus</i>	1	2	0	0	3	Chanachen	CBLF	27.1252516667°	89.533115000°	4.9PM	4.45PM	2117
	4	Grey-headed Canary Flycatcher	<i>Culicicapa ceylonensis</i>	1	0	0	0	1	Chanachen	CBLF	27.1252516667°	89.533115000°	4.9PM	4.45PM	2117
	5	Common Stonechat	<i>Saxicola torquata</i>	0	1	0	0	1	Chanachen	CBLF	27.1252516667°	89.533115000°	4.9PM	4.45PM	2117
	6	Stripe-throated Yuhina	<i>Yuhina gularis</i>	1	3	0	0	4	Chanachen	CBLF	27.1252516667°	89.533115000°	4.9PM	4.45PM	2117
	7	Nepal Fulvetta	<i>Alcippe nipalensis</i>	4	2	0	0	6	Chanachen	CBLF	27.1252516667°	89.533115000°	4.9PM	4.45PM	2117
30	1	Green-tailed Sunbird	<i>Aethopyga nipalensis</i>	1	0	0	0	1	Chanachen	CBLF	27.117151667°	89.531488333°	1.40PM	2.00PM	2093
	2	Rufous Sibia	<i>Heterophasia capistrata</i>	1	1	0	0	2	Chanachen	CBLF	27.117151667°	89.531488333°	1.40PM	2.00PM	2093
	3	White-collared Blackbird	<i>Turdus albocinctus</i>	1	0	0	0	1	Chanachen	CBLF	27.117151667°	89.531488333°	1.40PM	2.00PM	2093
	4	Ashy Drongo	<i>Dicrurus leucophaeus</i>	1	1	0	0	2	Chanachen	CBLF	27.117151667°	89.531488333°	1.40PM	2.00PM	2093
	5	Blue Whistling Thrush	<i>Myophonus caeruleus</i>	1	0	0	0	1	Chanachen	CBLF	27.117151667°	89.531488333°	1.40PM	2.00PM	2093
	6	Golden-breasted Fulvetta	<i>Alcippe chrysotis</i>	2	2	0	0	4	Chanachen	CBLF	27.117151667°	89.531488333°	1.40PM	2.00PM	2093

31	1	Rufous Sibia	<i>Heterophasia capistrata</i>	2	2		0	4	Bunagu	CBLF	27.147238333°	89.544001667°	2.00PM	2.30PM	2164
	2	Common Stonechat	<i>Saxicola torquata</i>	1	0	0	0	1	Bunagu	CBLF	27.147238333°	89.544001667°	2.00PM	2.30PM	2164
	3	Drongo Cuckoo	<i>Surniculus lugubris</i>	1	0	0	0	1	Bunagu	CBLF	27.147238333°	89.544001667°	2.00PM	2.30PM	2164
	4	Common Hoopoe	<i>Upupa epops</i>	1	1	0	0	2	Bunagu	CBLF	27.147238333°	89.544001667°	2.00PM	2.30PM	2164
32	1	Large-billed Crow	<i>Corvus macrorhynchos</i>	2	2	3	0	7	Bunagu	CBLF	27.148668333°	89.543636667°	3.00PM	3.45PM	2194
	2	Rufous-bellied Niltava	<i>Niltava sundara</i>	0	1	0	0	1	Bunagu	CBLF	27.148668333°	89.543636667°	3.00PM	3.45PM	2194
	3	Green-backed Tit	<i>Parus monticolus</i>	2	1	2	0	5	Bunagu	CBLF	27.148668333°	89.543636667°	3.00PM	3.45PM	2194
	4	Darjeeling Woodpecker	<i>Dendrocopos darjellensis</i>	0	1	0	0	1	Bunagu	CBLF	27.148668333°	89.543636667°	3.00PM	3.45PM	2194
	5	Greater Yellowthroat	<i>Picus flavinucha</i>	1	1	0	0	2	Bunagu	CBLF	27.148668333°	89.543636667°	3.00PM	3.45PM	2194
	6	Common Buzzard	<i>Buteo</i>	1	0	0	0	1	Bunagu	CBLF	27.148668333°	89.543636667°	3.00PM	3.45PM	2194
33	1	Rufous Sibia	<i>Heterophasia capistrata</i>	0	0	0	1	1	Bunagu	CBLF	27.144223333°	89.437515000°	11.45PM	12.10PM	1963
	2	White-tailed Nuthatch	<i>Sitta himalayensis</i>	1	0	0	0	1	Bunagu	CBLF	27.144223333°	89.437515000°	11.45PM	12.10PM	1963
	3	Great Barbet	<i>Megalaima virens</i>	0	0	0	1	1	Bunagu	CBLF	27.144223333°	89.437515000°	11.45PM	12.10PM	1963
	4	Nepal Fulvetta	<i>Alcippe nipalensis</i>	1	1	0	0	2	Bunagu	CBLF	27.144223333°	89.437515000°	11.45PM	12.10PM	1963
	5	Blyth's Leaf Warbler	<i>Phylloscopus reguloides</i>	1	2	0	0	3	Bunagu	CBLF	27.144223333°	89.437515000°	11.45PM	12.10PM	1963
	6	Collared Grosbeak	<i>Mycerobas affinis</i>	0	0	0	2	2	Bunagu	CBLF	27.144223333°	89.437515000°	11.45PM	12.10PM	1963
34	1	Grey-headed Canary Flycatcher	<i>Culicicapa ceylonensis</i>	0	0	0	2	2	Bunagu	CBLF	27.143325000°	89.541656667°	10.00AM	11.00PM	2023
	2	Oriental White-eye	<i>Zosterops palpebrosus</i>	1	0	0	0	1	Bunagu	CBLF	27.143325000°	89.541656667°	10.00AM	11.00PM	2023
	3	Kalij Pheasant	<i>Lophura leucomelanos</i>	2	2	0	0	4	Bunagu	CBLF	27.143325000°	89.541656667°	10.00AM	11.00PM	2023

	4	Rufous Sibia	<i>Heterophasia capistrata</i>	2	1	0	0	3	Bunagu	CBLF	27.143325000°	89.541656667°	10.00AM	11.00PM	2023
	5	Green-backed Tit	<i>Parus monticolus</i>	0	0	0	2	2	Bunagu	CBLF	27.143325000°	89.541656667°	10.00AM	11.00PM	2023
	6	Hill Partridge	<i>Arborophila torqueola</i>	0	0	0	2	2	Bunagu	CBLF	27.143325000°	89.541656667°	10.00AM	11.00PM	2023
35	1	Long-tailed Minivet	<i>Pericrocotus ethologus</i>	1	2	1	0	4	Bunagu	CBLF	27.138765000°	89.543241667°	1.35PM	2.7PM	2035
	2	Rufous Sibia	<i>Heterophasia capistrata</i>	1	1	1	0	3	Bunagu	CBLF	27.138765000°	89.543241667°	1.35PM	2.7PM	2035
	3	Green-backed Tit	<i>Parus monticolus</i>	1	0	0	0	1	Bunagu	CBLF	27.138765000°	89.543241667°	1.35PM	2.7PM	2035
	4	Wedge-tailed Green Pigeon	<i>Treron sphenura</i>	0	0	0	0	1	Bunagu	CBLF	27.138765000°	89.543241667°	1.35PM	2.7PM	2035
	5	White-throated Laughingthrush	<i>Garrulax albogularis</i>	2	3	2	0	7	Bunagu	CBLF	27.138765000°	89.543241667°	1.35PM	2.7PM	2035
36	1	Green-tailed Sunbird	<i>Aethopyga nipalensis</i>	1	1	0	0	2	Chanachen	CBLF	27.129763333°	89.535958333°	1.57PM	2.30PM	2004
	2	Brown-throated Treecreeper	<i>Certhia discolor</i>	1	1	0	0	2	Chanachen	CBLF	27.129763333°	89.535958333°	1.57PM	2.30PM	2004
	3	Long-tailed Minivet	<i>Pericrocotus ethologus</i>	1	1	1	0	3	Chanachen	CBLF	27.129763333°	89.535958333°	1.57PM	2.30PM	2004
	4	Grey-headed Canary Flycatcher	<i>Culicicapa ceylonensis</i>	2	1	0	0	3	Chanachen	CBLF	27.129763333°	89.535958333°	1.57PM	2.30PM	2004
	5	White-throated Fantail	<i>Rhipidura albicollis</i>	1	0	0	0	1	Chanachen	CBLF	27.129763333°	89.535958333°	1.57PM	2.30PM	2004
37	1	Rufous Sibia	<i>Heterophasia capistrata</i>	2	0	0	0	2	Bunagu	CBLF	27.124833333°	89.541148333°	3.50PM	4.20PM	1952
	2	Ashy Drongo	<i>Dicrurus leucophaeus</i>	1	1	0	0	2	Bunagu	CBLF	27.124833333°	89.541148333°	3.50PM	4.20PM	1952
	3	White-tailed Nuthatch	<i>Sitta himalayensis</i>	1	1	0	0	2	Bunagu	CBLF	27.124833333°	89.541148333°	3.50PM	4.20PM	1952
	4	Green-backed Tit	<i>Parus monticolus</i>	1	0	1	0	2	Bunagu	CBLF	27.124833333°	89.541148333°	3.50PM	4.20PM	1952
	5	Spotted Laughingthrush	<i>Garrulax ocellatus</i>	1	0	0	0	1	Bunagu	CBLF	27.124833333°	89.541148333°	3.50PM	4.20PM	1952
38	1	Greater Yellownape	<i>Picus flavinucha</i>	0	0	0	2	2	Chanachen	CBLF	27.119335000°	89.538055000°	4.40PM	5.20PM	1841

	2	White-tailed Nuthatch	<i>Sitta himalayensis</i>	0	1	0	0	1	Chanachen	CBLF	27.119335000°	89.538055000°	4.40PM	5.20PM	1841
	3	Rufous Sibia	<i>Heterophasia capistrata</i>	1	1	0	0	2	Chanachen	CBLF	27.119335000°	89.538055000°	4.40PM	5.20PM	1841
	4	Brown-throated Treecreeper	<i>Certhia discolor</i>	1	0	0	0	1	Chanachen	CBLF	27.119335000°	89.538055000°	4.40PM	5.20PM	1841
39	1	Rufous Sibia	<i>Heterophasia capistrata</i>	0	1	0	0	1	Chimasam	CBLF	27.096495000°	89.527310000°	2.40PM	3.15PM	1892
	2	Kalij Pheasant	<i>Lophura leucomelanos</i>	0	0	0	2	2	Chimasam	CBLF	27.096495000°	89.527310000°	2.40PM	3.15PM	1892
	3	Blue Whistling Thrush	<i>Myophonus caeruleus</i>	0	0	0	1	1	Chimasam	CBLF	27.096495000°	89.527310000°	2.40PM	3.15PM	1892
	4	Ashy Drongo	<i>Dicrurus leucophaeus</i>	1	1	0	0	2	Chimasam	CBLF	27.096495000°	89.527310000°	2.40PM	3.15PM	1892
	5	White-tailed Nuthatch	<i>Sitta himalayensis</i>	0	1	0	0	1	Chimasam	CBLF	27.096495000°	89.527310000°	2.40PM	3.15PM	1892

Habitat Type : WBLF-Warm broadleaf forest, CBLF-cool broadleaf forest, BPF-Blue pine forest , MCF- Mixed coniferous forest, CF-coniferous forest, R-riverine, SL-shrubland , M-meadow, Cluster Size; M-male, F-female, J-Juvenile
Area=400 sq.m.

SN	No of tree species (1600 sq.m)	Shrub specie (1600 sq.m)s	Herb species (4 sq.m)
1	10	8	4
2	12	6	4
3	19	7	3
4	8	5	2
5	14	3	0
6	11	6	4
7	16	7	1
8	14	6	4
9	11	4	3
10	12	3	2
11	23	11	3
12	13	3	4
13	10	4	5

14	12	5	4
15	11	9	2
16	13	5	3
17	1	4	3
18	12	8	4
19	7	4	6
20	11	7	4
21	18	4	1
22	13	6	4
23	12	14	4
24	7	3	4
25	0	3	6
26	12	9	4
27	6	4	5
28	8	7	4
29	7	3	5
30	9	11	3
31	10	7	4
32	21	7	3
33	10	5	1
34	11	9	4
35	9	6	5
36	11	5	10
37	10	2	4
38	6	2	4
39	8	7	4

5.6 BIRDS CHECKLISTS WITHIN THE SURVEY PLOTS

SN	Common Name	Species	IUCN status
1	Ashy-throated Warbler	Phylloscopidae	Least Concern
2	Bay Woodpecker	Picidae	Least Concern
3	Black Bulbu	Pycnonotidae	Least Concern
4	Blue Whistling Thrush	Muscicapidae	Least Concern
5	Blue-fronted Redstart	Muscicapidae	Least Concern
6	Blyth's Leaf Warbler	Phylloscopidae	Least Concern
7	Brown Dipper	Cinclidae	Least Concern
8	Brown Parrotbill	Paradoxornithidae	Least Concern
9	Chestnut-bellied Rock Thrush	Muscicapidae	Least Concern
10	Chestnut-crowned Laughingthrush	Leiothrichidae	Least Concern
11	Chestnut-headed Tesia	Cettiidae	Least Concern
12	Common Kestrel	Falconidae	Least Concern
13	Crested Kingfisher	Alcedinidae	Least Concern
14	Darjeeling Woodpecker	Picidae	Least Concern
15	Eurasian Jay	Corvidae	Least Concern
16	Eurasian Tree Sparrow	Passeridae	Least Concern
17	Eurasian Wren	Troglodytidae	Least Concern
18	Golden Bush Robin	Muscicapidae	Least Concern
19	Gray Wagtail	Motacillidae	Least Concern

20	Gray-backed Shrike	Laniidae	Least Concern
21	Gray-headed Woodpecker	Picidae	Least Concern
22	Gray-hooded Warbler	Phylloscopidae	Least Concern
23	Gray-sided Laughingthrush	Leiothrichidae	Least Concern
24	Great Barbet	Megalaimidae	Least Concern
25	Great Cormorant	Phalacrocoracidae	Least Concern
26	Green-backed Tit	Paridae	Least Concern
27	Green-tailed Sunbird	Nectariniidae	Least Concern
28	Hill Partridge	Phasianidae	Least Concern
29	Himalayan Bluetail	Muscicapidae	Least Concern
30	Indian Blue Robin	Muscicapidae	Least Concern
31	Kalij Pheasant	Phasianidae	Least Concern
32	Large-billed Crow	Corvidae	Least Concern
33	Lemon-rumped Warbler	Phylloscopidae	Least Concern
34	Lesser Yellownappe	Picidae	Least Concern
35	Mountain Hawk Eagle	Accipitridae	Least Concern
36	Olive-backed Pipit	Motacillidae	Least Concern
37	Plumbeous Water Redstart	Muscicapidae	Least Concern
38	Red-billed Leiothrix	Leiothrichidae	Least Concern
39	Red-headed Bullfinch	Fringillidae	Least Concern
40	Red-tailed Minla	Leiothrichidae	Least Concern

41	<i>Red-vented Bulbul</i>	<i>Pycnonotidae</i>	<i>Least Concern</i>
42	<i>Rufous Sibia</i>	<i>Leiothrichidae</i>	<i>Least Concern</i>
43	<i>Rufous Woodpecker</i>	<i>Picidae</i>	<i>Least Concern</i>
44	<i>Rufous-breasted Accentor</i>	<i>Prunellidae</i>	<i>Least Concern</i>
45	<i>Rufous-capped Babbler</i>	<i>Timaliidae</i>	<i>Least Concern</i>
46	<i>Rufous-gorgeted Flycatcher</i>	<i>Muscicapidae</i>	<i>Least Concern</i>
47	<i>Rufous-winged Fulvetta</i>	<i>Pellorneidae</i>	<i>Least Concern</i>
48	<i>Rusty-fronted Barwing</i>	<i>Leiothrichidae</i>	<i>Least Concern</i>
49	<i>Scaly Thrush</i>	<i>Turdidae</i>	<i>Least Concern</i>
50	<i>Scaly-breasted Wren Babbler</i>	<i>Timaliidae</i>	<i>Least Concern</i>
51	<i>Small Niltava</i>	<i>Muscicapidae</i>	<i>Least Concern</i>
52	<i>Snow Pigeon</i>	<i>Columbidae</i>	<i>Least Concern</i>
53	<i>Spotted Elachura</i>	<i>Elachuridae</i>	<i>Least Concern</i>
54	<i>Spotted Forktail</i>	<i>Muscicapidae</i>	<i>Least Concern</i>
55	<i>Spotted Nutcracker</i>	<i>Corvidae</i>	<i>Least Concern</i>
56	<i>Straited Bulbul</i>	<i>Pycnonotidae</i>	<i>Least Concern</i>
57	<i>Straited Laughingthrush</i>	<i>Leiothrichidae</i>	<i>Least Concern</i>
58	<i>Streak-breasted Scimitar Babbler</i>	<i>Timaliidae</i>	<i>Least Concern</i>
59	<i>Stripe-throated Yuhina</i>	<i>Zosteropidae</i>	<i>Least Concern</i>
60	<i>Wallcreeper</i>	<i>Tichodromidae</i>	<i>Least Concern</i>
61	<i>Whiskered Yuhina</i>	<i>Zosteropidae</i>	<i>Least Concern</i>

62	<i>Whistler's Warbler</i>	<i>Phylloscopidae</i>	<i>Least Concern</i>
63	<i>White Wagtail</i>	<i>Motacillidae</i>	<i>Least Concern</i>
64	<i>White-browed Fulvetta</i>	<i>Paradoxornithidae</i>	<i>Least Concern</i>
65	<i>White-capped Redstart</i>	<i>Muscicapidae</i>	<i>Least Concern</i>
66	<i>White-tailed Nuthatch</i>	<i>Sittidae</i>	<i>Least Concern</i>
67	<i>White-throated Fantail</i>	<i>Rhipiduridae</i>	<i>Least Concern</i>
68	<i>white-throated Laughingthrush</i>	<i>Leiothrichidae</i>	<i>Least Concern</i>
69	<i>White-throated Needletail</i>	<i>Apodidae</i>	<i>Least Concern</i>
70	<i>Yellow-bellied Fantail</i>	<i>Stenostiridae</i>	<i>Least Concern</i>
71	<i>Yellow-billed Blue Magpie</i>	<i>Corvidae</i>	<i>Least Concern</i>

Annexure 5.7: Bunakha Terrestrial Survey Photographs (will update)



Figure 1: Terrestrial field surveys at Bunakha HEP project area



Figure 2: Social surveys for biodiversity at Bunakha HEP



Figure 3: Grey Langur



Asiatic Black Bear fruit residue



Himalayan Goral pellet



Barking Deer hoofprint



Figure 4: Sambar Deer dung



Wild Pig dropping



Leopard Cat scat

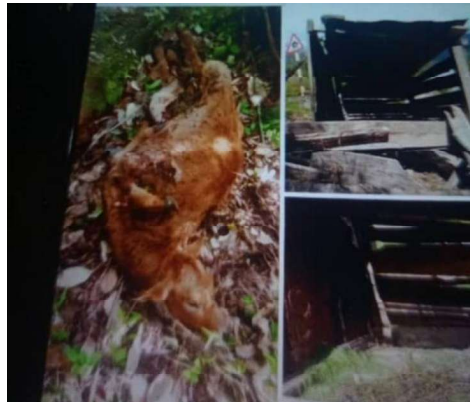


Figure 5: Red Panda rescued @ Former Range Officer, Tshimasham 2023 Cattle calf killed by Asiatic Black Bear @ May 2025



Figure 6: Blue pine forest

Broadleaf forest

Riparian Forest



Figure 7: Mixed Conifer forest



Shrubland



Meadow

Bird Photographs (will update)



Figure 8: Bird watching and data recording



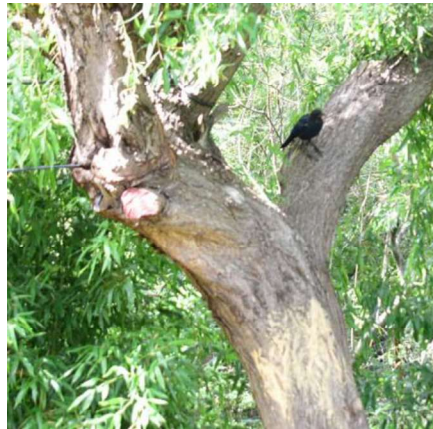
Figure 9: Oriental Turtle Dove



White-throated Laughingthrush



Figure 10: House crow



Blue Whistling Thrush



Figure11: White-browed Wagtail



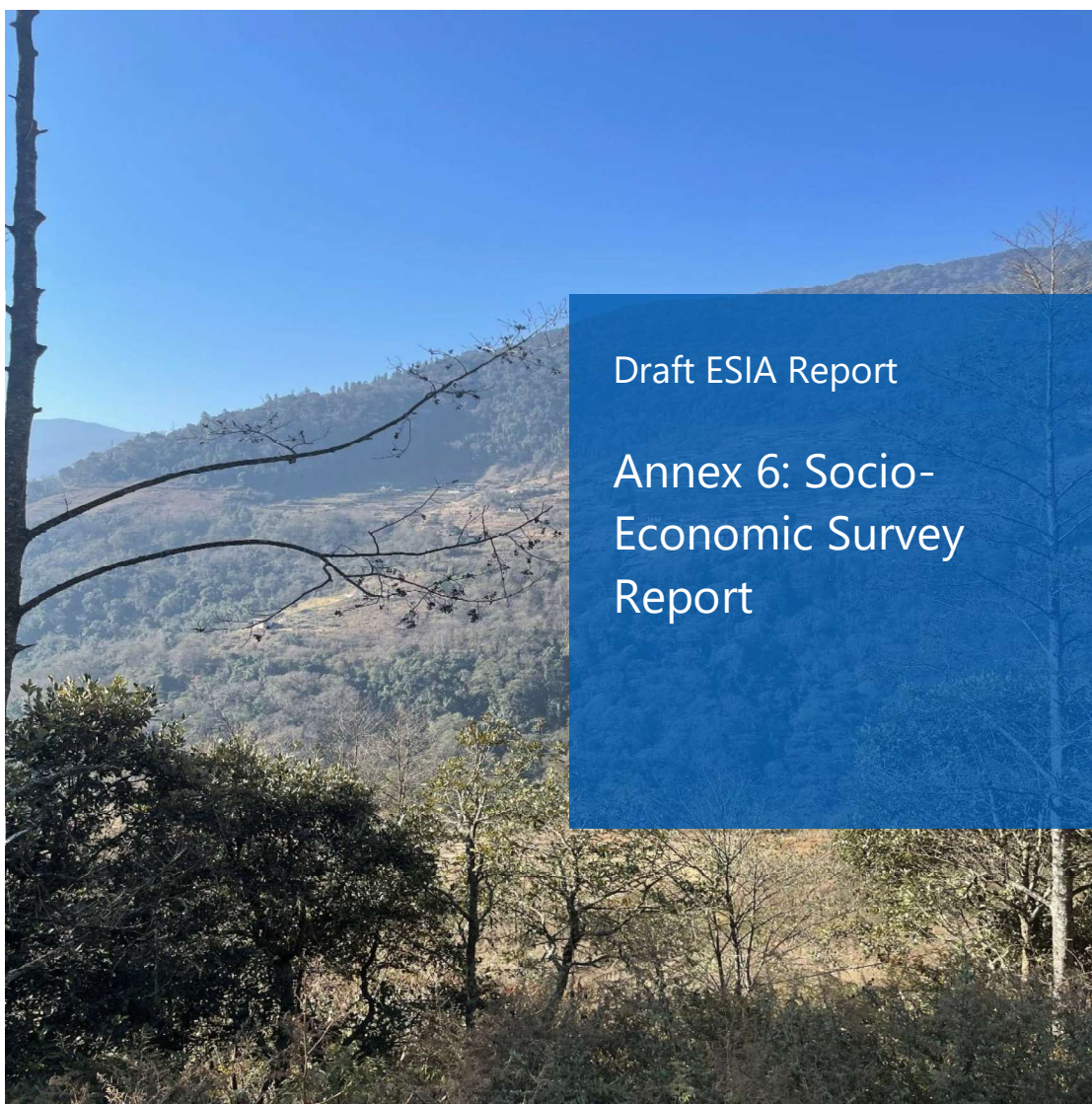
Ashy Drongo



Figure 12: Feather of Kalij Pheasant



Feather of Blue Whistling Thrush



FIS0001511

Bunakha Hydropower Project

Druk Green Power Corporation Ltd.

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Annex 1: Photographic Record of the Socio-Economic Survey

Annex 1.1: Nayakha village

Annex 1.2: Bunakha Chiwog

Annex 1.3: Geling Gewog Officials

Annex 1.4: Lobneykha Chiwog

Annex 1.5: Geling Gewog Meeting

Annex 1.6: Tsimalakha

Annex 1.7: Chanachen Chiwog

Annex 2: Socio-Economic Questionnaire Form

1 Introduction

Primary socio-economic data was collected at the Bunakha direct Aol, specifically at the two locations where several planned construction-related infrastructures are expected to be located (Figure 1):

- Chapcha Gewog, specifically the Bunakha Chiwog
- Geling Gewog, specifically the Chanachen Chiwog

Both Chiwogs are expected to experience some level of impact, with Bunakha likely to be more affected, particularly the paddy fields located below the national highway.

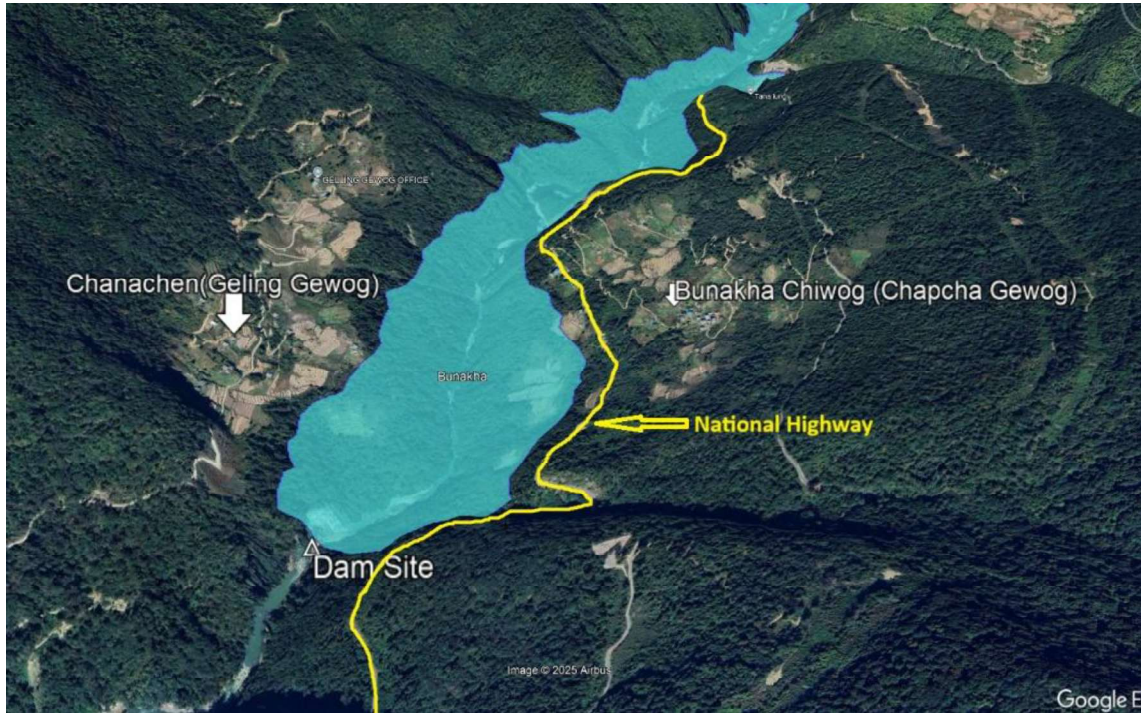


Figure 1: Bunakha and Chanachen Ghiwogs (next to the future Bunakha dam site)

1.1 Socio-economic data collection

The data collection was performed by conducting a socio-economic survey in April 25-29, 2025 at the households' level using a socio-economic questionnaire based on the Kobotool mobile application and simple random sampling techniques.

The socio-economic survey covered a total of 61 persons from 23 households (HH), representing 31% of the total of 74 households resident in the surveyed area (47 HH reside in Bunakha Chiwog and 27 HH reside in Chanachen Chiwog) (Figure 2).



Figure 2: Selected images of the socio-economic survey within Bunakha HPP's Aol in April 2025. Left: Bunakha Chiwog. Right: Chanachen Chiwog

The survey enumerators were trained on the usage of the survey questionnaire and mobile application prior to the mobilization to the field. The socio-economic survey captured:

- quantitative information on demographic, infrastructure, health, economic, livelihood income, expenditure and gender related aspects, allowing therefore the establishment of a robust baseline for the social impact assessment.
- A range of qualitative information, including:
 - Community perceptions and attitudes toward the Project
 - Anticipated benefits and potential adverse impacts
 - Possible resettlement and displacement concerns
 - Gender-specific issues affecting women and children
 - Other locally relevant social and economic issues

1.2 Consultations during the Socio-Economic Survey

Reports of these consultations are at present available in the Annexes to the Draft ESIA Report. Will be added to this Annex at a later stage for the sake of clarity.

The dam's backflow will extend about 17 km upstream, encompassing two additional Chiwogs — Tshamdrak and Shemanangkha, both under Chapcha Gewog (Figure 3). For this reason, additionally, during the socio-economic survey, consultation was performed with communities from Tsamdrak and Shemagangkha Chiwogs, allowing collection of their views and concerns.



Figure 3: Shemagangkha and Tsamdrak Chiwogs (upstream of the Bunakha dam)

At the time the survey was conducted, the exact locations of some infrastructures were not finalized and remained tentative. For example, the Client colony was initially proposed for Tsimalakha, and a stone quarry was proposed at Lobneykha. Due to this uncertainty, consultations were also carried out with communities in these villages to capture their perspectives (Figure 4).



Figure 4: Selected images of the consultations undertaken during the socio-economic survey within Bunakha HPP's AoI in April 2025. Left: Tsimalakha Chiwog. Right: Lobneykha Chiwog

Further information was gathered through a combination of KIIs and FGDs with:

- Affected households and their family members
- Community members
- Representatives of local institutions
- Local Government officials
- Officials from relevant district-level agencies, such as:
 - Dasho Dzongdag
 - Dasho Dzongrab

- Dzongkhag Planning Officer
- Dzongkhag Land Survey Office
- District Land Revenue Office
- Divisional Forest Office
- Local Government (LG) leaders
- Representatives from local-level institutions
- Other key informants, including women from the affected areas

These efforts were undertaken to ensure that all impacted groups were heard and that their concerns and suggestions were integrated into the Project planning and mitigation strategies.

2 Socio-Economic Data

2.1 Characteristics of the Surveyed Population

Characteristics	Information
Male	23
Female	38
Total persons surveyed	61
Total HHs surveyed	23
Family size	2.6

Women make up the majority of the surveyed population, accounting for about 62%, while men represent around 38% of the total of 23 HHs surveyed. The average household size of the surveyed household is 2.6 household members.

2.1.1 Age distribution

S.N.	Age group	Male	Female	Total persons	%
1	0-5	0	0	0	-
2	6-15	0	0	0	-
3	16-45	8	11	19	31.5
4	46-65	11	16	27	44.26
5	65 & over	4	11	15	24.59
	Total persons	23	38	61	100.00

There are no household members below the age of 15 living permanently at the surveyed HHs. School-age children attend schools located some distance away from the two communities, and they typically remain in school for more than nine months each year. Family members usually stay with these children to care for them during the school term.

If school-age children are discounted from the data, individuals aged 16 to 65 make up 75.76% of the population, representing the primary working-age group. Those above 65 years constitute 24.59%.

2.1.2 Gender distribution

Of the total 23 interviewed households, 17 are headed by males and 6 by females.

Gewog	Gender distribution		
	Male-headed HHs	Female-headed HHs	Total HHs
Chapcha-Bunakha	11	5	16
Geling - Chanachen	6	1	7
Total HHs	17	6	23

2.2 Material and Economic Assets

2.2.1 Employment

Employment is one of the key indicators of the economic conditions of the households interviewed. The data shows that approximately 85% of the population is engaged in farming, making it the dominant livelihood activity. This is followed by involvement in business and a range of other occupations, though these represent a much smaller share of the population.

Employment status	Employment category					Total persons
	Business	Civil servant	Farmer	Others	Student	
Bunakha Chiwog	4	1	38	2	1	46
Chanachen Chiwog			14	1		15
Total persons	4	1	52	3	1	61

2.2.2 Land holding

The distribution of land among the interviewed households was found to be unequal. The data indicates that 12 households possess less than 3 acres of land, while 11 households own more than 3 acres.

Chiwog	Dry land holding (in acres)						Total HHs
	< 1	1 – 3	3 – 5	5-7	7-9	Above 9	
Bunakha Chiwog	2	5	3	3	2	1	16
Chanachen Chiwog	1	4	1	1			7
Total HHs	3	9	4	4	2	1	23

2.2.3 Cash crops

Hazelnuts are the major cash crop cultivated in the project area. The primary purpose of cultivation is to sell the nuts in the market. The table below presents the number of households engaged in hazelnut cultivation.

Chiwog	Number of HHs growing hazelnut trees		
	No	Yes	Total HHs
Bunakha Chiwog	7	9	16
Chanachen Chiwog	5	2	7
Total HHs	12	11	23

2.2.4 Livestock possession

Livestock rearing is common practice on the project site. All of the interviewed HHs possess cattle but the number of heads varies. The table below shows the number of cattle heads raised by the interviewed HHs.

Chiwog	Number of cattle heads				Total HHs
	None	Up to 5	5 – 10	Above 10	
Bunakha Chiwog	5	6	4	1	16
Chanachen Chiwog		5	1	1	7
Total HHs	5	11	5	2	23

2.3 Cultivation Practices

None of the interviewed households were identified as sharecroppers or tenants. All respondents reported that they own the land they cultivate, having acquired it themselves. This indicates that tenancy and sharecropping practices are not present in the Project area.

Chiwog	Self-cultivation		
	Yes	No	Total HHs
Bunakha Chiwog	16	0	16
Chanachen Chiwog	7	0	7
Total HHs	23	0	23

2.3.1 Major crops

Rice, maize, and wheat are the major crops cultivated in the project area, complemented by the production of vegetables and cash crops. Potato is one of the most important cash crops and serves as a key supplement to the main cereal crops. Among vegetables, the most commonly grown are beans, radish, cabbage, cauliflower, and chilli, all of which contribute to household consumption and local market supply.

Crops	Nr. in Bunakha Chiwog	Nr. in Chanachen Chiwog
Rice	14	5
Maize	13	4
Millet	1	2
Barley	1	4
Wheat	8	4
Buckwheat	4	5
Potato	15	4
Cabbage	9	7
Cauliflower	9	7
Chilli	16	7
Radish	15	5
Beans	16	5

2.4 Food Sufficiency

Food sufficiency among the interviewed households was generally high. More than 90% reported that they are able to meet their food needs from their own agricultural production, indicating a strong level of self-reliance. The farmland in the village is considered to have high productivity, which contributes directly to this level of food security. The table below provides a detailed breakdown of household food sufficiency levels.

Chiwog	Food self-sufficiency		Total HHs
	Not sufficient	Sufficient	
Bunakha Chiwog	1	15	16
Chanachen Chiwog	1	6	7
Total HHs	2	21	23

2.5 Income and Expenditure

Income levels and household spending patterns recorded during the field survey showed considerable variation among respondents. The main sources of income include agriculture, seasonal labour, and remittances, but the contribution of each source differs widely from one household to another. As a result, overall income levels are not uniform.

Chiwog	Average annual income from all sources (Nu.)						Total HHs
	Up to 100,000	100,000 to 200,000	200,000 to 300,000	300,000 to 500,000	500,000 to 1,000,000	Above 1,000,000	
Bunakha Chiwog	4	2	2	3	3	2	16
Chanachen Chiwog	2	2		2		1	7
Total	6	4	2	5	3	3	23

Chiwog	Average annual expenses (Nu.)				Total HHs
	50,000 and below	50,000 to 100,000	100,000 to 500,000	Above 500,000	
Bunakha Chiwog	5	3	4	4	16
Chanachen Chiwog	1	1	5		7
Total HHs	6	4	9	4	23

2.6 Education

There is no school within the village, so children must attend schools in Chungkha, Kamji, or Tsimalakha. Chungkha and Kamji fall under Geling Gewog, while Tsimalakha is under Bjabcho Gewog. Children from Bunakha are enrolled in these schools, all of which are located at a considerable distance from both Chiwogs.

2.7 Health Services

Both Chiwogs lack a Basic Health Unit (BHU). Instead, they are served by Outreach Clinics (ORCs) for basic health needs. For more serious health concerns, residents travel to the District Hospital in Tsimalakha, which is the nearest facility equipped to handle more complex cases.

2.8 Renewable Natural Resources (RNR) services

Access to RNR services varies between the two Chiwogs:

- The Chanachen Chiwog under Geling Gewog has livestock, agriculture, and forestry services available within the Chiwog itself.
- Bunakha Chiwog, however, does not have these services locally. Residents must travel either to the Dzongkhag headquarters or to their Gewog Centre to access livestock, agriculture, or forestry support.

2.9 Human-Wildlife Conflict

All surveyed households reported human–wildlife conflict, with the majority (56.5%) experiencing crop damage, livestock predation, and threats to human life, while the remaining households reported various combinations of crop damage, livestock predation, and threats to human safety.

Human-Wildlife Conflict	Chiwogs		Total
	Bunagu	Chanachen	
Destroy agriculture crops	1	4	5
Destroy agriculture crops, endanger human life	3		3
Destroy agriculture crops, livestock predation	1	1	2
Destroy agriculture crops, livestock predation, endanger human life	11	2	13
Total	16	7	23

Existence of community-based initiatives or government programs to address human wildlife conflict

Chiwogs	community-based initiatives		Total
	No	Yes	
Bunagu	5	11	16
Chanachen	2	5	7
Total	7	16	23

2.10 Nature of Negative Impacts

Households expressed concerns regarding potential environmental and social impacts of the project, particularly dust and air pollution, blasting effects, noise, damage to agricultural land, crops and houses, water shortages, environmental degradation, and fair compensation for affected land. Additional concerns included labor influx, increased crime, traffic-related dust, and landslide risks. One respondent did not express any concerns.

Response	Bunagu	Chanachen	Total
Affected area may not be compensated well.	1		1
Agricultural production damage, drying up water sources, erosion.		1	1
Air pollution and impact on their crops	1		1
Blasting effects, environmental destruction if they can minimize the blasting	1		1
Chance of affecting the houses caused by blasting.	1		1
Due to movement of vehicle, there might be dust	1		1
Dust pollution leading to crop damage.	1		1
Dust pollution, blasting impact	1		1
Dust pollution, increase in crime rates		1	1
Dust pollution, land affect, house affect	1		1
Environment affect	1		1

Response	Bunagu	Chanachen	Total
Environmental impact, water shortages		1	1
Environmental impact, dust, blasting impact		1	1
Land affect		1	1
Might have land slide, blasting effects		1	1
Nature disruption.		1	1
Noise & Air pollution, blasting impact,	1		1
Social problems due to influx of workers	1		1
Their fields will be destroyed, dust	1		1
Water shortage, dust pollution and noise pollution, blasting impact	1		1
Water shortage, noise and air pollution, crime rates, blasting impact	1		1
Worried that the impacted land won't be compensated fairly.	1		1
No response	1		1
Total	16	7	23

2.11 Mitigation Suggestions to Negative Impacts

Households recommended mitigation measures including fair compensation for affected land, dust suppression through regular water sprinkling, minimizing blasting impacts, protecting water resources, managing construction activities responsibly, and conducting awareness programmes. Several respondents were unsure of suitable mitigation measures, while two households did not provide any response.

How can these negative impacts be mitigated?			
Response	Bunagu	Chanachen	Total
By being fair while compensating	1		1
Compensation of land to the people who are affected,		1	1
Different water source for the workers that will come the village, supervisor should organize and give awareness to the worker before hand	1		1
Doesn't know		1	1
Don't have any idea		1	1
Don't know	1	1	2
Don't know		1	1
Don't know	1		1
Expecting the government to compansate the same type of land(kamzhi for kanchi)	1		1
For the pollution if they could sprinkle water, awareness should be given and selling of alcohol and cigarettes should be limited		1	1
If the quarry is near the settlement, government should look into that		1	1
If they use their farm road , they can a least water their road so that it will stop the dust.	1		1

How can these negative impacts be mitigated?			
Response	Bunagu	Chanachen	Total
No comments	1		1
Pour water on the area where there is dust, for the blasting impact of the project could do in less	1		1
Project have to look after it	1		1
Project should look after it and mitigate the after impact of the project	1		1
Sprinkle water on the area where there is dust, different source of water for the workers	1		1
Sprinkle water, land compensation	1		1
That's up to the government	1		1
To water the road	1		1
No response	2		2
Total	16	7	23

2.12 Dependence on Forest Resources other than Timber

Most surveyed households (16 out of 23; 69.6%) reported that they depend on the surrounding forest (not of the inundation area) for resources other than timber, while 6 households (26.1%) reported no such dependence, and one household did not provide a response.

Response	Bunagu	Chanachen	Total
No	5	1	6
Yes	10	6	16
No response	1		1
Total	16	7	23

Among the 16 households that depend on forest resources, the most commonly collected products were ferns and mushrooms, primarily for household consumption. Some households also collected pine needles, firewood, and asparagus, while a few reported selling surplus forest products for additional income.

If Yes, what do they depend for?			
Response	Bunagu	Chanachen	Total
Fern and mushroom		1	1
Fern for self-consumption, pine tree	1		1
Fern, mushroom		1	1
Fern, mushroom, firewood, pine leave.		1	1
Fern	1		1
Mushroom and fern	1		1
Mushroom, fern	3		3
Mushroom, fern, asparagus and pine needle leaves	1		1

If Yes, what do they depend for?			
Response	Bunagu	Chanachen	Total
Mushrooms, fern	1		1
Self-consumption	2	1	3
Self-consumption and to sell		1	1
Self-Consumption like ferns and mushrooms		1	1
Total	10	6	16



Annex 1

Photographic Record of the Socio-Economic Survey

Annex 1: Photographic Record of the Socio-Economic Survey

Annex 1.1: Nayakha village



Annex 1.2: Bunakha Chiwog





Annex 1.3: Geling Gewog Officials



Annex 1.4: Lobneykha Chiwog



Annex 1.5: Geling Gewog Meeting



Annex 1.6: Tsimalakha



Annex 1.7: Chanachen Chiwog





Annex 2

Socio-Economic Questionnaire Form

Annex 2: Socio-Economic Questionnaire Form

Bunakha HPP

I. General Information

Record your current location

latitude (x,y °)

longitude (x,y °)

altitude (m)

accuracy (m)



II. Household Roster (list only those residing in the house for the last 6 months)

1

Name of HHH

Gender of HHH

☐ Male

☐ Female

Age of HHH

Marital status

- ☐ Never married
- ☐ Partner
- ☐ Married
- ☐ Divorced
- ☐ Separated
- ☐ Widow / widower

Occupation

- ☐ Farmer
- ☐ Civil servant
- ☐ Business
- ☐ Monk
- ☐ Student
- ☐ Others

Others (specify)

Education level

- ☐ None
- ☐ Primary level
- ☐ Lower Secondary level
- ☐ Middle Secondary level
- ☐ High School level
- ☐ Tertiary level
- ☐ NFE
- ☐ Monastic education

Employment status

- ☐ Farming
- ☐ Regular paid employee
- ☐ Casual employee
- ☐ Unpaid family worker
- ☐ Self employed
- ☐ Employer
- ☐ Others

Specify others

Skills

- ☐ Farming
- ☐ Weaving
- ☐ **Carpentry**
- ☐ Masonry
- ☐ Driver
- ☐ Others

Specify others

Disability

- ☐ Yes
- ☐ No

Kidu recipient

- ☐ Yes
- ☐ No

III. Land ownership & Land use (in acres)

Kamzhing

Chuzhing

Orchard land

Kitchen Garden

Pasture

Other type of land

Specify others

How much of Kamzhing is cultivated?

How much of Chuzhing is cultivated?

How much of Kitchen Garden is cultivated?

Reason for not cultivating the land

- ☐ No water
- ☐ No labor
- ☐ Damage from Wildlife
- ☐ Others

Others specify

Do you cultivate the land **yourself**?

- ☐ Yes
- ☐ No

If no, what is the arrangement for land cultivation?

- ☐ Share cropping by others
- ☐ Agricultural land Lease to others
- ☐ Other arrangement

Name the other arrangement

IV. Crop Production

Annual Rice production

Annual Maize production

Annual Barley production

Annual Buck wheat production

Annual Millet **production**

Annual potato production

Annual Chilli **production**

Annual Cabbage production

Annual Radish production

Annual Wheat production

Annual other crop production

Specify other crop

Amount on others

(Nu.)

Total annual income from all the above sources

(Nu.)

Do you grow hazel nut?

☐ Yes

☐ No

If yes, what is the quantity that you produce?

(In Kgs)

Do you grow walnut?

☐ Yes

☐ No

If yes, How much do you produce?

(In Kgs)

Do you grow other cash crops?

- ☐ Yes
☐ No

What other cash crops do you grow?

What is the quantity of produce of other cash crops?
(In kgs)

Do you use chemical Fertilizers for your agriculture?

- ☐ Yes
☐ No

If yes, Quantity in Kgs in a year.

Do you use Improved seeds for agriculture?

- ☐ Yes
☐ No

If Yes, quantity in Kgs per year?

Do you use Pesticides for agriculture?

- ☐ Yes
☐ No

If yes, quantity per year

Do you use Farm equipment for agriculture?

- ☐ Yes
☐ No

If yes, types of farm equipment.

- ☐ Power tiller
- ☐ Rice huller
- ☐ Pedal thresher
- ☐ Power thresher
- ☐ Harvester
- ☐ Oil expeller
- ☐ Other equipment

Specify other equipment

If no, why do you not use agricultural equipment??

- ☐ Cannot afford
- ☐ Land not suitable for farm equipment
- ☐ Equipment not available
- ☐ Other reasons

Specify other reasons

Does household own the equipment?

- ☐ Yes
- ☐ No

If No, how much do you pay for hiring equipment in a year?

Do you use irrigation for your agricultural activities?

- ☐ Yes
- ☐ No

If Yes, is there a well constructed irrigation channel?

- ☐ Yes
- ☐ No

Is the irrigation water needed for your fields enough throughout the year?

- ☐ Enough
- ☐ Not enough

If it is not enough, what could be the reasons?

- ☐ Channel not well maintained?
- ☐ Not enough water at the source
- ☐ Frequent damaged by floods/wild animals
- ☐ Channel Seepage
- ☐ Water theft
- ☐ Others

Specify others

If irrigation water is not enough, how do you manage water?

Do you have food self sufficiency throughout the year?

- ☐ Yes
- ☐ No

If No, how do you manage you food needs?

- ☐ Income from Job/service
- ☐ Income from Business
- ☐ Income from Remittances
- ☐ Credit
- ☐ Income from Fruit selling
- ☐ Income from Diary product
- ☐ Income from Labor
- ☐ From Land selling
- ☐ Income from Pension,
- ☐ Income from interest,
- ☐ Income from rent
- ☐ Income from Other sources

V. Livestock and Assets

Number of Cattle

Number of Pigs

Number of Poultry

Others (count)

Specify others

VI. Household Credit and finance

Have you availed any loan from any financial institutions?

☐ Yes

☐ No

If Yes, which financial institution?

☐ Bank of Bhutan

☐ Tashi Bank

☐ Druk Punjab Bank

☐ Bhutan National Bank

☐ Bhutan Development Bank Limited

How much have you taken as loan?

What was the reason for availing the loan?

☐ For agricultural purpose

☐ For house construction

☐ For purchase of farm equipment

☐ For purchase of vehicle

☐ For children's education

☐ For medical purpose

☐ For other purpose

Specify other purpose

What is the rate of interest you are paying?

What is the source of your repayment of the loan?

- ☐ From sale of agriculture produce
- ☐ From sale of livestock produce
- ☐ Payment from remittances received
- ☐ From income from the vehicle
- ☐ From income hiring of equipment
- ☐ From other sources

Specify other sources

Do you make some savings in a year?

- ☐ Yes
- ☐ No

If yes, where do you keep it?

- ☐ Bank
- ☐ At home
- ☐ Lend it to people
- ☐ Invest
- ☐ Others

Specify others

VII. Access to services

How often do you or your HH members visit the RNR Centre in a month?

How often do you or your HH members visit the Forest Range Office in a month?

How often do you or your HH members visit the Out Reach Clinic in a month?

How often do you or your HH members visit the BHU in a month?

How often do you or your HH members visit the Hospital in a month?

How often do you or your HH members visit the Shop/market in a month?

How often do you or your HH members visit the District Head Office in a month?

Do you have a school in your village?

- ☐ Yes
- ☐ No

If yes, what is the level of school?

- ☐ Extended Classroom
- ☐ Primary School
- ☐ Lower Secondary School
- ☐ Middle Secondary School
- ☐ Higher Secondary School

If you do not have school in your village, where do children of the village go to school?

- ☐ To the next village
- ☐ To **school** in other Gewog
- ☐ Keep with working relatives in other places
- ☐ Others

Specify others

What is the **level** of health facility in your village?

- ☐ ORC
- ☐ BHU
- ☐ Hospital
- ☐ No health facility

Do you have agriculture/livestock/forestry extension services located withing you village?
(RNR services)

- ☐ Yes, in the village
- ☐ No

If No, then where do you go for such services?

- ☐ Dzongkhag Head quarter
- ☐ Respective Gewog
- ☐ Another Gewog

VIII. Household income and expenditure

What are the main sources of income of the Household?

(More than one answer possible)

- ☐ Sale agricultural products (including cash crops)
- ☐ Sale of livestock products
- ☐ Sale of animals
- ☐ Business/trading
- ☐ Weaving
- ☐ Carpentry/masonry jobs
- ☐ Casual labour (on others farm and off-farm)
- ☐ House construction works
- ☐ Transporting goods (manually)
- ☐ Cash remittances received (contribution from employed relatives)
- ☐ Others

Specify Others

What is the average income annual income of the household from all the above sources?

What is the average annual expenses of the household?

What is your expenses on the following?

- ☐ Food grain
- ☐ **Vegetable**
- ☐ Salt, oil and spices
- ☐ Clothes
- ☐ Education
- ☐ Medical **treatment**
- ☐ Fuel
- ☐ Electricity
- ☐ Agriculture input
- ☐ Cattle food
- ☐ Interest payment
- ☐ Transport and Communication
- ☐ Religious function
- ☐ Social function
- ☐ Tea/coffee and citrate
- ☐ Meat
- ☐ Others

Specify income from other sources

IX. Perceived opinion on the Project

There will be Uninterrupted supply of electricity once the project is completed

- ☐ Yes
- ☐ No

Because of the project, there will be Easy market for agricultural produce

- ☐ Yes
- ☐ No

Because of the project, there will be Better education services

☐ Yes

☐ No

Because of the project, there will be Improved Access to health services

☐ Yes

☐ No

Because of the project, there will be Better and easy employment opportunities

☐ Yes

☐ No

Because of the project, there will be Better access to business opportunities

☐ Yes

☐ No

Because of the project, there will be Better road condition.

☐ Yes

☐ No

Because of the project, there will be Other opportunities

(List other opportunities)

There will be No benefits from the Project

☐ Yes

☐ No

Do you foresee negative impacts from the project?

☐ Yes

☐ No

If Yes, nature of negative impacts

How can these negative impacts be mitigated?

X. Vulnerability

In the last 12 months did you face difficulty with cultivating your land?

- ☐ Yes
☐ No

In the last 12 months did you face food sufficiency?

- ☐ Yes
☐ No

In the last 12 months did you face labour shortage?

- ☐ Yes
☐ No

In the last 12 months did you face difficulty with family members being sick?

- ☐ Yes
☐ No

In the last 12 months did you face crop damage from wild life?

- ☐ Yes
☐ No

In the last 12 months did you face water shortage?

- ☐ Yes
☐ No

In the last 12 months did you face difficulty from natural distasters?

- ☐ Yes
☐ No

In the last 12 months did you face with household members disability?

- ☐ Yes
☐ No

In the last 12 months did you face difficulty because only elderly members in the household?

- ☐ Yes
☐ No

In the last 12 months did you face difficulty because more unemployed member in the households?

- ☐ Yes
☐ No

Do any of the households depend on the river for anything?

- ☐ Yes
☐ No

If yes, what they depend on?

Is fishing activities practiced by any of the households either for income or for self-consumption?

- ☐ Yes
☐ No

If yes, how many households are engaged in it?

Do any of the households depend on the forest around the village for anything besides timber?

- ☐ Yes
☐ No

If Yes, what do they depend for?

XI. Gender

Who does most of the household works in the family?

- ☐ Male
☐ Female
☐ Both

Who does most of the work in the fields?

- ☐ Male
☐ Female
☐ Both

Who mostly takes care of the cattle?

- ☐ Male
☐ Female
☐ Both

Are there any income generating activities carried out by women only?

- ☐ Yes
☐ No

If yes, what are these?

Are there any income generating activities carried out by men only?

- ☐ Yes
☐ No

If yes, what are these?

Who goes to the community meeting most of the time?

- ☐ Male
☐ Female
☐ Who ever is free

Who makes most of the household decisions?

- ☐ Male
☐ Female
☐ Both

Are females equally represented in community meetings?

- ☐ Yes
☐ No

Have females been elected as local leaders in the community?

- ☐ Yes
☐ No

Who owns the household property?

- ☐ Male
☐ Female
☐ Joint ownership

Who mostly goes to the market/shop for household shopping?

- ☐ Male
- ☐ Female
- ☐ Who ever is free

Is there anything that the Bunakha project should consider for women?

- ☐ Yes
- ☐ No

If Yes, what is it?

Is there anything that the Bunakha project should consider for men?

- ☐ Yes
- ☐ No

If yes, what is it?

Do women have equal accessibility to the natural resources as men?

- ☐ Yes
- ☐ No

If No, what aspects are not equally accessible to women?

XII. Project interventions

Are you aware about the upcoming Bunakha HPP in your locality?

- ☐ Yes
- ☐ No

If yes, where did you hear from?

- ☐ Neighbours
- ☐ Family members
- ☐ Community meetings
- ☐ Media
- ☐ Others

What positive aspects do you foresee from the Bunakha HPP?

- ☐ Employment opportunities
- ☐ Market opportunities
- ☐ Land lease opportunities
- ☐ Renting opportunities
- ☐ Others

Specify others

What negative aspects do you foresee from the Bunakha HPP?

- ☐ **Social** problems with the workers
- ☐ Dust problem
- ☐ Noise problem
- ☐ Road congestion
- ☐ Disturbance to our holy sights
- ☐ Possibility of landslides in future
- ☐ Others

Specify others

XIII. Direct Project impact (to be asked to Project Impacted persons only)

Do you know that your house is getting impacted by the project?

- ☐ Yes
- ☐ No

If yes, from where did come to know about it?

- ☐ From the Gewog Officials
- ☐ From the Dzongkhag Officials
- ☐ From the project officials
- ☐ From the neighbours
- ☐ From other sources

Specify other sources

Nature of impact

- ☐ Only Land impacted
- ☐ Only House impacted
- ☐ Land and house impacted
- ☐ Land and Cowshed
- ☐ House and cowshed
- ☐ Land, house and cowshed
- ☐ Only cowshed
- ☐ Others

Specify others

How far is the house from the nearest road?

- ☐ Within 50 metres from the road
- ☐ 50 to 100 metres from the road
- ☐ More than 100 metres from the road

What percentage of land is likely to be impacted by the projected?

- ☐ Less than 20 percent
- ☐ 20 to 50 percent
- ☐ Between 50% to less than 100%
- ☐ 100%

What do you grow on the land that is going to be impacted by the project?

- ☐ Paddy
- ☐ Maize
- ☐ Wheat
- ☐ Cash crops
- ☐ Vegetable
- ☐ Others

Specify others

Was the house constructed by the family or inherited?

- ☐ Constructed by the family
- ☐ Ancestral Inheritance

If it was constructed by the family, when was your house constructed?

Visually Observation of the house as to what it is constructed of.

- ☐ CGI sheet roof, cement walls and floors
- ☐ CGI sheet, stone walls and stone/wood floors
- ☐ CGI sheet roof, wood walls and wood floors
- ☐ CGI sheet roof, thatch walls and floors
- ☐ Wooden roof, stone walls and stone/wood floors
- ☐ Wooden roof, wood walls and wood floors
- ☐ Others

Specify Others

Number of rooms

Connected with Electricity

- ☐ Yes
- ☐ No

Water supply in the house

- ☐ Inside the house
- ☐ Outside the house

Sanitation

- ☐ Toilet inside the house
- ☐ Toilet outside the house
- ☐ No formal toilet

Is the house rented out?

- ☐ Whole house rented out
- ☐ Only part of the house rented out
- ☐ Not rented

Besides this house, do you own any other house that you can stay if you are to be resettled?

- ☐ Yes, we have another house
- ☐ No, we don't have any other house

If you have another house, where is the house located?

- ☐ In the same Chiwog
- ☐ In the same Gewog
- ☐ Neighbouring Gewog
- ☐ Outside of the Gewog

Other than the land that is going to be impacted, do you have land elsewhere?

- ☐ Yes
- ☐ No

If yes, where do you have your land?

- ☐ In the same Chiwog
- ☐ In the same Gewog
- ☐ In another Gewog of the same Dzongkhag
- ☐ In another Dzongkhag

How much land do you have there?

in acres

In case some portion of your land is going to be taken by the project, are you willing to surrender the land?

- ☐ Yes
- ☐ No

If you are to be relocated, Where would you prefer relocation?

- ☐ In the same Chiwog
- ☐ In the same Gewog
- ☐ In the same Dzongkhag
- ☐ **Anywhere**

Since your house is being impacted, would you prefer cash compensation for the house or prefer the project to construct for you?

- ☐ Prefer Cash compensation
- ☐ Prefer project to construct for us

What would be the direct impact to your family due to loss of land to the project?

- ☐ Food shortages
- ☐ Hamper to our income because of good land being lost to the project
- ☐ That is the only cultivable land that we have
- ☐ Very small parcel of land remains if the land is taken by the project
- ☐ Others

Specify others

In case you face food deficiency, what would be your solution?

- ☐ Purchase from Market
- ☐ Share cropping of others land
- ☐ Work as daily wage workers
- ☐ Get totally resettled
- ☐ Seek govt. support
- ☐ Others

Specify others

What are the assets that you will be losing to the project?

- ☐ House and Khimsa only
- ☐ Wet Land only
- ☐ Dry land only
- ☐ Both wet and dry land
- ☐ All of the above
- ☐ Orchard only
- ☐ Private forest
- ☐ Others

Specify others
