Conservation Management Plan for Biological Corridor 07

(Connecting PNP-BWS-WCNP)

Jan 2023 - December 2032

Divisional Forest Office, Mongar
Department of Forests and Park Services
Ministry of Energy and Natural Resources

CONSERVATION MANAGEMENT PLAN FOR

BIOLOGICAL CORRIDOR 07

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Front cover photo: View of BC7 from Narongbi village under Menbi Gewog © Krishna Prasad Dimal

Back cover photo: View of BC7 from Phuningla under Tsenkhar Gewog © Krishna Prasad Dimal

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ROYAL GOVERNMENT'S ENDORSEMENT AND APPROVAL

SUBJECT: Conservation Management Plan of Biological Corridor 07 for the period Jan 2023 – Dec 2033

"In accordance with and as per the Forest and Nature Conservation Act of Bhutan, 1995"

Submitted for Approval

Chief Forestry Officer
Divisional Forest Officer, Mongar

Forwarded for Approval

Chief Forestry Officer
Nature Conservation Division

Recommended for Approval

DIRECTOR
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Approved by

SECRETARY
Ministry of Energy and Natural Resources

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On behalf of the management of the Divisional Forest Office, Mongar, I would like to thank all the staff for working tirelessly and timely coming up with the conservation management plan for Biological Corridor 07. I would also like to thank Dasho Dzongdag, local leaders and general public of Gangzur, Menbi, Menji and Tsamang under Lhuentse Dzongkhag Administration for the strong support and cooperation rendered to the management.

I would like to thank the Hon'ble Minister, Secretary and Director for your continued guidance and support towards the Divisional Forest Office, Mongar. I would like to thank the officials at the Nature Conservation Division for their valuable comments and suggestions. It helped us immensely in fine-tuning our management plan.

Lastly, I would like to thank Bhutan for Life Project for funding the rapid biodiversity and socio-economic survey and Global Environment Fund (GEF) NAPA III for funding the plan consultation workshops conducted in four Gewogs under the BC.

Karma Tempa
Chief Forestry Officer

EXECUTIVE SUMMARY

Bhutan has set aside more than 50% of its geographical area under protected areas for conservation of rare and endangered flora and fauna, out of which 7.73% of the total geographical area has been specifically designated as Biological Corridors (BC) to provide connectivity between the protected areas in the country. This connectivity ensures continuous gene flow through uninterrupted wildlife movements and succession of habitats. The BC7 is one amongst eight BCs in the country that is located in the eastern part of the country and falls within the administrative jurisdiction of Lhuentse and Mongar Dzongkhag. It covers Gangzur, Khoma, Metsho, Menbi, Minjay and Tsenkhar Gewogs under Lhuntse and Tsakaling and Tsamang Gewogs Mongar Dzongkhag. With an area of 419.66 km^2, it connects Wangchuck Centennial National Park in northwest, Phrumsengla National Park in southwest and west and Bumdeling Wildlife Sanctuary in northeast.

BC7 has numerous streams and tributaries draining into Kurichhu. The 15.26 km of Kurichu that is assessed as degraded catchment runs through BC7 forming indispensable migratory routes to avifauna and other lesser-known aquatic lives. It is joined by 43.48 km of streams and another 1,296.68 km of rivulets and tributaries. The globally threatened Pallas's fish eagle, river lapwing and black-necked crane feeds and roosts along these river stretches.

There are four major forest types in BC7 classified as broadleaf, chirpine, fir and mixed conifer forest. The one third of the BC area falls under broadleaf forest. The chirpine and fir forest has least coverage in the BC area. The other land cover type includes shrubs, meadows and built-up areas have least coverage in the BC area.

The floristic composition consists of 307 plant species belonging to 103 families from which 104 tree species, 47shrub species, 144 herb species including one endemic species were recorded. As of now 276 species of birds have been documented out of which 1 is endangered, 3 are vulnerable and 6 are near threatened as per the International Union for Conservation of Nature's (IUCN) Red List of Threatened Species. The camera trap studies and field surveys have revealed the presence of 28 species of mammals belonging to 11 families and 4 orders. Of these, 3 are Endangered, 8 are Vulnerable, and 5 are Near Threatened and 12 are Least Concerned as per IUCN.

A total of 193 households resides within the BC area and around 727 households that reside around the BC area also use BC for natural resources particularly timber, firewood and non-wood forest products. Agriculture and livestock farmingforms the mainstay of the livelihood of the farmers residing in and around the biological corridor. As of now tourism is the least income generating activity in the BC area. As human populations expand, the resources like water and land are becoming scarcer and incidences of crop damage, livestock predation and conflict is growing annually. Due to the expansion of agriculture and other anthropogenic pressures including development of infrastructures through intensive garnering of natural resources, habitat fragmentation and degradation has also become a pressing issue. Crop damage and livestock predation is one of the prominent issues faced by the people living in the BC area.Results from Bhutan Monitoring Effectiveness Tracking Tools, social and ecological survey identified five significant threats such as forest fire, grazing, farm road construction, electrical transmission line and illegal harvesting of timbers on the flora in BC7.The natural disasters such as landslides, erosions and frequent roadblocks are also posing serious problems to the lives of people. There is also a rise in water problems in the Gangzur area leading to conflicts with upstream and downstream users.

In line with planning-oriented analyses carried in the perspectives of social, ecological, and management effectiveness, and subsequent SWOT matrix, the management intervention measures were proposed to benefit flora, fauna and people living in and around the corridor. Through wide consultations with the key stakeholders, general public and exhaustive discussions with the staff in series of meetings, the Divisional Forest Office intends to achieve its visions and missions through 5 objectives, 17 outputs and 57 actions all geared towards protecting the keystone and flagship species, mitigating conflicts between BC residents and wild animals, scientific management of key natural resources in participatory manner, and strengthening the institutional capacity of the management in conservation of natural resources. The implementation of planned activities is scheduled to begin from the beginning of July 2022 till the end of June 2032.

The progress towards achievement of strategic goals and objectives will be periodically monitored as the indicators are explicitly stated in a comprehensive logical framework. It is sincerely hoped that all key collaborators and stakeholders would render optimum support towards fulfillment of the management goals and objectives.

TABLE OF CONTENT

TABLE OF FIGURES

LIST OF TABLES

CHAPTER I:
INTRODUCTION

1.1. Bckground of biological corridors in Bhutan

Bhutan Biological Conservation Complex (B2C2) aka Biological Corridor (BC) system in Bhutan started as early as 1999 as a "Gift to the Earth from the people of Bhutan" by Her Majesty Ashi Dorji Wangmo Wangchuck. Bhutan has set aside 51.44 % of its geographical area under protected areas for conservation of rare and endangered flora and fauna, out of which 7.73 % (2966.54 km^2) of the total geographical area has beens pecifically designated as BC that provides connectivity between different protected areas in the country (Fig.1). This connectivity will ensure continuous gene flow through uninterrupted wildlife movements and succession of habitats. Linkage of protected areas through a string of corridors including areas of forests and low-level human disturbances will enable wildlife to move between protected areas and will greatly increase the conservation values of these protected areas as well as in buffering against climate change.

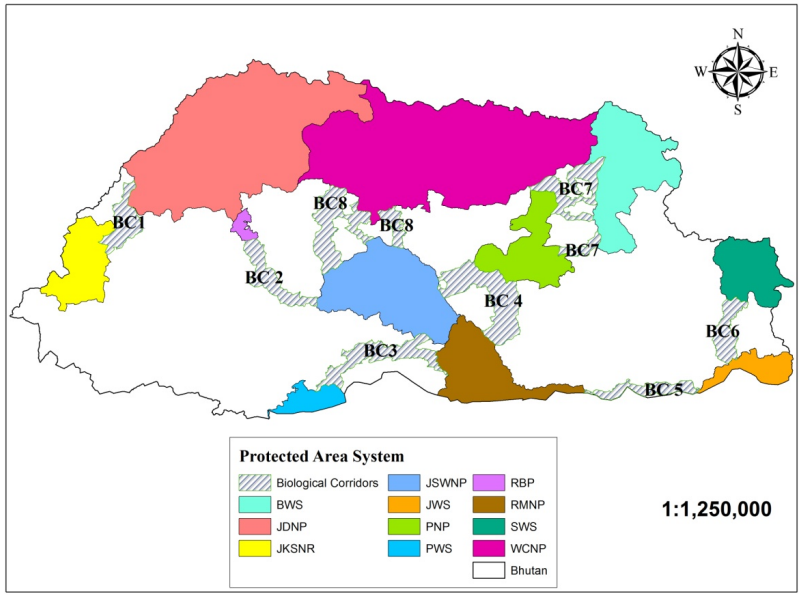

Figure 1: Protected Area map of Bhutan. The country has 5 national parks, 4 wildlife sanctuaries, 1 strict nature reserve and 8 biological corridors

1.2. Brief functions of the biological corridors

BC is a geographically defined area that provides connectivity between natural or modified landscapes, ecosystems, and habitats, and ensures the conservation of biodiversity as well as ecological and evolutionary processes. Corridors enable migration, colonization, and minimal interbreeding of flora and fauna by connecting larger areas of habitat. Corridors are essential for the maintenance of ecological processes, including but not limited to movement of animals and the continuation of viable populations. Without proper wildlife corridors, wildlife populations tend to become isolated within the areas and as a result can face multiple natural and anthropogenic threats. Isolated populations can become more vulnerable to threats such as poaching, disease outbreaks, genetic inbreeding, and physiological changes, which at the end can affect the reproductive success of entire populations. Therefore, BC's were established mainly to connect the protected area network for efficient gene flow and to avoid the inbreeding of wild populations so as to tackle genetic drift.

The functions of the BC's in Bhutan have been defined as:

- to provide conserved, secured habitats to facilitate dispersal or migration of species between core areas;
- to sustain ecological and environmental flows;
- to prevent genetic inbreeding and erosion of genetic variability; and,
- to provide supplementary feeding habitats for redpanda and clouded leopard

1.3.Brief information of Biological Corridor Number 07 (BC7)

The BC7 is located in the eastern part of the country and falls within the administrative jurisdiction of Lhuentse and Mongar Dzongkhag. It covers Gangzur, Khoma, Metsho, Menbi, Minjay and Tsenkhar Gewogs under Lhuntse and Tsakaling and Tsamang Gewogs Mongar Dzongkhag (Table 1). With an area of 419.66 km^2, it connects Wangchuck Centennial National Park (WCNP) in northwest, Phrumsengla National Park (PNP) in southwest and west with two strands and Bumdeling Wildlife Sanctuary in northeast. It extends from 27.581381°N, 91.079231°E east to 27.627670°N 91.278289°E in the west and 27.825163°N 91.304039°E north to 27.402930°E 91.227943°N south. BC7 has an altitudinal variation from 753 m in the south toover 4328 m in the north. It comprises four forest types viz; broadleaf forest (74.20 %), mixed conifer forest (17.36 %), chirpine forest (5.63 %) and fir forest (2.81 %). Ever since its declaration, no scientific

interventions have been implemented to bring this corridor under management.

Table 1: Gewog jurisdictions falling under BC7

Dzongkhag	Gewog	Area (km2)	Area (%)
Lhuentse	Gangzur	153.02	36.46
	Khoma	105.25	25.08
	Menbi	40.76	9.71
	Minjay	31.88	7.60
	Tsenkhar	51.19	12.20
	Metsho	8.7	2.07
Mongar	Tsamang	24.06	5.73
	Tsakaling	4.8	1.14

Vision, Mission, Goal and Objectives

Vision: A structurally functional corridor for wildlife movement and genetic dispersal between protected areas of Bhutan

Mission: To secure functional habitat contiguity between three protected areas of PNP, WCNP and BWS through enhanced climate smart management of biodiversity and engagement of communities.

Goal: Secure BC7 as a core habitat for migration of species between 3 major protected areas by 2032

- To contribute towards participatory landscape conservation and ensure the functionality of BC7 in pursuit of achieving the above stated mission and vision.
- To provide baseline information and guidance in implementing the proposed activities through the time frame of 10-year management plan period

Objective:

The objectives are to;

Objective 01: To maintain viable population of flora and fauna

Objectives 2: To ensure sustainable utilization of forest resources

Objective 3: To enhance socio-economic wellbeing of the communities

Objective 4: To enhance institutional capacity to deliver effective service

Objective 5: To strengthen environment education and interpretation on biodiversity conservation and waste management

Scope of the plan

In order to scientifically manage the BC7, a wide range of relevant activities are proposed in the plan. The activities proposed in the plan are in line with 12th Five Year Plan of Department of Forests and Park Services and alignment to the threats identified in the corridor. This plan is expected to balance biodiversity conservation along with enhancement of livelihood of the people living in and around the corridor. In order to cater successful implementation of the planned activities, the Divisional Forest Office-Mongar should seek external funding assistance apart from Government funding. The 10 Year Plan shall come into force with effect from 1st January, 2023 and expires on 31stDecember 2032.

CHAPTER II:
CURRENT STATUS

2.1.Physical feature

2.1.1. Boundary descriptions

The BC7 consists of two isolated strands; a strand from the former northern corridor and another from the former BC7. The BC links with three protected areas; Wangchuck Centennial Park (WCNP) in the northwest, Bumdeling Wildlife Sanctuary (BWS) in the northeast and Phrumsengla National Park (PNP) in the southwest (Fig. 2). The corridor shares boundary with Tsakaling and Tsamang Gewogs under Mongar (28.86 km^2) and Menbi, Gangzur, Khoma, Minjey, Metsho and Tsenkhar Gewogs unders Lhuentse Dzongkhag (390.8 km^2).

Figure 2: Boundary of BC7 showing the jurisdictions of Gewogs falling under it. The BC boundary connects with Bumdelling Wildlife Sanctuary in the east, Wangchuck Centennial National Park in the northwest and Phrumsengla National Park in the southwest.

The boundary of the BC7 aligns along the prominent natural features like river and streams, drainage, ridges and foot trails mainly originating from boundary edges of national parks and wildlife sanctuary. The boundary is not just restricted to complete state reserved forest land but also includes registered agricultural land and settlements.

The upper most strand of BC7 boundary in Gangzur Gewog originates from southern edge of WCNP (27.702858; 90.981704) and follows Doksumchu. From there it runs along edge of Tsholing village and meets Brauchu (27.737031; 91.114714) and further extends to Tashi Peling ridge of Lingbi (27.723729; 91.122612). It then ascends to Phagizor (27.714261; 91.11478) crossing Kilong-chu (27.700138; 91.12594). From Kilong-chu it follows its small stream till Gonserpang and traverse from Janchubling to Yodra-Goenpa road (27.684916; 91.133665). Then it follows Mongling-chu till NamchaDur stream confluence (27.682928; 91.158181) and follows Khizugang and ascends to Japhegor of Jang village (27.672118; 91.152714). Following the Dokola ridge (27.659995; 91.146045) with an elevation of 2238 m, it reaches Jang-Goenpa (27.654007; 91.165607). From Jang-Goenpa, it descends along Lekpagang-Chu from till Pangchung La ridge point (27.655449; 91.182867). It then ascends to Pangchung La (27.651392; 91.192933) drops to Kurichu at (27.665037; 91.207057) at an elevation of 1154 m. From there it follows Kurichu till Thimyul (27.718974; 91.153504) and ascends to Phoma (27.731944; 91.153938). It then drops to Shawarong-chu (27.732518; 91.148588) and continues till it connects WCNP (27.782901; 91.180452) at an elevation of 2398 m. Following WCNP boundary, it enters Khoma Gewog (27.794583 E91.230339) and connects to BWS boundary.

It continuously shares its boundary with BWS under Khoma Gewog and descends into Khoma-chu (27.827938; 91.314573). Following the Khoma-chu till Labar (91.314573; 91.272966) and it then ascends to Kama La entering Minjey Gewog (27.642636; 91.268435) until it reaches Kama La (27.627854; 91.27918) at 3453 m. From Kama La it detaches its boundary from BWS at and makes a sharp drop following Lhathoka ridge and joins Kurichu (27.639251; 91.218963) intersecting Lhuentse-Mongar highway (27.641901; 91.218695).

The inner loop of boundary extends from the confluence of Khomachu and Kurichu (27.663962; 91.208829) running along the edge of Khoma village. It reaches Sengegong-chu (27.67261; 91.219035) and ascends along trails and passes through Lawa village (27.686028; 91.198365). It continues along thetrail towards Timula Lhakhang (27.711499; 91.192099) and follows the same trail until Wangla (27.73912; 91.181985). From there it follows a ridge towards Thongthong

(27.736553; 91.203381) and then follows a stream till Zhangzhong-chu (27.732496; 91.213155). It ascendsa ridge and follows the trail towards Zhazhong (27.72648; 91.234808). Following the stream joining Maniwakang-chu (27.716897; 91.24065) below Shawa Goenpa, it reaches the lower part of Maniwakang (27.716897; 91.24065). From there it follows the stream and heads towards Nangring top (27.716897; 91.24065) above Lukchu Goenpa. It descends along Nangring ridge where it meets a trail near Khoma Gewog Centre (27.686023; 91.23238). Then it follows a stream and diverts along another stream (27.678648; 91.257838) near Baptong. Following the stream, it ascends to Binakhar ridge (27.64923; 91.251477) at an elevation of 2804 m. It then descends down along Nonodila ridge near Nyamlamdung and joins the Kurichu completing a loop in Khoma.

Following the Blaktho ridge from Kurichu near Jabin, it enters into the Menbi Gewog landscape. Taking a turn from Tharmling (27.633978; 91.185907), it reaches Zarthang Goenpa, then to Karney Goenpa and Pachola ridge (27.622226; 91.166756). From Pachola it drops to Begangchu (27.611998; 91.155056) and follows Salem-chu. Following Salem-chu it reaches to Yangposhing (27.60159; 91.132955) crisscrossing olden trails at northeast leading to Aie Lhamo. From Yangposhing it follows a stream to Chudigang-chuin northeast direction until it reaches Rawabee Goenpa. Then it follows old trails towards Damchogang and enters Kurichu following Majabeegang ridge. After crossing Kurichu it again enters Minjey Gewog boundaryalong the stream and follows BWS (27.574793; 91.262222) boundary till the drainage meets Rogam Ri(27.557097; 91.257564). Then it runs along Rongmanchu until it joins Kurichu. Again it enters Menbi Gewog via Yomey and follows Namnangpang through Bunuphung entering into Metsho Gewog.

Following Bunuphung ridge, it reaches the summit of Frangfrangla and Namogurdung where the boundary of Menbi and Metsho Gewog meets. Following a stream which later joins Yungichu (27.581898; 91.07897) and then join the PNP boundary in Metsho Gewog. It continues to share its boundary with PNP along a stream and reaches Ai Lhamo (27.622427; 91.109984) where a boundary of Gangzur, Menbi and Metsho Gewogs meet at a summit. From the PNP boundary, it drops down along the Kyidloong stream (27.679679; 91.091576). The BC boundary detaches from PNP after reaching Gangzur Gewog (27.683964; 90.990448). This completes the loop of the northern corridor strand.

The isolated strand of the BC7 that links BWS-PNP in Tsenkhar Gewog sweeps a small portion of Tsakaling in Mongar extending to Galapong under Tsamang Gewog. The boundary emerges from the lower and northwest part of BWS at Phunyingla (27.511793; 91.281176) that is located at an elevation of 3880m. Then it continues to follow Phunyingla ridge until it intersects with Damthang-Aja trail (27.500091; 91.282444) at an elevation of 3562 m. It further descends from Phunyingla and connects to Dongchenla (27.479449; 91.294381) at an elevation of 3328 m. Following Dongchenla, it continues to share its boundary with BWS until it converges with Sophula ridge (27.437772; 91.277574) at an elevation of 3743 m.

After the boundary detaches from BWS at Sophula and Dongchenla confluence, it continues to descend down the ridge via Takambi village (27.401946; 91.227918) in Tsakaling Gewog. Later it meets with Chimungchu (27.412601; 91.220619) and follows the stream until it reaches Kurichuafter crossing Lhuentse-Mongar highway at Autsho Chorten (27.412601; 91.220619). It then enters into Tsamang Gewog of Mongar Dzongkhag following Shemkichu where it joins again with the PNP boundary (27.402839; 91.154357). It follows a trail leading to Ganglapong village (27.412968; 91.146155) until it reaches ridge top (27.401354; 91.108953). It continues to follow the PNP boundary till Wabragchu at Rindibee (27.443919; 91.116798) below Khooling village. Then it follows Wabragchu and again connectsKurichu (27.434997; 91.171606). It then follows an uphill trail leading to Namdroling Dratshang (27.439227; 91.203403) until Phawan Khoe (27.469907; 91.237279). It follows Fawanchu towards Dekiling and Fawantoe. It continues along Fawanchu and joins BWS at Phunyingla connecting the loop.

2.1.2. Water bodies

BC7 has numerous streams and tributaries draining into Kurichhu. The Kurichhu is one of the sub-basin tributaries of Manas watershed in the country. The 15.26 km of Kurichu that is assessed as degraded catchment runs through BC7 forming an indispensable migratory route for avi-fauna and other lesser-known aquatic diversity. Kurichu is joined by 43.48km of streams and another 1,296.68 km of rivulets and tributaries. The globally threatened Pallas's fish eagle, river lapwing and black-necked crane feeds and roosts along this river stretch. The vulnerable species of otters are also recorded feeding along Kurichu making it one of the significant wetland habitats.

Due to the presence of several wetlands and seasonal ponds in the upper ridges of forest, it forms an important habitat for wildlife populations and important catchment areas for the downstream communities.

2.1.3. Climate

Weather data from the past 10 years (2011-2020) showed that the highest average maximum temperature of 25.4 ° C (2016) and lowest average minimum temperature of 10.7° C (2013) was recorded in the BC area (Fig. 3A). The highest average precipitation recorded was 3.32 mm in 2016 and lowest of 1.01 mm in 2013 (Fig. 3B). Meteorological data has been derived from station records of Sumpa under Lhuntse Dzongkhag from the Meteorology Section, Department of Hydro-met Services, Ministry of Economic Affairs, Thimphu.

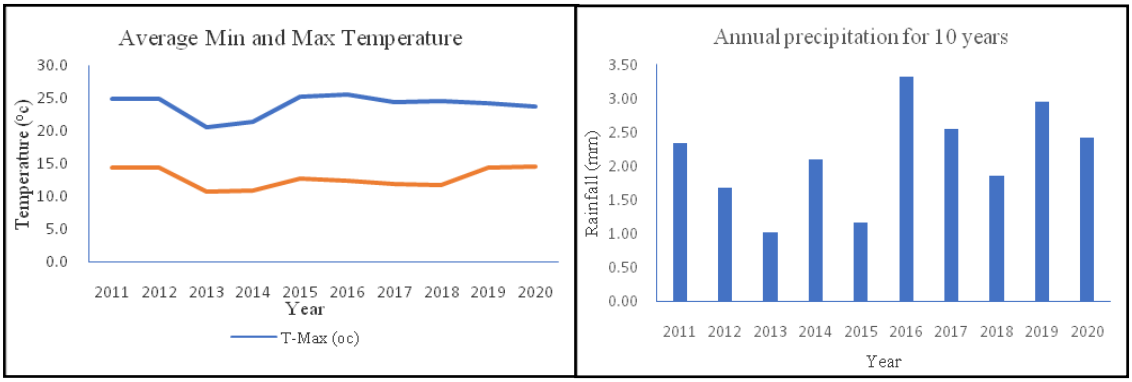

Figure 3: The average min and max temperature in BC area (3A) and annual precipitation in BC area for last 10 years (3B)

2.2.Biological features

2.2.1. Vegetation and forest types

There are four major forest types in BC7 categorically broadleaf forest, chirpine forest, fir forest and mixed conifer forest. About 70% of BC area falls under broadleaf forest and followed by mixed conifer forest (16%) (Fig. 4). Among different forest types, chirpine (5%) and fir (3%) forest has least coverage in the BC area. The other land cover type includes shrub (3%) and meadows (1%). Landslide (0.05%) and built up (0.05%) areas have least coverage in the BC area.

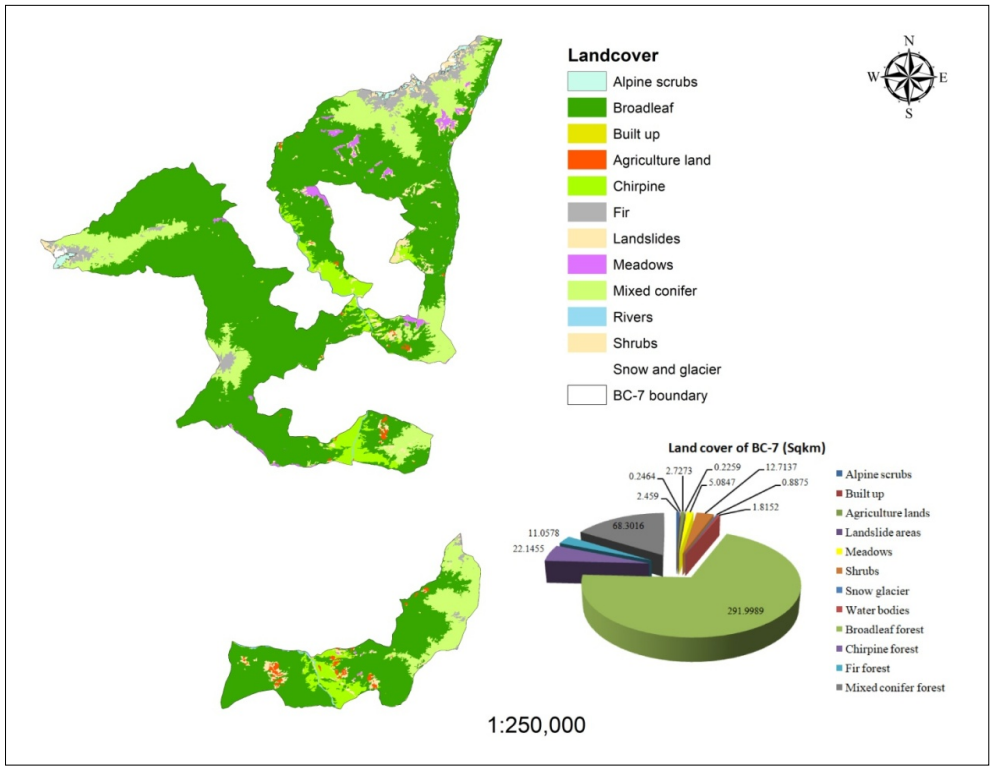

Figure 4: Landcover landuse map of BC7. The pie chart shows area (Sqkm) of BC area falling under each land cover category

2.2.2. Floral diversity

The floristic compositions in BC7 consists of 307 plant species belonging to 103 families from which 104 tree species (Annexure I), 47shrub species (Annexure II), 144 herb species including one endemic species (*Corallo discuscooperi)*(Annexure III), five climber species (*Clematis* spp, *Hedera nepalensis, Tetrastigma serrulatum, Smilax* sppand *Piper* spp),three bamboo species(*Bambusease* spp, *Yushania microphylla* and *Yushania*s spp), three terrestrial orchid species(*Calanthe* spp, *Calanthe sylvatica* and *Galeola lindleyana)* and one cane species (*Plectocomia himalayana*) were recorded.

Floral species composition of BC7 includes five live forms such as conifer trees, deciduous trees, evergreen trees, evergreen shrubs, and deciduous shrubs. The overall life-form composition appeared to be considerable proportion of deciduous trees with 32.04 %, followed by coniferous trees (28.13 %), evergreen trees (23.8 %), evergreen shrub (12.9 %) and deciduous shrubs (3.01 %) from 5 Gewogs (Fig. 5). Khoma and Tsenkhar Gewogs are predominantly composed of coniferous trees and Minjey, Gangzur and Menbi with deciduous trees. The evergreen shrubs are found predominant in Menbi Gewog. The deciduous shrubs were barely recorded in all five Gewogs.

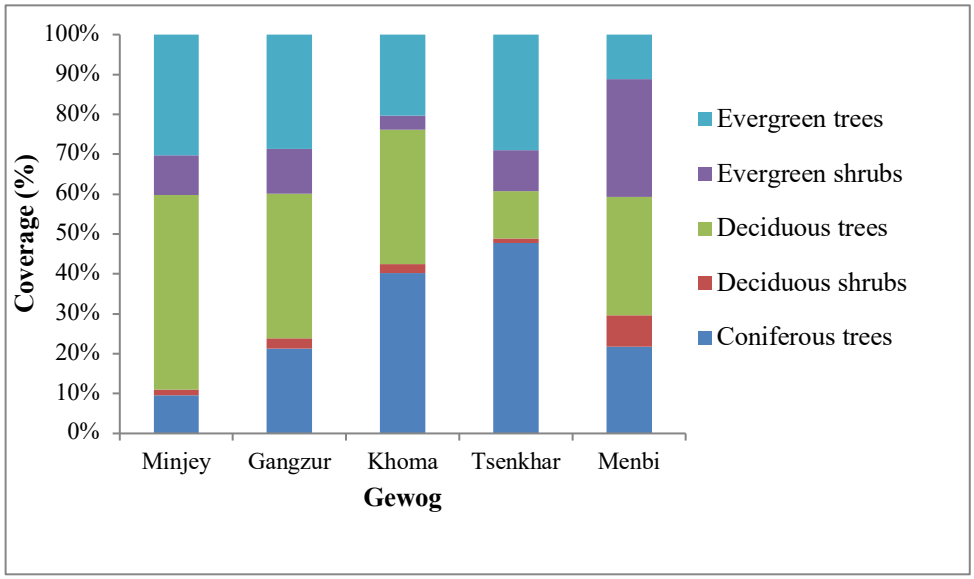

Figure 5: Floral species composition (live forms) under each Gewog in BC area

The herb diversity and richness were highest recorded from Khoma Gewog (Fig. 6). The invasive herb species present in BC7 includes *Trifolium repens, Chromolaena odorata, Ageratina adenophora* and *Eupatorium adenophorum.* The other interesting plant species such as *Tetracentron sinense*, a monotypic genus in family Tetracentraceae considered as living fossil plants and *Sapria himalayana*, a rare holoparasitic under Rafflesia family were also recorded.

Overall, the BC7 has high diversity of herbs (H′=4.419) followed by trees (H'=3.846) and shrubs (H'=3.089). The basal area of trees in BC7 stands at 50.32 m^2/ha.

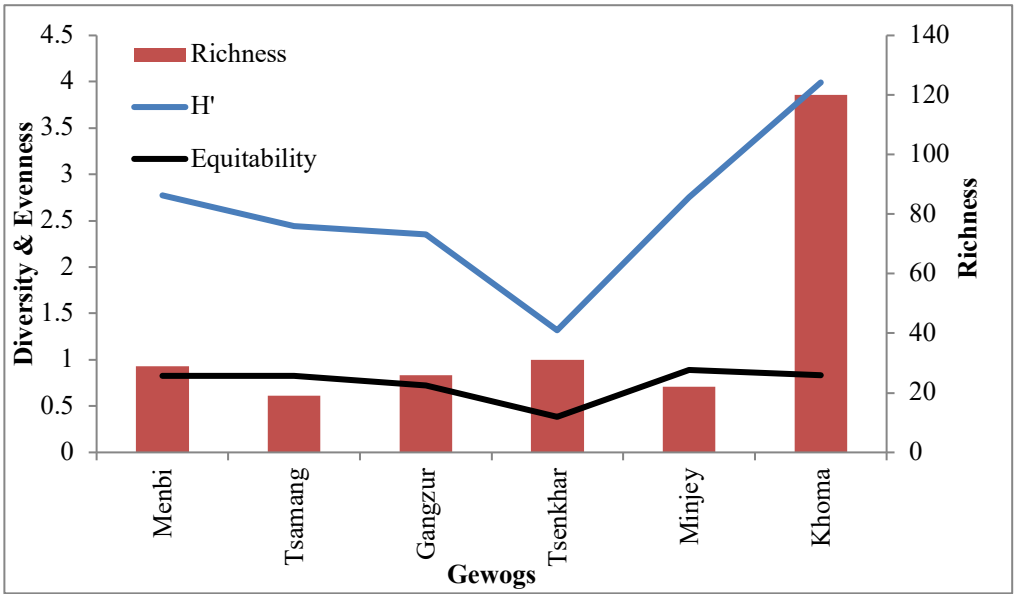

Figure 6: Herbaceous species richness, diversity and evenness by Gewogs in BC7

2.2.3. Mammal diversity

Much as the floristic diversity, the faunal diversity of BC7 is astounding with species from both the Palearctic and Indo-Malayan biogeographic realms (Wangchuk et al. 2004). So far, the Divisional Forest Management office has uncovered the presence of only vertebrates, and is yet to dive into the world of invertebrates. Recent camera trap studies and field surveys have revealed the presence of 28 species of mammals belonging to 11 families and 4 orders (Annexure VI). Of these, 3 are Endangered, 8 are Vulnerable, 5 are Near Threatened and 12 are Least Concerned as per the International Union for Conservation of Nature's (IUCN) Red List of Threatened Species (IUCN 2014). The majority of animal signs were recorded from cool-broadleaf forest (55.59 %) followed by chirpine (12.94 %) and warm-broadleaf forest (7.94 %).

2.2.4. Avifauna diversity

As of now 276 species of birds have been documented in BC7; 160 bird species were recorded during the recent survey carried out in the months of June, July, November and December and, 116 other species were recorded through incidental sightings (Annexure IV). Of these, 1 is endangered (pallas's fish eagle), 3 are vulnerable (black-necked crane, wood snipe, and rufous-

necked hornbill), and 6 are near threatened (himalayan vulture, satyr tragopan, great hornbill, ward's trogon, river lapwing and yellow-rumped honey-guide) as per the International Union for Conservation of Nature's (IUCN) Red List of Threatened Species (IUCN 2014). The bird survey was carried out along the transect of 251.32 km which was laid within different habitats of the entire corridor.

Birds were recorded within three different habitats inside the BC: wetland (WL) (farmland and settlements, alpine meadow, rivers and streams), conifer forest (dry temperate conifer forest, moist temperate conifer forest and sub-alpine conifer forest) and broadleaf forest (BLF) (cool broadleaved forest and warm broadleaved forest). Based on the *Chao1 estimator*, species estimation in various habitats of WL, BLF and CF are sEST=104, sEST=175 and sEST= 101 respectively. However, species observed in various habitats in WL, BLF and CF are sOBS=172, sOBS=101 and sOBS=98 respectively indicating more species encounter with more effort. The Shannon Wiener Index (H') shows greater species diversity in BF (H'=1.9) in comparison to CF (H'1.7) and WL (H'=1.3).

2.3.Socio-economic characteristics

2.3.1. Social information

The BC7 expands over two administrative boundaries covering an area of 390.8 km^2 under Lhuentse and 28.86 km^2under Mongar Dzongkhag. A total of 193 households resides within the BC area (Table 2). Around 727 households that reside around the BC area also use BC for natural resources particularly timber, firewood and non-wood forest products. The recent socio-economic survey involved 67% of the households comprising 46 % male and 54 % female for the interview.

Agriculture (26%) and livestock farming (22%) forms the mainstay of the livelihood of the farmers residing in and around the biological corridor (Fig. 7). As of now tourism (2%) is the least income generating activity in the BC area. Most farmers practice subsistence farming combined with the rearing of livestock. Cattle and poultry were the main livestock reared by the communities while few households also reared horse, goats and pigs.

Table 2: List of households residing inside BC7

Gewog	Chiwog	Village	No. of HH
Tsenkhar	Artobadap-Gundrang	Drakar	6
		Pokornang	1
		Yangla	9
		Sisinyisa	3
	Autsho-Chharbi	Gangmachen	1
		Drakmar Ney	1
		Pela Drakphu	9
		Rashangbee	2
		Kilam	1
	Dekiling-Tshochen	Dekiling	4
		Phawantoe	3
		Tadogang	2
Tsakaling	Takhambi	Goomdrang	6
Minjey	Bragong Jalang	Bragong	10
		Chengling	11
		Amdrang	2
Menbi	Kamder-Murmo	Sumpa	3
		Zarthang	1
		Karney	1
	Manjabe-Daangling	Rawabee	4
Gangzur	Jang- Ngar	Fatala	6
	Nimshong-Tongling	Yodra Goenpa	1
	Shawa-Zhamling	Charabi	2
Khoma	Rolmateng-Tsango	Khomagang	8
		Denchung	6
	Pangkhar	Khomadung	2
	Drakteng-Baptong	Kemtsong	13
	Gangla-Khelma	Buyum	1
Tsamang	Ganglapong	Ganglapong	66
		Khooling	8
Total			**193**

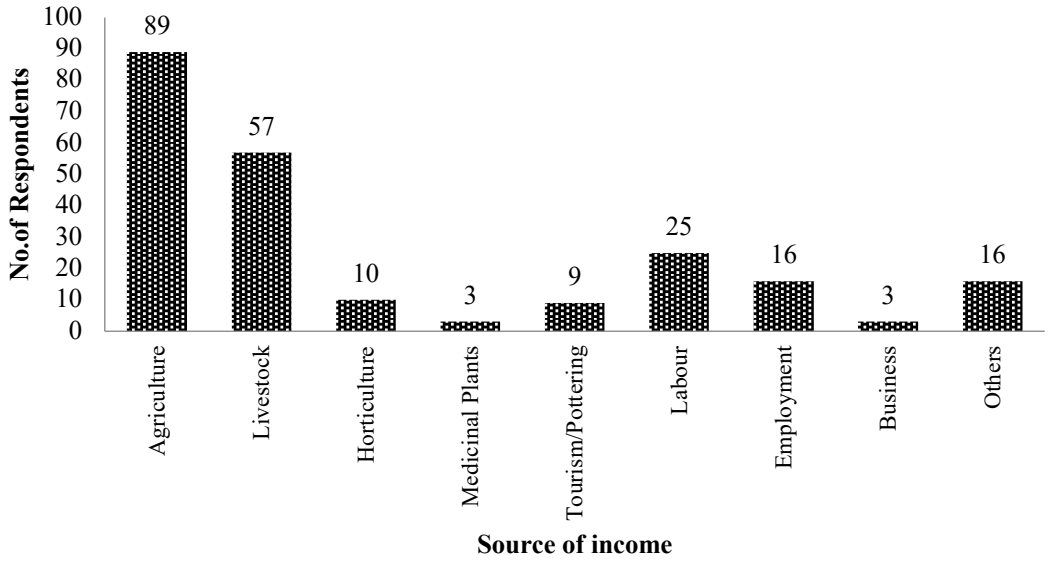

Figure 7: Income sources of households residing inside BC7

2.3.2. Agriculture farming

Although the agriculture remains the primary source of livelihood for majority of the people living inside BC, 69 % of lands were however left fallow. From 220 acres of dry land owned by people in the BC area, around 152 acres were left fallow. They only used it for cultivation ofmaize, vegetable, mustard, wheat, chili and potato. The chilli, cabbage and maize form the main cash crop for these people. Wet lands are used mainly for cultivation of paddy. Around 64 acres were found cultivated and about 15 acres left fallow. Most people practice vegetable gardening for both self-consumption and sale in the market. The popular vegetables grown in the area are potato, chilli, cabbage, brinjal, radish, beansand onions. Besides growing for their own consumption, they sell the surplus products either in local markets in Lhuentse or sometimes they sell it to vegetable vendors who take it to the neighboring Dzongkhags.

2.3.3. Livestock farming

Besides agriculture, livestock husbandry is also considered as an integralactivity supporting the livelihood of the local people. It is well recognized that people depend upon animals for food, income, fertilizers, transportation, fuel (dung cakes) and other cultural aspects. Rearing of

cattle is the most dominant livestock activity incomparision to other livestock animals. During the last SES survey, a total of 539 numbers of cattle were recorded from various locations followed by poultry with 429 numbers. Only a few households reared horses and pigs in the BC area. Majority of households (75%) rear local cattle as they have access to vast forested land that provides free grazing area throughout the year.

2.3.4. Farmers' perception on climate change pattern, severity, and impacts

Climate change is a cause of concern over the world and its impact is felt differently in different regions of the world. With increase in average global temperature, some regions of the earth are experiencing extreme events, extreme heat and cold. Bhutan is also no exception to this phase of change. The shifts in temperatures and weather patterns should be assessed and addressed for it can impact the livelihood of the people. Considering the fact that farmers are closer to nature in terms of resource use and interactions, their perceptions on climate change patterns, severity, and impacts have been assessed in theBC area. From 140 respondents included in the survey, 79 of them stated that they felt extreme events (extreme heat and cold) and 60 respondents felt a change in rainfall pattern in recent years (Fig. 8).

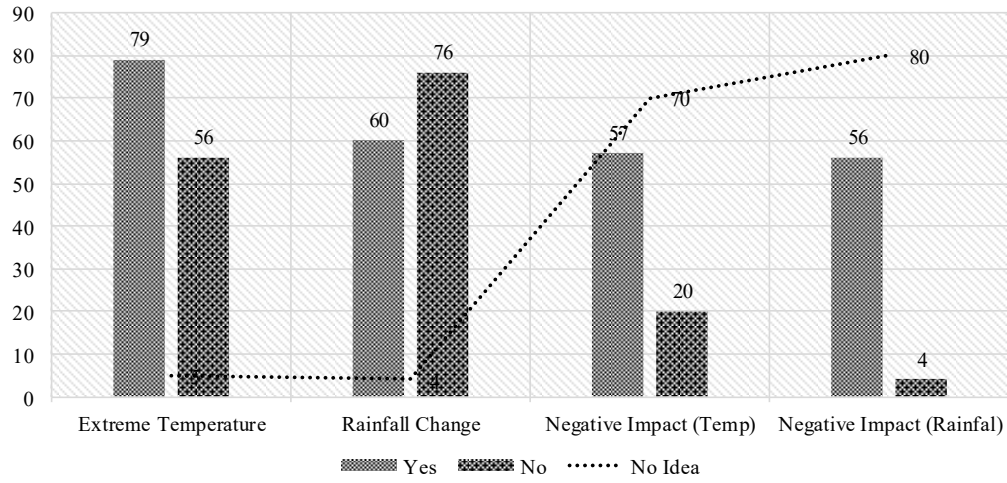

Figure 8: Temperature and rainfall change and its impact on farmer's livelihood. The information is based on farmers perception

In order to determine the severity of the climate change pattern, some variables taken into consideration were drought, flood, landslide, windstorm, forest cover, rainfall pattern, diseases and pests. Duration predetermined for these variables was based on the past ten years. Within this span of time, people residing in the BC landscape have not experienced severe impacts of climate

change. About 85% of respondents asserted that they have not seen landslides and 93% have also not experienced flashfloods. Moreover, about 79% of respondents stated that they have not seen seasonal droughts while 15%, 7% and 19% of respondentsemphasised that they have experienced landslides, flashfloods and seasonal drought respectively.

Although, the majority of the respondents proclaimed that they have not seen or experienced the changing pattern yet there were few respondents who felt the change. Some 52% of respondents stated that they experienced windstorms and over 66% of them felt change in forest cover in the area. The people dwelling in the landscape have least knowledge on forest pests and diseases.

2.3.5. Climate change adaptation measures

There is clear scientific evidence that climate change is real. But what can we do about it? This are the important questions that we need to ask for better adaptation with regard to climate change. In essence, climate change is now very much with us, and for the rural communities the implications are particularly daunting. Adaptation, learning to cope with rising temperature and other effects of climate change isa difficult but indispensable task for these vulnerable groups.

Climate related disasters; landslides, flashfloods, seasonal drought, and windstorm are recurring problems for some people residing in the BC landscape though they were not fully aware of this issue. Although, the climate change is not felt largely in the area, with rapid developmental activities, increasing population and human settlement, the increasing demand for natural resources will bring implications in near future. Therefore, mitigation measures have to be in place for solving the adverse consequences. For instance, in other countries, institutions and plans to deal with early warning, relief, rehabilitation and recovery exists. Some are quite successful (such as the cyclone warning system in Bangladesh) while others are inefficient and unlikely to be able to cope with future disasters exacerbated by climate change. Strengthening both national and local capacity building in disaster risk reduction and disaster management is essential. More programs have to reach the local people for better understanding of climate change. The people centric program such as climate change vulnerability study, awareness program, agriculture and food security program-which is at larger risk, has to be addressed.

The local people will suffer most from many adverse climate change impacts. Therefore, adaptation at the local level is crucial and essential. The communities that are susceptible to current climate variability are likely to be vulnerable to future climate change, so it is not always necessary

to wait for more accurate local forecasts to start building adaptive capacity. Strengthening community institutions to help them provide social safety nets and develop new coping mechanisms is a key way forward to fight climate change.

2.4.Resource use

Communities in the BC area also depend on the forest for their livelihood. The rich forest provides provisioning services such as fuel wood, timber, food, fodder, fibre, shelter, medicines, household implements, and handicrafts. Firewood, Fodder, fiddleheads, cane, bamboo, and mushroom are most common and frequently collected for household consumption as well as to sell in the local markets. Fuel wood is the major source of energy for the majority of the people living in rural communities. They depend on fuel wood for cooking and heating. Majority of them collect fuelwood on back load (BL) basis. Other forest resources such as stone, sand, leaf litters, and leaf mould are collected by the locals. Stones and sand are the basic materials for construction of houses in the BC area. Leaf litters and leaf moulds are mostly collected from *sokshing* which they consider as traditional user rights.

2.5.Current threats in the corridor

2.5.1. Human wildlife conflict

As human populations expand, the resources like water and land are becoming scarcer and incidences of crop damage, livestock predation and conflict is growing annually. Crop damage and livestock predation is one of the prominent issues faced by the people living in the BC area. The HWC conflict assessment was conducted in all the villages inside the BC as the nature of conflict and severity were different based on various environmental aspects; distance between settlement areas and SRF land, ecological range, forest type and condition, cropping pattern and season. As per the assessment result, 61.5 % respondents revealed that the maximum HWC issues are in relation to crop damages followed by livestock depredation (20 %) (Fig.9). The property damage and attack on human cases are however negligible.

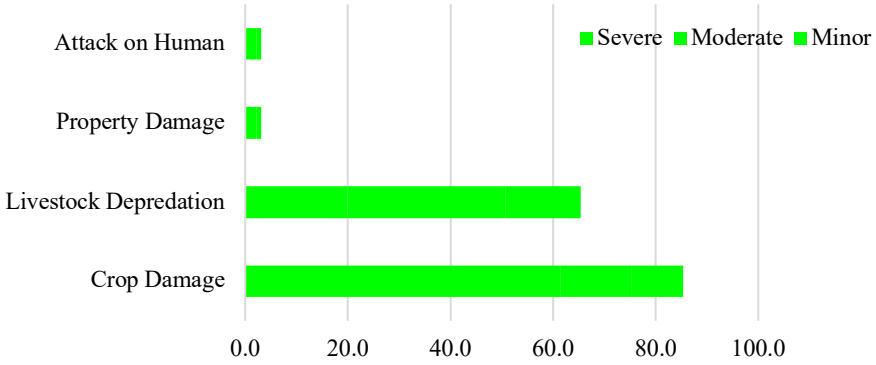

Figure 9: Type and severity of HWC conflict in BC area

While assessing thepeople's attitude toward wildlife conservation it was found that the majority (42%) of the respondents have a negative attitude towards wild pig conservation. The other wild animals considered as pests are barking deer, porcupine and monkey. The reason for people disliking these animals could be due to the threats posed to their crops. In general, around 53.1% of respondents dislike wildlife conservation in the BC area (Fig.10). This is because majority of the respondents (70.2%) felt that there is a general increase of wildlife population and the increase could be aggravated by decline in number of poachers, good forest conditions and increased conservation measures.

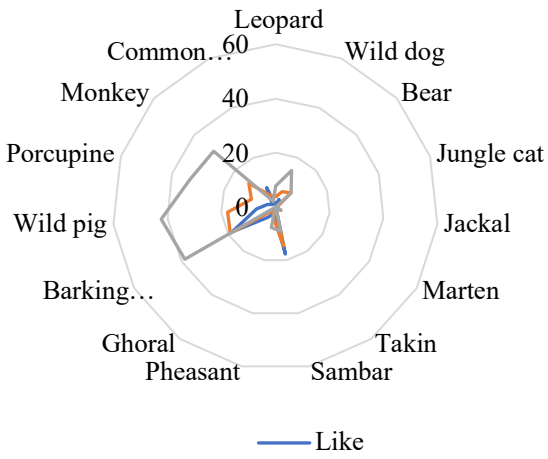

Figure 10: Attidue of people towards wildlife conservation

2.5.2. *Farmers' perception on climate change pattern, severity, and impacts*

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Climate related disasters such as landslides; flashfloods, seasonal draught, and windstorm are recurring problems for some people residing in the BC landscape though they were not fully aware with this issue. Although, the climate change is not felt largely in the area, with rapid developmental activities, increasing population and human settlement, the increasing demand for

natural resources will bring implications in near future. Therefore, mitigation measures have to be in place for solving the adverse consequences. For instance, in other countries, institutions and plans to deal with early warning, relief, rehabilitation and recovery exists. Some are quite successful (such as the cyclone warning system in Bangladesh) while others are inefficient and unlikely to be able to cope with future disasters exacerbated by climate change. Strengthening both national and local capacity building in disaster risk reduction and disaster management is essential. More programshave to reach the local people for better understanding of climate change. The people centric program such as climate change vulnerability study, awareness program, agriculture and food security program-which is at larger risk, has to be addressed.

The local people will suffer most from many adverse climate change impacts. Therefore, adaptation at the local level is crucial and essential. The communities that is susceptible to current climate variability is likely to be vulnerable to future climate change, so it is not always necessary to wait for more accurate local forecasts to start building adaptive capacity. Strengthening community institutions to help them provide social safety nets and develop new coping mechanisms is a key way forward to fight climate change.

The other threats in BC area includes but not limited to forest fire, wildlife poaching, unregulated grazing, habitat degradation and waste management.

2.6.Forest resource area

Three types of scientific management regimes; Community Forest (CF), Local Forest Managemnet Area (LFMP), and Forest Management Unit (FMU) fall within the boundary of BC7 landscape. From the 21 CFs (3.9 % of the total BC area) falling inside the BC, the two CFs in Khoma Gewog are under administrative control of Bumdeling Wildlife Sanctuary and one CF in Tsamang geog is under PNP eventhough the boundaries of these CF's fall within the jurisdiction of BC7. The remaining CFs is under the administrative control of Divisional Forest Office, Mongar (Annexure V). Likewise, 7.78 km^2 of Rongmanchu Forest Management Unit (RFMU) overlaps with BC7 accounting to 1.85 % of the total BC area. Three FMU compartments and one small portion of the social block of RFMU fall inside the BC area. The Rongmanchu compartment- I (Wildlife and soil protection compartment) with 7.75 km^2, Rongmachu compartment-II (Production compartment) with 0.01 km^2, Rongmanchu compartment-III (Production compartment) with 0.01 km^2 and Kupineysa social block 0.0014 km^2 are inside BC7 areas (Fig. 12).

Similarly, two LFMPs fall inside the BC area; Local Forest Management Plan for Menbi Gewog and Local Forest Management Plan for Tsenkhar Gewog (Table 3). The local forest management areas are designated and plans are made to basically regulate the rural wood supply on a sustainably basis.

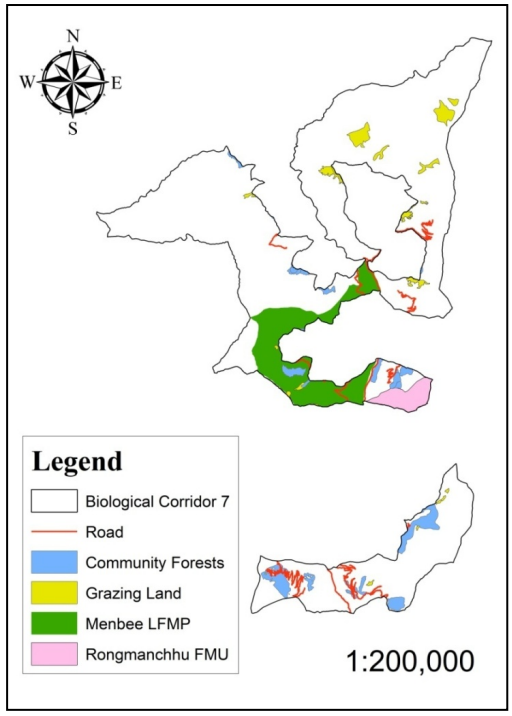

Figure 11: Different Forest mangaement regimes inside BC7

Table 3: Details of Local Forest Management Areas overlapping with BC area

Name of LFMP	Production area	Inoperable area	Protection area	Potential timber production (m3/Ha)	Firewood production (m3/Ha)	AAC (m3/Ha)	Production potential/AAC (years)
Menbi LFMP	1426.4	135.9	1529.8	35.4	135	2	103
Tsenkhar LFMP	1171.3	812.2	599	98.9	46.339	0.8	117

CHAPTER III:
THREAT ANALYSIS

3.1. Determining Strength, Weakness, Opportunity and, Threats (SWOT), and issues

The focused group discussion was held with 8 communities within BC7 to carryout SWOT analysis. The SWOT analysis was aimed to identify key internal factors (strength and weakness) and external factors (opportunity and threats) that were considerably important to achieve the conservation objectives. The following strengths, opportunities, weaknesses and threats have been discussed and identified to come up with the relevant strategies and interventions for monitoring the effectiveness of the corridor (Table 4).

Table 4: SWOT matrix

Strengths	**Weaknesses**
✓ Plantation in CF's and other barren areas ✓ Timely patrolling of BC area ✓ Support from communities ✓ Active participation in forest fire management ✓ Sustainable harvesting of timbers ✓ Fire line construction ✓ Aware of environmental conservation ✓ Water sources identified	✓ Lack of awareness on forest rules and regulations ✓ CF members show less concern over management and protection forest areas outside CF ✓ Lacks training on forest fire control and prevention ✓ Increasing human wildlife conflict
Opportunities	**Threats**
✓ SMART patrolling ✓ Income generation from community forest and sale of NWFPs ✓ Local employment through tourism services ✓ Long term benefits through conservation of forest ✓ Water source protection ✓ Ecotourism	✓ Forest fire ✓ Landslides ✓ Poaching ✓ Illegal harvesting of NWPFs (*Paris polyphylla, Rubia cordifolia*) ✓ Illegal harvesting of timbers ✓ Waste management

3.1.1. Threats on floral diversity

Results from Bhutan Monitoring Effectiveness Tracking Tools (Bhutan METT+), social and ecological survey identified five significant threats such as forest fire, grazing, farm road construction, electrical transmission line and illegal harvesting of timbers on the flora in BC7. Of the five threats identified, forest fire, grazing and road are considered a severe threat and categorized as 'major and continuous impact' to biodiversity conservation and clearing of corridor of transmission line was categorized as 'minor impact' while illegal harvesting of timbers is considered minor and not continuous. All these threats were classified as current and potential ones across BC7 (Table 5).

Table 5: Threats on flora

Threats (T) or Issues (I)	Impact of threat		Management response
Status of threats: 1. Current (C), 2. Potential (P)	Extent of the impact	Severity of the impact	Action planned or have taken place to manage the threat
Forest fire (C & P)	Several areas in small pockets in chirpine forest (5% of BC area)	Major impact	• Awareness on prevention and control of forest fire • Formation of forest fire fighting management groups • Training and supply of forest fire fighting equipments • Carryout fire risk mapping
Unregulated grazing (C & P)	In and around the settlement areas inside the BC	Major impact	• Support improved breeds • Reduction in number of scrub cattle • Support in development of private pasturelands

Roads (C&P)	**% of BC area falls under secondary highway and farm roads	Major impact	• Road construction should be eco-friendly in conformity toEFRC rules • Monitoring of excavation and identification of proper dumping sites • Plantation of trees and bamboos to stabilize the landslides
Clearing of corridor for transmission line (C& P)	The transmission line for entire upper side Lhuentse (Kurtoe) runs through BC	Minor impact but not continuous	• Monitoring clearing of corridors along the transmission line • Strengthen the field staffs for effective monitoring
Invasive species	In and across BC area (*Ageratina adenophora, Chromolaena odorata*)	Minor impact but continuous	• Mapping extent and distribution of invasive species

3.1.2. Threats on mammals and avifauna

A rich diversity of mammals was recorded and this includes common leopard, wild dog, clouded leopard, Asiatic golden cat, red panda, musk deer, and ungulates such as sambar, muntjak, wild pig, goral, musk deer and serow. As the majority of the settlements are located in remote areas in close proximity to wildlife habitats; human wildlife conflict has emerged as the most common and frequent problem. The conflicts include crop and livestock depredation, property damage and in some cases even human mauling by wild predators. The rise in HWC cases is equally posing a threat to the lives of wild predators. Owing to the rich wildlife diversity and porous international borders, the wildlife poaching and its illegal trades are also being reported. Few incidences of Musk deer and black bear poaching have also been recorded in the BC area. The other wildlife species like wild pig, muntjak and sambar are alsohunted for meatillegally in the BC area.

Due to the expansion of agriculture and other anthropogenic pressures including development of infrastructures through intensive garnering of natural resources, habitat fragmentation and degradation has also become a pressing issue. The drivers for habitat degradation include extensive harvesting of timbers particularly during clearing of road and transmission line, clearing of forest for other developmental activities, cattle grazing and sometimes with forest fires.

Potential threat to avifauna includes snaring of broad pheasants by locals and road side laborers and hunting of black necked cranes by stray dogs in its staggering areas (Table 6).

Table 6: Threats on mammals and avifauna

Threats (T) or Issues (I)	Impact of threat		Management response
Status of threats: 1. Current (C), 2. Potential (P)	Extent of the impact	Severity of the impact	Action planned or have taken place to manage the threat
Wildlife poaching (T) (C) & (P)		Severe	• Strengthen and enhance periodic SMART patrollings. • Wildlife population monitoring and habitat rehabilitation. • Carry out survey to identify wildlife in the area vulnerable to poaching Awareness/ education program on biodiversity conservation
Habitat degradation (C&P)	Resource catering to 920 hhs	Severe	• Strengthen and monitoring of CF's (20) • Identify Key Biodiversity Hotspot area and strategize conservation programs. • Habitat restoration/enrichment plantations/improvement of saltlick and waterholes • Improvement of meadows • Identify and form LFMPs for sustainable supply forest produce within 7 Gewogs under BC

Human wildlife conflict (C&P)	Evident in all 8 Gewogs	Severe	• EF installed in 11 villages covering an area of 119.8 Ha benefiting 85 hhs • Support live fencing in all 30 villages under BC • Formation of quick response team to rescue wild life • Encourage and create awareness on crop and livestock insurance schemes • Strengthen HWC reporting mechanisms • Mapping of HWC hotspot areas
Hunting of BNC by stray dogs	Sumpa,Zham, Tangmachu, Chusa, Jang, Baptong and Shawa	Major impact and continuous	• Sterilization of stray dogs • Timely monitoring of BNC staggering areas • Reclamation of fellow lands • Mapping of staggering areas

3.1.3. Threats to/by local communities residing within and outside the corridor

As human populations expand, the resources like water and land are becoming scarcer and incidences of crop damage, livestock predation are growing annually. Crop damage and livestock predation is one of the prominent issues faced by the people living in the BC area. The natural disasters such as landslides, erosions and frequent roadblocks are also posing serious problems to the lives of people. There is also a rise in water problems in the Gangzur area leading to conflicts with upstream and downstream users (Table 7).

Table 7: Threats on people and properties

Threats (T) or Issues (I)	Impact of threat		Management response
Status of threats: 1. Current (C), 2. Potential (P)	Extent of the impact	Severity of the impact	Action planned or have taken place to manage the threat
Human wildlife	Evident in all 8 Gewogs	Severe	• EF installed in 11 villages covering an area of 119.8 Ha benefiting 85 hhs

conflict (C&P)			• Support live fencing in all 30 villages under BC • Formation of quick response team to rescue wild life • Encourage and create awareness on crop and livestock insurance schemes • Strengthen HWC reporting mechanisms • Mapping of HWC hotspot areas • Support improved breeds • Reduction in number of scrub cattle • Support in development of private pasturelands
Natural disasters (landslide /erosions) (C&P)		Major impact but not continuous	• Initiate sustainable land management programs • Support and improve irrigation canals • Improve road drainage inconformity to EFRC • Carryout bioengineering works along roadside and landslide prone areas
Drying of water sources	Gangzur area	Minor impact and not continuous	• Preparation of watershed management intervention report

3.2.Biodiversity hotspot in Biological Corridor 07

Much of the floristic, faunal and avifaunal diversity of BC7 is astounding with species from both the Palearctic and Indo-Malayan biogeographic realms. So far, the Divisional Forest Management office has uncovered the presence of 28 species of mammals, 276 species of birds, and 307 species of plants from the BC area. The endangered mammals recorded include red panda, dhole and Bengal tiger. Using the NTS data of 2014-2015 and 2021-2022, tiger habitat was found in the northwestern part of the BC area adjoining Wangchuck Centennial National Park and Phrumsengla National Park (Fig. 13 A). The other wild felids recorded include clouded leopard, common leopard, Asiatic golden cat, marbled cat and leopard cat. These felid species are found mostly in

the southeastern part of the BC area (Fig. 13 B). High density of sambar, barking deer and wild pig are also recorded from the BC area (Fig. 13 C).

The other interesting plant species such as *Tetracentron sinense*, a monotypic genus in family Tetracentraceae considered as living fossil plants and *Sapria himalayana*, a rare holoparasitic under Rafflesia family were also recorded. The endangered Pallas's fish eagle, vulnerable black-necked crane, wood snipe, and rufous-necked hornbill, and near threatened himalayan vulture, satyr tragopan, great hornbill, ward's trogon, river lapwing and yellow-rumped honey-guide are also recorded from BC area.

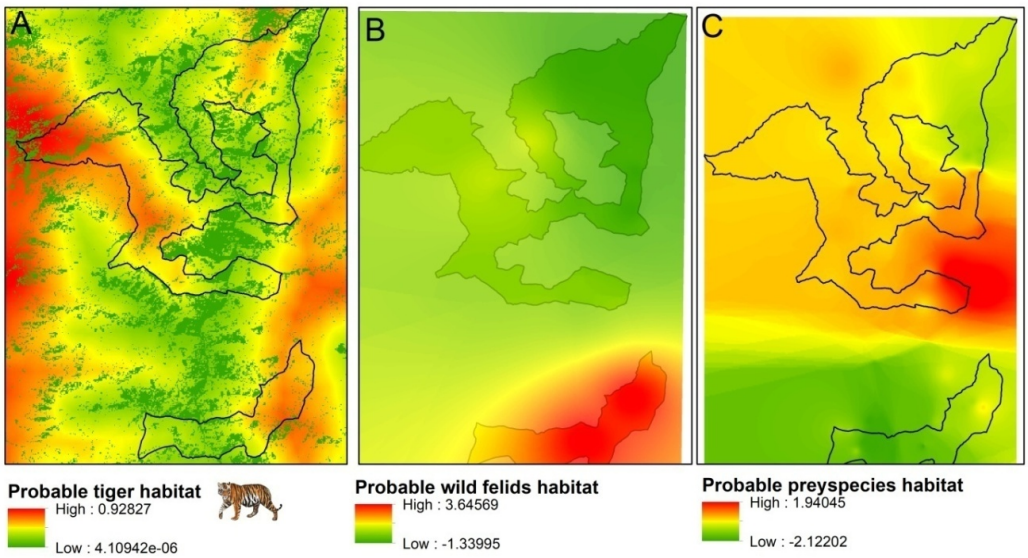

Figure 12: Probabale habitat of wild felids and its prey in BC7. The tiger habitat (A) is prepared based on NTS data of 2014-2015, and other wild felids and its prey habitat are prepared based on NTS data of 2021-2022

CHAPTER IV:
MANAGEMENT INTERVENTIONS

In line with planning-oriented analyses carried out in Chapter III from the perspectives of social, ecological, and management effectiveness, and subsequent SWOT matrix, the management intervention measures were proposed in benefit of flora, fauna and people living in and around BC7. The checklist of intervention measures was categorized under various programs and aligned towards ensuring fulfilment of the vision and mission of the corridor management and with DoFPS major plans and programs.

Table 8: Management interventions; program, output and actions

Programs and Outputs
Program 1: Understanding landscape, species composition, abundance, and functionality of Biological Corridor 07
Output 01: Knowledge on flora and fauna diversity enhanced
Activity 1: Study on population dynamics and habitat use of big carnivores (tiger/leopard/clouded leopard/wild dog)
Activity 2: Study on distribution and habitat use of red panda
Activity 3: Document orchids diversity in BC area
Activity 4: Survey of lesser-known reptiles, amphibians and fishes
Output 02: Ecosystem diversity and habitats contiguity maintained
Activity 1: Improvement of meadows
Activity 2: Conduct periodic SMART patrolling Activity 3: Monitor road constructions within BC areas to ensure wildlife crossings Activity 4: Inventory and control of invasive plant species
Output 03: Conservation and management of wetlands enhanced
Activity 1: Conduct wetland inventory Activity 2: Update map and improve waterholes sites Activity 3: Implementation of watershed management interventions for Gangzur Gewog
Program 2: Empowering local people and ensure sustainable utilization of resources – timber, NWFPS, stone, sand and water
Output 01: Sustainable management and utilization of timber promoted
Activity 1: Revision of LFMPs (2 Gewogs)
Output 02: Community participation in sustainable forest management and conservation increased
Activity 1: Revision of CFMPs

Activity 2: Training on record and book keeping within CFs (20)
Activity 3: Formation of NWFP groups
Output 03: Incidences of forest fire reduced
Activity 1: Awareness on forest fire prevention and control
Activity 2: Strengthen existing Forest Fire Management Committee (Procurement of forest firefighting equipment)
Activity 3: Identify and map forest fire prone zone and develop fire lines
Program 3: Ensuring harmonious coexistence through alternative livelihood supports to farmers in Biological Corridor 07
Output 01: Community-based ecotourism and product diversification enhanced
Activity 1: Develop campsite at Phuningla (enroute to Ajaney)
Activity 2: Support and strengthen groups on earthen pot making
Output 02: HWC mitigation measures enhanced
Activity 1: Update map on human wildlife conflict hotspot areas periodically
Activity 2: Provide technical support and facilitate electric fencings and promote chain link fencing for crop guarding
Program 4: Strengthening institutional capacity for effective service delivery
Output 01: Protected Area management enhanced/strengthened
Activity 1: Ecological and social survey for next BC management plan
Activity 2: Assess BC management effectiveness using METT+
Activity 3: Construct office for Tangmachu beat and staff quarter (4 units) at Lhuentse
Activity 4: Maintenance of old office buildings and staff quarters
Output 02: Forest protection and enforcement enhanced
Activity 1: Procure field equipments (GPS (30 etrex & above), binoculars, acoustic equipments, handsets)
Activity 2: Training on anti-poaching patrol techniques
Activity 3: Establish intelligence network between various law enforcement agencies
Output 03: Professional capacity enhanced
Activity 1: Capacity building for staffs on SMART patrolling
Activity 2: Training on wildlife management and statistical analysis
Program 5: Strengthening environment education and interpretation on biodiversity conservation and waste management
Output 01: Conservation education/awareness through conservation arts and specimens strengthened
Activity 1: Educate communities and support nature club programs on conservation and significance of BC
Activity 2: Create awareness and monitor waste management in BC area

CHAPTER V:
IMPLEMENTATION SCHEDULE AND BUDGET OUTLAY

5.1. A brief overview

In this chapter, the implementation plan and financial outlay to implement the management actions are presented. All activities are included in the action plan with specific details of locations and timeframe. To properly implement the scheduled activities of the plan, funding needs to be sought from RGoB, BFL and other potential donors. For the key collaborators to be available during the implementation of activities, the Divisional Forest Management shall inform the collaborators much in advance, preferable during the start of the financial year. If activities are not implemented in a scheduled plan year, the Divisional Forest Managmement shall attempt to implement them in the succeeding plan year to be able to guarantee the maximum implementation of planned activities. Majority of the proposed amounts are alingned BFL project document. The Divisional Forest Management needs to secure funding for other activities that are not committed by BFL project.

5.2. The detailed budget outlay

The detailed budget outlay is presented in Table 9 in millions of Ngultrums (the currency of Bhutan). The total amount required to fully implement the plan stands at Nu. 37.1 million for the 10-year plan period.

Table 9: Implementation schedule and budget outlay against each proposed activities

Programme 1:	**Better understanding the landscape and species abundance in BC7**												
Objectives	**Strategies**	**Actions**	**Budget in Nu. (Million)**										Total (Nu)	Remarks
			Y1	Y2	Y3	Y4	Y5	Y6	Y7	Y8	Y9	Y10		
Objective 1: To maintain viable population of flora and fauna	Enhance knowledge on floral and faunal diversity	Activity 1: Study on population dynamics and habitat use of big carnivores				0.5					0.7		1.2	Tiger, Leopard, Clouded leopard and wild dog
		Activity 2: Study on distribution and habitat use of red panda	0.3										0.3	Entire BC area
		Activity 3: Document/update orchid diversity in BC area				0.3							0.3	Entire BC area
		Activity 4: Survey on lesser known reptiles, amphibian and fishes (BMG)	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.6	Along Kurichu
	Maintain ecosystem diversity and habitats contiguity	Activity 1: Improvement of meadows					0.2						0.2	Menji and Menbi Gewogs
		Acitivity 2: Conduct periodic SMART patrollings	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	3	Entire BC area
		Activity 3: Monitor road constructions within BC to ensure wildlife crossings												Entire BC area

		Activity 4: Inventory and control of invasive plant species			0.3					0.3			0.6	Along GC road from Gangzur to Shawa
	Enhance conservation and management of wetlands	Activity 1: Conduct wetland inventory	0.8										0.8	Entire BC area
		Activity 2: Update map and improve water hole sites			0.4					0.4			0.8	Entire BC arean (improvement of waterhole at above Rawabi Goenpa, Namagudungjuk , Dungleypangtsho, Darchentop, above Zhungkhar village, Yanglapang, Gungdrang,Changchangtop,Domathang)
		Activity 3: Implementation of watershed management interventions for Gangzur Gewog												Gangzur Gewog (Supported through GEF Napa-3 Project)
		Wastemanage												
Program 2: Empowering local people and ensure sustainable utilization of resources														
	Strategies	**Actions**	Annual Budget (Nu. in Million)											

			Y1	Y2	Y3	Y4	Y 5	Y6	Y7	Y8	Y9	Y10		
	Sustainable management and utilization of timber	Activity 1: Revision of LFMPs for 2 Gewogs	0.3							0.3			0.6	Menbi and Tsenkhar LFMP
	Community participation in sustainable forest resource management and conservation	Activity 1: Revision of CFs			0.12	0.24	0. 24	0.3	0.0 6	0.0 6	0.0 6	0.0 6	1.14	17 CFs under BC area
		Activity 2: Training on record and book keeping within CFs		0.6						0.6			1.2	All CFs under BC area
		Activity 3: Formation of NWFP groups				0.1			0.1				0.2	Shawa and Zamling (*Rubia cordifolia*)
Objectives 2: To ensure sustainable utilization of forest resources	Reduce Incidences of forest fire	Activity 1: Awareness on forest fire prevention and control		0.15		0.15		0.1 5		0.1 5		0.1 5	0.75	Entire BC area and adjoining Gewogs
		Activity 2: Strengthen existing Forest Fire Management Committee (Procurement of forest firefighting equipment)			0.2	0.2							0.4	Tsenkhar and Menbi Gewogs
		Activity 3: Identify and update forest fire prone zone and develop fire lines		0.5									0.5	Entire BC area and adjoining Gewogs
Program 3: Ensuring harmonious coexistence through alternative livelihood supports to farmers in Biological Corridor 07														
Objective 3: To enhance socio-	**Strategies**	**Actions**	Annual Budget (Nu. in Million)											
			Y1	Y2	Y3	Y4	Y5	Y6	Y7	Y8	Y9	Y10		

economic wellbeing of the communities	Enhance community-based ecotourism and product diversification	Activity 1: Develop campsite at Phuningla		2									2	Phuningla (enroute to Ajaney) The proposed will be proposed from GEF-7
		Activity 2: Support and strengthen groups on earthen pot making	0.3						0.2				0.5	Gangzur Gewog (Group formation, capacity development)
	Enhance HWC mitigation measures	Activity 1: Update map on human wildlife conflict hotspot areas periodically		0.1					0.1				0.2	Entire BC area
		Activity 2: Provide technical suppoand facilitate electric fencings and promote chainlink fencing for crop guarding		1							0.6		1.6	Entire BC area
Program 4: Strengthening institutional capacity for effective service delivery														
Objective 4: To enhance institutional capacity to deliver effective service	**Strategies**	**Actions**	Annual Budget (Nu. in Million)											
			Y1		Y3	Y4	Y5	Y6	Y7	Y8	Y9	Y10		
	Strengthen protected Area management	Activity 1: Ecological and social survey for next BC management plan										1	1	Entire BC area
		Activity 2: Assess BC management effectiveness using Bhutan METT+					0.1					0.1	0.2	Entire BC area

		Activity 3: Construct office and staff quarter			8.5			5.5					14	Office construction at Tangmachu and staff quarter at Lhuentse
		Activity 4: Maintenance of old office buildings and staff quarters		0.5			0.5				0.5		1.5	Old BC office
	Enhance forest protection and enforcement	Activity 1: Procure field equipments (GPS, binoculars, acoustic equipments, handsets)		0.6						0.4			1	BC office
		Activity 2: Training on anti-poaching patrol techniques		0.5				0.6					1.1	BC staff
		Activity 3: Establish intelligence network between various law enforcement agencies	0.2					0.2					0.4	Lhuentse Dzongkhag
	Enhance professional capacity of staff	Activity 1: Capacity building for staffs on SMART patrolling			0.2								0.2	BC staff
		Activity 2: Training on wildlife management and statistical analysis		0.5				0.4					0.9	BC staff
Program 5: Strengthening environment education and interpretation on biodiversity conservation and waste management														
Objective 05: To strengthen environment	Strengthen conservation education/	Activity 1: Educate communities and nature club programs on	Y1	Y2	Y3	Y4	Y5	Y6	Y7	Y8	Y9	Y10		
				0.2			0.2				0.2		0.6	BC office

education and interpretation on biodiversity conservation and waste management	awareness through conservation arts and specimens	conservation and significance of BC												
		Activity 2: Create awareness and monitor waste management in BC area				0.3				0.3			0.6	Entire BC area
Total													**37.1**	

CHAPTER VI:

MONITORING AND EVALUATION

Monitoring plan

Table 10: Monitoring and Evaluation Plan

Programme 1: Better understanding the landscape and species abundance in BC7																	
Objectives	**Strategies**	**Actions**	**Output indicators**	**Baseline**			**Budget in Nu. (Million)**										Total
				Unit	**Qty**	**Year**	Y1	Y2	Y3	Y4	Y5	Y6	Y7	Y8	Y9	Y10	
Objective 1: To maintain viable population of flora and fauna	Enhance knowledge on floral and faunal diversity	Activity 1: Study on population dynamics and habitat use of big carnivores	Report produced	Nos	0	2022				1					1		2
		Activity 2: Study on distribution and habitat use of red panda	Report produced	Nos	0	2022						1					1
		Activity 3: Document/update orchid diversity in BC area	Orchid diversity of BC7 published	Nos	0	2022				1							1
		Activity 4: Survey on lesser-known reptiles, amphibian, and fishes	Reptiles, amphibian and fishes checklist updated	Nos	0	2022		1		1		1					3

	Maintain ecosystem diversity and habitats contiguity	Activity 1: Improvement of meadows	Ha of meadows improved	Area	0	2022					3						3
		Acitivity 2: Conduct periodic SMART patrollings	Patrolling conducted	Nos	0	2022	4	4	4	4	4	4	4	4	4	4	40
		Activity 3: Monitor road constructions within BC to ensure wildlife crossings	Monitoring report	Nos	0	2022	1	1	1	1	1	1	1	1	1	1	10
		Activity 4: Inventory and control of invasive plant species	Areas controlled	Area (Ha)	0	2022			0.1					0.1			0.2
	Enhance conservation and management of wetlands	Activity 1: Conduct wetland inventory	Field report	Nos	0	2022	1										1
		Activity 2: Update map and improve water hole sites	Waterhole sites improved	Nos	7	2022	1										1
		Activity 3: Implementation of watershed management interventions for Gangzur Gewog	Map and report produced	Nos	0	2022	1				1						1
Programme 2: Empowering local people to ensure sustainable utilization of resources – timber, NWFPS, Stone, Sand and Water																	
Objectives	**Strategies**	**Actions**	**Output indicators**	**Baseline**			Annual Budget (Nu. in Million)										Total
				Unit	**Qty**	**Year**	Y1	Y2	Y3	Y4	Y5	Y6	Y7	Y8	Y9	Y10	

Objectives 2: To ensure sustainable utilization of forest resources	Sustainable management and utilization of timber	Activity 1: Revision of LFMPs (2 Gewogs)	LFMPs revised	Nos	2	2022	1							1			2
	Community participation in sustainable forest resource management and conservation	Activity 1: Revision of CFs	Number of CF's revised	Nos	19	2022			2	4	4	5	1	1	1	1	19
		Activity 2: Training on record and book keeping within CFs (20)	CF executive members trained	Heads			125							125			250
		Activity 4: Formation of NWFP groups	NWFP groups formed	Nos						1			1				2
	Reduce Incidences of forest fire reduced	Activity 1: Awareness on forest fire prevention and control	Awareness program conducted	Nos					8								8
		Activity 2: Strengthen existing Forest Fire Management Committee (Procurement of forest fire fighting equipment)	Forest fire fighting equipments procured and supplied	Sets					5	5							10
		Activity 3: Identify and map forest fire prone zone and develop fire lines	Map and report produced	Nos				1									1
Programme 3: Ensuring harmonious coexistence of wildlife and people through alternative livelihood supports																	
Objectives	**Strategies**	**Actions**		**Baseline**			Annual Budget (Nu. in Million)										Total

			Output indicators	Unit	Qty	Year	Y1	Y2	Y3	Y4	Y5	Y6	Y7	Y8	Y9	Y10	
Objective 3: To enhance socio-economic wellbeing of the communities	Enhance community-based ecotourism and product diversification	Activity 1: Develop campsite at Phuningla	Campsite developed	Nos	0	2022					1						1
		Activity 2: Support and strengthen group on earthen pot making	Groups supported	Nos	0	2022				1			1				2
	Enhance HWC mitigation measures	Activity 1: Update map on human wildlife conflict hotspot areas periodically	Map and report produced	Nos						1							1
		Activity 2: Provide technical support and facilitate electric fencings and chainlink fencing for crop guarding	Households supported	Nos				50							10		60
Programme 4: Enhancing institutional capacity for effective service delivery																	
Objectives	**Strategies**	**Actions**	**Output indicators**	**Baseline**			Annual Budget (Nu. in Million)										Total
				Unit	**Qty**	**Year**	Y1	Y2	Y3	Y4	Y5	Y6	Y7	Y8	Y9	Y10	
Objective 4: To enhance institutional capacity to	Strengthen protected Area management	Activity 1: Ecological and social survey for next BC management plan	Report produced	Nos	1	2022										1	1

deliver effective service		Activity 2: Assess BC management effectiveness using METT+	Assessed effectiveness of BC plan implementation	Nos	1	2021					1					1	2
		Activity 3: Construct office and staff quarters (4 units)	Office and staffquarter Constructed	Nos	1				1			1					2
		Activity 4: Maintenance of old office buildings and staff quarters	Buildings maintained	Nos	2	2022		3			3				3		9
	Enhance forest protection and enforcement	Activity 1: Procure field equipments (GPS, binoculars, acoustic equipments, handsets)	Equipments pocured and supplied	Nos	0	2022		5						5			10
		Activity 2: Training on anti-poaching patrol techniques	Trainings conducted	Nos	0	2022		6				6					12
		Activity 3: Establish intelligence network between various law enforcement agencies	Networks established	Nos	0	2022	1					1					2
	Enhance professional capacity of staff	Activity 1: Capacity building for staffs on SMART patrolling	Staff trained on SMART	Nos	5	2022		82									82
		Activity 2: Training on wildlife management and statistical analysis	Trainings conducted	Nos	0	2022		1				1					2

Programme 5: Strengthening Environment Education and Interpretation on biodiversity conservation and Waste management																
Objectives	**Strategies**	**Actions**	**Output indicators**	**Baseline**			Annual Budget (Nu. in Million)									Total
				Unit	**Qty**	**Year**	Y 1	Y2	Y3	Y4	Y5	Y6	Y7	Y8	Y9	Y10	
Objective 05: To strengthen environment education and interpretation on biodiversity conservation and waste management	Strengthen conservation education/ awareness through conservation arts and specimens	Activity 1: Educate communities and nature club programs on conservation and significance of BC	Communities and nature club programs supported	Nos	0	0		100			2				100		200 hhs & 2 nature club programs
		Activity 2: Create awareness and monitor waste management in BC area	Number of awareness program conducted	Nos						2				2			4

ANNEXURES

Annexure I: Annotated checklist of trees in BC7

SL No	Species	Family
1	*Acer cambellii*	Aceraceae
2	*Acer oblongum*	Aceraceae
3	*Acer* spp	Aceraceae
4	*Acer sterculiaceum*	Aceraceae
5	*Rhus chinensis*	Anacardiaceae
6	*Rhus hookeri*	Anacardiaceae
7	*Ilex* spp	Aquifoliaceae
8	*Brassaiopsis hainla*	Araliaceae
9	*Brassaiopsis hispida*	Araliaceae
10	*Macropanax dispermus*	Araliaceae
11	*Merrilliopanax alpinus*	Araliaceae
12	*Pentapanax* spp	Araliaceae
13	*Schefflera impressa*	Araliaceae
14	*Trevesia palmata*	Araliaceae
15	*Alnus nepalensis*	Betulaceae
16	*Betula alnoides*	Betulaceae
17	*Betula utilis*	Betulaceae
18	*Carpinus* spp	Betulaceae
19	*Corylus* spp	Betulaceae
20	*Bischofia* spp	Bischofiaceae
21	*Cordia* spp	Boraginaceae
22	*Benthamidia capitata*	Cornaceae
23	*Torricelli tiliifolia*	Cornaceae
24	*Juniperus recurva*	Cupressaceae
25	*Daphniphyllum himalayense*	Daphniphyllaceae
26	*Elaeocarpus varunua*	Elaeocarpaceae
27	*Enkianthus deflexus*	Ericaceae
28	*Lyonia ovalifolia*	Ericaceae
29	*Pieris formosa*	Ericaceae

30	*Rhododendron arboreum*	Ericaceae
31	*Rhododendron barbatum*	Ericaceae
32	*Rhododendron campylocarpum*	Ericaceae
33	*Rhododendron cinnabarinum*	Ericaceae
34	*Rhododendron falconeri*	Ericaceae
35	*Rhododendron grande*	Ericaceae
36	*Rhododendron griffithianum*	Ericaceae
37	*Rhododendron hodgsonii*	Ericaceae
38	*Rhododendron kendrickii*	Ericaceae
39	*Rhododendron kesangiae*	Ericaceae
40	*Rhododendron* spp	Ericaceae
41	*Glochidion* spp	Euphorbiaceae
42	*Macaranga deticulata*	Euphorbiaceae
43	*Mallotus nepalensis*	Euphorbiaceae
44	*Ostodes paniculata*	Euphorbiaceae
45	*Acrocarpus fraxinifolius*	Fabaceae
46	*Castanopsis hystrix*	Fagaceae
47	*Castanopsis tribuloides*	Fagaceae
48	*Quercus glauca*	Fagaceae
49	*Quercus griffithii*	Fagaceae
50	*Quercus lamellosa*	Fagaceae
51	*Quercus lanata*	Fagaceae
52	*Quercus semicarpifolia*	Fagaceae
53	*Casearia glomerata*	Flacourtiaceae
54	*Altingiaexcelsa*	Hamamelidaceae
55	*Exbucklandia populnea*	Hamamelidaceae
56	*Engelhardia spicata*	Juglandaceae
57	*Juglans regia*	Juglandaceae
58	*Beilschmiedia gammieana*	Lauraceae
59	*Beilschmiedia* spp	Lauraceae
60	*Cinnamomum* spp	Lauraceae
61	*Dodecadenia grandiflora*	Lauraceae
62	*Lindera neesiana*	Lauraceae
63	*Persea* spp	Lauraceae
64	*Albizia chinensis*	Leguminosae

65	*Albizia gamblei*	Leguminosae
66	*Albizia* spp	Leguminosae
67	*Dalbergia sericea*	Leguminosae
68	*Erythrina arborescens*	Leguminosae
69	*Lagerstroemia spp*	Lythraceae
70	*Magnolia globosa*	Magnoliaceae
71	*Magnolia* spp	Magnoliaceae
72	*Michelia doltsopa*	Magnoliaceae
73	*Toona ciliata*	Meliaceae
74	*Ficus cyrtophylla*	Moraceae
75	*Ficus glaberrima*	Moraceae
76	*Ficus* spp	Moraceae
77	*Morus lavigata*	Moraceae
78	*Myrica esculanta*	Myricaceae
79	*Abies densa*	Pinaceae
80	*Pinus bhutanica*	Pinaceae
81	*Pinus roxburghii*	Pinaceae
82	*Tsuga dumosa*	Pinaceae
83	*Ziziphus incurva*	Rhamnaceae
84	*Prunus rufa*	Rosaceae
85	*Prunus* spp	Rosaceae
86	*Sorbus cuspidata*	Rosaceae
87	*Sorbus microphylla*	Rosaceae
88	*Sorbus* spp	Rosaceae
89	*Hymenodictyon flaccidum*	Rubiaceae
90	*Wendlandia* spp	Rubiaceae
91	*Tetradium fraxinifolium*	Rutaceae
92	*Zanthoxylum* spp	Rutaceae
93	*Meliosma dilleniifolia*	Sabiaceae
94	*Salix* spp	Salicaceae
95	*Pyrularia edulis*	Santalaceae
96	*Diploknema butyracea*	Sapotaceae
97	*Symplocos* spp	Symplocaceae
98	*Symplocus ramosissima*	Symplocaceae
99	*Taxus baccata*	Taxaceae

100	*Eurya acuminata*	Theaceae
101	*Eurya* spp	Theaceae
102	*Schima khasiana*	Theaceae
103	*Schima wallichii*	Theaceae
104	*Celtis tetrandra*	Ulmaceae

Annexure II: Annotated checklist of shrubs in BC7

SL No	Species	Family
1	*Alangium alpinum*	Alangiaceae
2	*Rhus paniculata*	Anacardiaceae
3	*Wallichia densiflora*	Arecaceae
4	*Berberis angulosa*	Berberidaceae
5	*Berberis* spp	Berberidaceae
6	*Mahonia nepalensis*	Berberidaceae
7	*Buddleja colvilei*	Buddlejaceae
8	*Buddleja* spp	Buddlejaceae
9	*Viburnum cylindricum*	Caprifoliaceae
10	*Viburnum erubescens*	Caprifoliaceae
11	*Viburnum* spp	Caprifoliaceae
12	*Coriarianepalensis*	Coriariaceae
13	*Gaultheria hookeri*	Ericaceae
14	*Gaultheria* spp	Ericaceae
15	*Gaultheria trichophylla*	Ericaceae
16	*Rhododendron aeruginosum*	Ericaceae
17	*Rhododendron dalhousiae*	Ericaceae
18	*Rhododendron edgworthii*	Ericaceae
19	*Rhododendron keysii*	Ericaceae
20	*Rhododendron lanatum*	Ericaceae
21	*Rhododendron setosum*	Ericaceae
22	*Vaccinium retusum*	Ericaceae
23	*Phyllanthus officinalis*	Euphorbiaceae
24	*Ribes laciniatum*	Grossulariaceae
25	*Ribes* spp	Grossulariaceae
26	*Dichroa febrifuga*	Hydrangeaceae
27	*Hydrangea aspera*	Hydrangeaceae
28	*Hydrangea* spp	Hydrangeaceae
29	*Hydrangea stylosa*	Hydrangeaceae
30	*Hypericum choisianum*	Hypericaceae
31	*Elsholtzia fruitcosa*	Labiatae

32	*Leea asiatica*	Leeaceae
33	*Indigofera* spp	Leguminosae
34	*Ardisia macrocarpa*	Myrsinaceae
35	*Maesachisa*	Myrsinaceae
36	*Rubus ellipticus*	Rosaceae
37	*Rubus* spp	Rosaceae
38	*Skimmia laureola*	Rutaceae
39	*Skimmia* spp	Rutaceae
40	*Toddalia asiatica*	Rutaceae
41	*Daphne bholua*	Thymelaeaceae
42	*Daphne* spp	Thymelaeaceae
43	*Daphne sureil*	Thymelaeaceae
44	*Edgeworthia gardneri*	Thymelaeaceae
45	*Grewia optiva*	Tiliaceae
46	*Boehmeria* spp	Urticaceae
47	*Debregeasia longifolia*	Urticaceae

Annexure III: Annotated checklist of herb in BC7

SL No	Species	Family
1	*Strobilanthes* spp	Acanthaceae
2	*Thunbergia* spp	Acanthaceae
3	*Allium sativum*	Alliaceae
4	*Allium* spp	Alliaceae
5	*Alternanthera sessilis*	Amaranthaceae
6	*Arisaema flavum*	Araceae
7	*Arisaema griffithii*	Araceae
8	*Arisaema* spp	Araceae
9	*Arisaema tortuosum*	Araceae
10	*Asparagus racemosa*	Asparagaceae
11	*Aster* spp	Asteraceae
12	*Eupatorium adenophora*	Asteraceae
13	*Impatiens cristata*	Balsaminaceae
14	*Impatiens* spp	Balsaminaceae
15	*Impatiens sulcata*	Balsaminaceae
16	*Begonia* spp	Begoniaceae
17	*Cynoglossum furcatum*	Boraginaceae
18	*Onosma hispida*	Boraginaceae
19	*Sarcococca hookeriana*	Buxaceae
20	*Cannabis sativa*	Cannabceae
21	*Drymaria cordata*	Caryophyllaceae
22	*Stellaria* spp	Caryophyllaceae
23	*Cyanotis* spp	Commelinaceae
24	*Streptoliriovolubile*	Commelinaceae
25	*Ageratina adenophora*	Compositae
26	*Ageratum conyzoides*	Compositae
27	*Ageratum* spp	Compositae
28	*Anaphalisbusua*	Compositae
29	*Anaphalis* spp	Compositae
30	*Artemisia* spp	Compositae
31	*Bidens bipinnata*	Compositae

32	*Bidens* spp	Compositae
33	*Chromolaena odoratum*	Compositae
34	*Cirsium verutum*	Compositae
35	*Conyza floribunda*	Compositae
36	*Conyza* spp	Compositae
37	*Crassocephalum crepidioides*	Compositae
38	*Crassocephalum* spp	Compositae
39	*Galinsoga parviflora*	Compositae
40	*Ligularia mortonii*	Compositae
41	*Ligularia* spp	Compositae
42	*Saussaurea* spp	Compositae
43	*Senecio raphanifolius*	Compositae
44	*Senecio* spp	Compositae
45	*Sigesbeckia orientalis*	Compositae
46	*Synotis* spp	Compositae
47	*Xanthium indicum*	Compositae
48	*Ophiopogon* spp	Convallariaceae
49	*Tupistra wattii*	Convallariaceae
50	*Cardamine macrophylla*	Cruciferae
51	*Cyperus* spp	Cyperaceae
52	*Pteridium* spp	Dennstaedtiaceae
53	*Droserapeltata*	Droseraceae
54	*Agapatesserpens*	Ericaceae
55	*Vaccinium retusum*	Ericaceae
56	*Vaccinium sikkimensis*	Ericaceae
57	*Euphorbia hirta*	Eurphorbiaceae
58	*Euphorbia* spp	Eurphorbiaceae
59	*Corydalis* spp	Fumariaceae
60	*Halenia elliptica*	Gentianaceae
61	*Megacodon stylophorus*	Gentianaceae
62	*Swertia angustifolia*	Gentianaceae
63	*Swertia bimaculata*	Gentianaceae
64	*Swertia* spp	Gentianaceae
65	*Geranium procurrens*	Geraniaceae
66	*Geranium*spp	Geraniaceae

67	*Corallo discuscooperi*	Gesneriaceae
68	*Didymocarpus gromaticus*	Gesneriaceae
69	*Didymocarpus*spp	Gesneriaceae
70	*Iris* spp	Iridaceae
71	*Juncus* spp	Juncaceae
72	*Leucas ciliata*	Labiatae
73	*Leucas lanata*	Labiatae
74	*Leucas* spp	Labiatae
75	*Origanum vulgare*	Labiatae
76	*Orthosiphon rubicundus*	Labiatae
77	*Pogostemon amarathoides*	Labiatae
78	*Pogostemon* spp	Labiatae
79	*Desmodium* spp	Leguminosae
80	*Trifolia* spp	Leguminosae
81	*Trifolium repens*	Leguminosae
82	*Uraria lagopodioides*	Leguminosae
83	*Cardiocrinum giganteum*	Liliaceae
84	*Lilium nepalensis*	Liliaceae
85	*Lycopodium japonicum*	Lycopodiaceae
86	*Lycopodium* spp	Lycopodiaceae
87	*Urena lobata*	Malvaceae
88	*Melastoma* spp	Melastomataceae
89	*Osbeckia nepalensis*	Melastomataceae
90	*Acanthocalyx nepalensis*	Morinaceae
91	*Oxalis corniculata*	Oxalidaceae
92	*Meconopsis horridula*	Papaveraceae
93	*Meconopsis paniculata*	Papaveraceae
94	*Meconopsis* spp	Papaveraceae
95	*Plantago erosa*	Plantaginaceae
96	*Aconogonon molle*	Polygonaceae
97	*Aconogonon spp*	Polygonaceae
98	*Bistorta macrophylla*	Polygonaceae
99	*Fagopyrum* spp	Polygonaceae
100	*Persicaria nepalensis*	Polygonaceae
101	*Persicaria* spp	Polygonaceae

102	*Rheum* spp	Polygonaceae
103	*Rumex nepalensis*	Polygonaceae
104	*Primula* spp	Primulaceae
105	*Primula whitei*	Primulaceae
106	*Pyrola corbieri*	Pyrolaceae
107	*Pyrola* spp	Pyrolaceae
108	*Aconitum* spp	Ranunculaceae
109	*Fragaria nubicola*	Rosaceae
110	*Fragaria* spp	Rosaceae
111	*Potentilla lineata*	Rosaceae
112	*Potentilla saundersiana*	Rosaceae
113	*Potentilla* spp	Rosaceae
114	*Rosa macrophylla*	Rosaceae
115	*Rosa* spp	Rosaceae
116	*Rubus calycinus*	Rosaceae
117	*Rubia cordifolia*	Rubiaceae
118	*Rubia* spp	Rubiaceae
119	*Houttuynia cordata*	Saururaceae
120	*Bergenia* spp	Saxifragaceae
121	*Chrysosplenium forrestii*	Saxifragaceae
122	*Saxifraga* spp	Saxifragaceae
123	*Hemiphragma heterophylla*	Scrophulariaceae
124	*Lagotis* spp	Scrophulariaceae
125	*Pedicularis pyramidata*	Scrophulariaceae
126	*Pedicularis* spp	Scrophulariaceae
127	*Selaginella monospora*	Selaginellaceae
128	*Selaginella* spp	Selaginellaceae
129	*Solanum viarum*	Solanaceae
130	*Solanum nigrum*	Solanaceae
131	*Paris polyphylla*	Trilliaceae
132	*Elatostema* spp	Urticaceae
133	*Girardinia diversifolia*	Urticaceae
134	*Lecanthus peduncularis*	Urticaceae
135	*Pilea glaberrima*	Urticaceae
136	*Pilea* spp	Urticaceae

137	*Pouzolzia hirta*	Urticaceae
138	*Viola bhutanica*	Violaceae
139	*Viola* spp	Violaceae
140	*Cymbopogon flexuosus*	Gramineae
141	*Cautleya spicata*	Zingiberaceae
142	*Hedychium densiflorum*	Zingiberaceae
143	*Hedychium gardnerianum*	Zingiberaceae
144	*Roscoea alpina*	Zingiberaceae

Annexure IV: Checklist of bird species

SLNo	Common Name	Scientific Name	Family	Group	Conservation status	Remarks
1	Rufous-throated Partridge	*Arborophila rufogularis*	Phasianidae	Partridge	Least Concern	
2	Hill Partridge	*Arborophila torqueola*	Phasianidae	Partridge	Least Concern	
3	Blood Pheasant	*Ithaginis cruentus*	Phasianidae	Pheasants	Least Concern	
4	Satyr Tragopan	*Tragopan satyra*	Phasianidae	Pheasants	Near Threatened	Schedule 1, FNCA-1995
5	Himalayan Monal	*Lophophorus impejanus*	Phasianidae	Pheasants	Least Concern	Schedule 1, FNCA-1995
6	Kalij Pheasant	*Lohura leucomelanos*	Phasianidae	Pheasants	Least Concern	
7	Bar-headed Goose	*Anser indicus*	Anatidae	Duck	Least Concern	
8	Ruddy Shelduck	*Tadorna ferruginea*	Anatidae	Duck	Least Concern	
9	Common Shelduck	*Tadorna tadorna*	Anatidae	Duck	Least Concern	
10	Gadwall	*Anas strepera*	Anatidae	Duck	Least Concern	
11	Eurasian Wigeon	*Anas penelope*	Anatidae	Duck	Least Concern	
12	Mallard	*Anas platyrhynchos*	Anatidae	Duck	Least Concern	
13	Northern Pintail	*Anas acuta*	Anatidae	Duck	Least Concern	
14	Common Teal	*Anas crecca*	Anatidae	Duck	Least Concern	
15	Red-crested Pochard	*Netta rufina*	Anatidae	Duck	Least Concern	
16	Ferruginous Duck	*Aythya nyroca*	Anatidae	Duck	Least Concern	
17	Goosander	*Mergus merganser*	Anatidae	Duck	Least Concern	
18	Grey Heron	*Ardea*	Ardeidae	Heron	Least Concern	
19	Striated Heron	*Butoridas striata*	Ardeidae	Heron	Least Concern	

20	Indian Pond Heron	*Ardeola grayii*	Ardeidae	Heron	Least Concern	
21	Cattle Egret	*Babulcus ibis*	Ardeidae	Egret	Least Concern	
22	Great Cormorant	*Phalacrocorax carbo*	Phalacrocoracidae	Cormorant	Least Concern	
23	Eurasian Hobby	*Falco subbuto*	Falconidae	Falcon	Least Concern	
24	Common Kestrel	*Falco tinnunculus*	Falconidae	Kestrel	Least Concern	
25	Jerdon's Bazza	*Aviceda jerdoni*	Accipitridae	Bazza	Least Concern	
26	Osprey	*Pandion haliaetus*	Accipitridae	Eagle	Least Concern	
27	White-tailed Eagle	*Haliaeetus albicilla*	Accipitridae	Eagle	Least Concern	
28	Black Eagle	*Ictinaetus malayensis*	Accipitridae	Eagle	Least Concern	
29	Palla's Fish Eagle	*Haliaeetus leucoryphus*	Accipitridae	Eagle	Endangered	Schedule 1, FNCA-1995
30	Himalayan Vulture	*Gyps himalayensis*	Accipitridae	Vulture	Near Threatened	
31	Shikra	*Acccipiter badius*	Accipitridae	Accipeter	Least Concern	
32	Northern Goshwak	*Accipiter gantilis*	Accipitridae	Accipeter	Least Concern	
33	Besra	*Accipiter virgatus*	Accipitridae	Accipeter	Least Concern	
34	Eurasian Sparrowhawk	*Accipiter nisus*	Accipitridae	Accipeter	Least Concern	
35	Himalayan Buzzard	*Buteo (buteo) burmanicus*	Accipitridae	Buzzard	Least Concern	
36	Common Buzzard	*Buteo buteo*	Accipitridae	Buzzard	Least Concern	
37	Mountain Hawk Eagle	*Nisaetus nipalensis*	Accipitridae	Hawk Eagle	Least Concern	
38	Slaty-breasted Rail	*Gallirallus striatus*	Rallidae	Rail	Least Concern	
39	Black-tailed Crake	*Porzana bicolor*	Rallidae	Crake	Least Concern	
40	Ruddy-breasted Crake	*Porzana fusca*	Rallidae	Crake	Least Concern	
41	Barred Buttonquail	*Turnix suscitator*	Turnicidae	Buttonquail	Least Concern	

42	Black-necked Crane	*Grus nigricollis*	Gruidae	Crane	Vulnerable	Schedule 1, FNCA-1995
43	Bronze-winged Jacana	*Netopidus indicus*	Jacanidae	Jacana	Least Concern	
44	Black-winged Stilt	*Himantopushimantopus*	Recurvirostridae	Wader	Least Concern	
45	Northern Lapwing	*Vanellus vanellus*	Charadriidae	Lapwing	Least Concern	
46	River Lapwing	*Vanellus duvaucelii*	Charadriidae	Lapwing	Near Threatened	
47	Red-wattled Lapwing	*Vanellus indicus*	Charadriidae	Lapwing	Least Concern	
48	Long-billed Plover	*Charadrius placidus*	Charadriidae	Plover	Least Concern	
49	Little Ringed Plover	*Charadrius dubius*	Charadriidae	Plover	Least Concern	
50	Wood Snipe	*Gallinago nemoricola*	Scolopacidae	Snipe	Vulnerable	
51	Solitary Snipe	*Gallinago solitaria*	Scolopacidae	Snipe	Least Concern	
52	Whimrel	*Numenius phaeopus*	Scolopacidae	Curlew	Least Concern	
53	Common Sandpiper	*Actitis hypoleucos*	Scolopacidae	Sandpiper	Least Concern	
54	Oriental Pratincole	*Glagreola pratincola*	Glareolidae	Pratincole	Least Concern	
55	Brown-headed Gull	*Chroicocephalus brunnicephalus*	Laridae	Gull	Least Concern	
56	Common Pigeon	*Columba libia*	Columbidae	Pigeon	Least Concern	
57	Speckled Wood Pigeon	*Columba hodgsonii*	Columbidae	Pigeon	Least Concern	
58	Barred Cuckoo Dove	*Macropygia unchall*	Columbidae	Dove	Least Concern	
59	Oriental Turtle Dove	*Streptopelia orientalis*	Columbidae	Dove	Least Concern	
60	Spotted Dove	*Stigmatopelia chinensis*	Columbidae	Dove	Least Concern	
61	Wedge-tailed Green Pigeon	*Treron sphenurus*	Columbidae	Green Pigeon	Least Concern	
62	Emerald Dove	*Chalcophaps indica*	Columbidae	Green Pigeon	Least Concern	
63	Common Hawk Cuckoo	*Hierococcyx varius*	Cuculidae	Cuckoo	Least Concern	
64	Large Hawk Cuckoo	*Hierococcyx sparverioides*	Cuculidae	Cuckoo	Least Concern	

65	Hodgson's Hawk Cuckoo	*Hierococcyx fugax*	Cuculidae	Cuckoo	Least Concern	
66	Indian Cuckoo	*Cuculus micropterus*	Cuculidae	Cuckoo	Least Concern	
67	Himalayan Cuckoo	*Cuculus Saturatus*	Cuculidae	Cuckoo	Least Concern	
68	Lesser Cuckoo	*Cuculus poliocephalus*	Cuculidae	Cuckoo	Least Concern	
69	Eurasian Cuckoo	*Cuculus canorus*	Cuculidae	Cuckoo	Least Concern	
70	Black-Winged Cucooshrike	*Coracina melaschistos*	Cuculidae	Cuckoo	Least Concern	
71	Plaintive Cuckoo	*Cacomantis merulinus*	Cuculidae	Cuckoo	Least Concern	
72	Green-billed Malkoha	*Rhopodytes tristis*	Cuculidae	Malkoha	Least Concern	
73	Lesser Coucal	*Centropus bengalensis*	Cuculidae	Coucal	Least Concern	
74	Indian Scops Owl	*Otus bakkamoena*	Tytonidae	Scops Owl	Least Concern	
75	Collared Owlet	*Glaucidium brodiei*	Tytonidae	Owlet	Least Concern	
76	Asian Barred Owlet	*Glaucidium cuculoides*	Tytonidae	Owlet	Least Concern	
77	Spot-bellied Eagle Owl	*Bubo nipalensis*	Strigidae	Eagle Owl	Least Concern	
78	Grey Nightjar	*Camprimulgus (indicus) jotaka*	Caprimulgidae	Nightjar	Least Concern	
79	Common Hoopoe	*Upupa epops*	Upupidae	Hoopoe	Least Concern	
80	Red-headed Trogon	*Harpactes erythrocephalus*	Trogonidae	Trogon	Least Concern	
81	Ward's Trogon	*Harpactes wardi*	Trogonidae	Trogon	Near Threatened	Schedule 1, FNCA-1995
82	Indian Roller	*Coracias benghalensis*	Coraciidae	Roller	Least Concern	
83	White-throated Kingfisher	*Halcyon smyrnensis*	Alcedinidae	Kingfisher	Least Concern	
84	Common Kingfisher	*Alcedo atthis*	Alcedinidae	Kingfisher	Least Concern	
85	Crested Kingfisher	*Megaceryle lugubris*	Alcedinidae	Kingfisher	Least Concern	
86	Blue-bearded Bee-eater	*Nyctyornis athertoni*	Meropidae	Bee-eater	Least Concern	
87	Great Hornbill	*Buceros bicornis*	Bucerotidae	Hornbill	Near Threatened	

88	Rufous-necked Hornbill	*Aceros nipalensis*	Bucerotidae	Hornbill	Vulnerable	
89	Great Barbet	*Magalaima virens*	Lybiidae	Barbet	Least Concern	
90	Golden-throated Barbet	*Megalaima franklinii*	Lybiidae	Barbet	Least Concern	
91	Blue-throated Barbet	*Megalaima asiatica*	Lybiidae	Barbet	Least Concern	
92	Speckled Piculet	*Picumnus innominatus*	Picidae	Piculet	Least Concern	
93	White-browed Piculet	*Sasiao ochracea*	Picidae	Piculet	Least Concern	
94	Yellow-rumped Honeyguide	*Indicator xanthonotus*	Picidae	Honeyguide	Near Threatened	
95	Rufous Woodpecker	*Micropternus brachyurus*	Picidae	Woodpecker	Least Concern	
96	Rufous-bellied Woodpecker	*Dendrocopos hyperythrus*	Picidae	Woodpecker	Least Concern	
97	Grey-capped Pygmy Woodpecker	*Dendrocopos canicapillus*	Picidae	Woodpecker	Least Concern	
98	Crimson-breasted Woodpecker	*Dendrocopos cathpharius*	Picidae	Woodpecker	Least Concern	
99	Bay Woodpecker	*Blythipicus pyrrhotis*	Picidae	Woodpecker	Least Concern	
100	Darjeeling Woodpecker	*Dendrocopos darjellensis*	Picidae	Woodpecker	Least Concern	
101	Lesser Yellownape	*Pycus chlorophus*	Picidae	Woodpecker	Least Concern	
102	Greater Yellownape	*Pycus flavinucha*	Picidae	Woodpecker	Least Concern	
103	Long-tailed Broadbill	*Psarisomus dealhousiae*	Eurylaimidae	Broadbill	Least Concern	
104	Bar-winged Flycatcher-Shrike	*Hemipus picatus*	Vangidaea	Flycatcher-Shrike	Least Concern	
105	Grey-chinned Minivet	*Pericrocotus solaris*	Campephagidae	Minivet	Least Concern	
106	Short-billed Minivet	*Pericrocotus brevirostris*	Campephagidae	Minivet	Least Concern	
107	Scarlet Minivet	*Pericrocotus (flammeus)speciosus*	Campephagidae	Minivet	Least Concern	
108	Long-tailed Shrike	*Lanius schach*	Laniidae	Shrike	Least Concern	
109	Grey -backed Shrike	*Lanius tephronotus*	Laniidae	Shrike	Least Concern	
110	Spangled Drongo	*Dicrurus hottentottus*	Dicruridae	Drongo	Least Concern	

111	Ashy Drongo	*Dicrurus leucophaeus*	Dicruridae	Drongo	Least Concern	
112	Slender-billed Oriole	*Oriolus tenuirostris*	Icteridae	Oriole	Least Concern	
113	Maroon Oriole	*Oriolus traillii*	Icteridae	Oriole	Least Concern	
114	Yellow-bellied Fairy Fantail	*Chelidorhynx hypoxantha*	Stenostiridae	Fantail	Least Concern	
115	White-throated Fantail	*Rhipidura albicollis*	Rhipiduridae	Fantail	Least Concern	
116	Black-naped Monarch	*Hypothymis azurea*	Monarchidae	Monarch	Least Concern	
117	Eurasian Jay	*Garrulus glandarius*	Corvidae	Jay	Least Concern	
118	Yellow-billed Blue Magpie	*Urocissa flavirostris*	Corvidae	Magpie	Least Concern	
119	Grey Treepie	*Dendrocitta formosae*	Corvidae	Treepie	Least Concern	
120	Eurasian Magpie	*Pica pica*	Corvidae	Magpie	Least Concern	
121	Large-billed Crow	*Corvus macrorhynchos*	Corvidae	Crow	Least Concern	
122	Red-billed Chough	*Pyrrhocorax pyrrhocorax*	Corvidae	Chough	Least Concern	
123	Spotted Nutcracker	*Nucifraga caryocatactes*	Corvidae	Nutcracker	Least Concern	
124	Green-Backed Tit	*Parus monticolus*	Paridae	Tit	Least Concern	
125	Yellow-cheeked Tit	*Parus spilonotus*	Paridae	Tit	Least Concern	
126	Rufous -vented Tit	*Periparus rubidiventris*	Paridae	Tit	Least Concern	
127	Yellow-browed Tit	*Sylviparus modestus*	Paridae	Tit	Least Concern	
128	Black Throated Tit	*Aegithalos concinnus*	Paridae	Tit	Least Concern	
129	Nepal House Martin	*Delichon nipalense*	Hirundinidae	Martin	Least Concern	
130	Bengal Bushlarch	*Mirafra assamica*	Aludidae	Larch	Least Concern	
131	Ashy Bulbul	*Hemixos flavala*	Pycnonotidae	Bulbul	Least Concern	
132	Black Bulbul	*Hypsipetes leucocephalus*	Pycnonotidae	Bulbul	Least Concern	
133	Black-crested Bulbul	*Hypsipetes flaviventris*	Pycnonotidae	Bulbul	Least Concern	
134	Mountain Bulbul	*Ixos mcclellandii*	Pycnonotidae	Bulbul	Least Concern	

135	Red-vented Bulbul	*Pycnonotus cafer*	Pycnonotidae	Bulbul	Least Concern	
136	Striated Bulbul	*Pycnonotus striatus*	Pycnonotidae	Bulbul	Least Concern	
137	Himalayan Prinia	*Prinia crinigera*	Cisticolidae	Prinia	Least Concern	
138	Black-throated Prinia	*Prinia atrogularis*	Cisticolidae	Prinia	Least Concern	
139	Rufescent Prinia	*Prinia rufescens*	Cisticolidae	Prinia	Least Concern	
140	Common Tailorbird	*Orthotomus sutorius*	Cisticolidae	Prinia	Least Concern	
141	Chestnut-headed Tesia	*Oligura castaneocoronata*	Cittiidae	Tesia	Least Concern	
142	Grey-bellied Tessia	*Tesia cyaniventer*	Cittiidae	Tesia	Least Concern	
143	Chestnut-crowned Bush Warbler	*Cettia major*	Cittiidae	Warbler	Least Concern	
144	Large-billed Leaf Warbler	*Phylloscopus magnirostris*	Cittiidae	Warbler	Least Concern	
145	Brown Bush Warbler	*Bradypterus luteoventris*	Cittiidae	Warbler	Least Concern	
146	Grey-sided Bush Warbler	*Cettia brunnifrons*	Cittiidae	Warbler	Least Concern	
147	Black-faced Warbler	*Abroscopus schisticeps*	Cittiidae	Warbler	Least Concern	
148	Brownish-flanked Bush Warbler	*Cettia fortipes*	Cittiidae	Warbler	Least Concern	
149	Lemon-rumped warbler	*Phylloscopus chlorolotus*	Phylloscopidae	Warbler	Least Concern	
150	White-spectacled Warbler	*Seicrcus affinis*	Acanthizidae	Warbler	Least Concern	
151	Grey-cheeked Warbler	*Seicercus poliogenys*	Phylloscopidae	Warbler	Least Concern	
152	Ashy-throated Warbler	*Phylloscopus maculipennis*	Phylloscopidae	Warbler	Least Concern	
153	Whistler's Warbler	*Seicercus whistleri*	Phylloscopidae	Warbler	Least Concern	
154	Chestnut-crowned Warbler	*Seicercus castaniceps*	Phylloscopidae	Warbler	Least Concern	
155	Buff-barred Warbler	*Phylloscopus pulcher*	Phylloscopidae	Warbler	Least Concern	
156	Grey-hooded Warbler	*Phylloscopus Xanthoschistos*	Phylloscopidae	Warbler	Least Concern	
157	Hume's bush Warbler	*Cettia brunnescens*	Cittiidae	Warbler	Least Concern	
158	Scaly-breasted Wren Babbler	*Pnoepyga albiventer*	Pellorneidae	Babbler	Least Concern	

159	Rufous-throated Wren Babbler	*Spelaeornis caudatus*	Pellorneidae	Babbler	Least Concern	
160	Rufous-capped babbler	*Stachyridopsis ruficeps*	Timaliidae	Babbler	Least Concern	
161	Golden Babbler	*Stachyridopsis chrysaea*	Timaliidae	Babbler	Least Concern	
162	Rusty-cheeked Scimitar Babbler	*Pomatorhinus erythrogenys*	Timaliidae	Babbler	Least Concern	
163	White-browed Scimitar Babbler	*Pomatorhinus schisticeps*	Timaliidae	Babbler	Least Concern	
164	Streak-breasted Scimitar Babbler	*Pomatorhinus ruficollis*	Timaliidae	Babbler	Least Concern	
165	Jungle Babbler	*Turdoides striata*	Leiothrichidae	Babbler	Least Concern	
166	White-throated Laughingthrush	*Garruulax albogularis*	Leiothrichidae	Laughingthrush	Least Concern	
167	Striated Laughingthrush	*Garrulax striatus*	Leiothrichidae	Laughingthrush	Least Concern	
168	Spotted Laughingthrush	*Garrulax ocellatus*	Leiothrichidae	Laughingthrush	Least Concern	
169	Rufous-necked Laughingthrush	*Garrulax ruficollis*	Leiothrichidae	Laughingthrush	Least Concern	
170	White-crested Laughingthrush	*Garrulax leucolophus*	Leiothrichidae	Laughingthrush	Least Concern	
171	Bhutan Laughingthrush	*Garrulax imbricatus*	Leiothrichidae	Laughingthrush	Least Concern	
172	Blue-winged Laughingthrush	*Garrulax squamatus*	Leiothrichidae	Laughingthrush	Least Concern	
173	Black-faced Laughingthrush	*Garrulax affinis*	Leiothrichidae	Laughingthrush	Least Concern	
174	Chestnut-crowned Laughingthrush	*Garrulax erythrocephalus*	Leiothrichidae	Laughingthrush	Least Concern	
175	Hoary-throated Barwing	*Actinodura nipalensis*	Leiothrichidae	Barwing	Least Concern	
176	Rusty-fronted Barwing	*Actinodura egertoni*	Leiothrichidae	Barwing	Least Concern	
177	Red-billed leiothrix	*leiothrix lutea*	Leiothrichidae	Babbler	Least Concern	
178	Himalayan Cutia	*Cutia nipalensis*	Leiothrichidae	Babbler	Least Concern	
179	Blue-wingwd siba	*Siva cyanouroptera*	Leiothrichidae	Babbler	Least Concern	
180	Red-tailed Minla	*Minla ignotincta*	Leiothrichidae	Babbler	Least Concern	
181	Black-headed Shrike-babbler	*Pteruthius rufiventer*	Vireonidae	Babbler	Least Concern	
182	Black-eared Shrike-babbler	*Pteruthis melanotis*	Vireonidae	Babbler	Least Concern	

183	Green Shrike-babbler	*Pteruthis xanthochlorus*	Vireonidae	Babbler	Least Concern	
184	Golden -breasted Fulvetta	*Lioparus chrysotis*	Paradoxornithidae	Fulvetta	Least Concern	
185	Rufous-winged Fulvetta	*Pseudominla castaneceps*	Paradoxornithidae	Fulvetta	Least Concern	
186	White-browed Fulvetta	*Fulvetta vinipectus*	Paradoxornithidae	Fulvetta	Least Concern	
187	Nepal Fulvetta	*Alcippe nipalensis*	Paradoxornithidae	Fulvetta	Least Concern	
188	Rufous Sibia	*Malacias capistratus*	Leiothrichidae	Sibia	Least Concern	
189	Striated Yuhina	*Staphida castaniceps*	Zosteropidae	Yuhina	Least Concern	
190	White-napped Yuhina	*Yuhina bakery*	Zosteropidae	Yuhina	Least Concern	
191	Whiskered Yuhina	*Yuhina flavicollis*	Zosteropidae	Yuhina	Least Concern	
192	Strip-throated Yuhina	*Yuhina gularis*	Zosteropidae	Yuhina	Least Concern	
193	Rufous-vented Yuhina	*Yuhina occipitalis*	Zosteropidae	Yuhina	Least Concern	
194	Black-chinned Yuhina	*Yuhina nigrimenta*	Zosteropidae	Yuhina	Least Concern	
195	Black-throated Parrotbill	*Suthora nipalensis*	Paradoxornithidae	Parrotbill	Least Concern	
196	Fire-tailed Myzornis	*Myzornis pyrrhoura*	Paradoxornithidae	Babbler	Least Concern	
197	Indian White-eye	*Zosterops palpebrosus*	Zosteropidae	White-eye	Least Concern	
198	Winter Wren	*Troglogytes troglogytes*	Troglodytidae	Wren	Least Concern	
199	Brown Dipper	*Cinclus pallasii*	Cinclidae	Dipper	Least Concern	
200	White-tailed Nuthatch	*Sitta himalayensis*	Sittidae	Nuthatch	Least Concern	
201	Chestnut-bellied Nuthatch	*Sitta (castanea)cinnamoventris*	Sittidae	Nuthatch	Least Concern	
202	Wallcreeper	*Tichodroma muraria*	Tichodromidae	Wallcreeper	Least Concern	
203	Rusty-flanked Treecreeper	*Certhia nipalensis*	Certhiidae	Treecreeper	Least Concern	
204	Sikkim Treecreeper	*Certhia discolor*	Certhiidae	Treecreeper	Least Concern	
205	Chestnut-tailed Starling	*Sturnia malabarica*	Sturnidae	Starling	Least Concern	

206	Blue Whistling Thrush	*Myophonus caeruleus*	Muscicapidae	Thrush	Least Concern	
207	Orange-headed Thrush	*Zoothera citrina*	Turdidae	Thrush	Least Concern	
208	Scaly Thrush	*Zoothera dauma*	Turdidae	Thrush	Least Concern	
209	Plain-backed Thrush	*Zoothea mollissima*	Turdidae	Thrush	Least Concern	
210	Long-billed Thrush	*Zoothera monticola*	Turdidae	Thrush	Least Concern	
211	Grey-winged Blackbird	*Turdus boulboul*	Turdidae	Thrush	Least Concern	
212	Long-tailed Thrush	*Zoothera dixoni*	Turdidae	Thrush	Least Concern	
213	Gould's Shortwing	*Heteroxenicus stellatus*	Muscicapidae	Shortwing	Least Concern	
214	Rufous-breasted Bush Robin	*Tarsiger hyperythrus*	Muscicapidae	Robin	Least Concern	
215	Himalayan Bluetail	*Tarsiger (cyanurus) rufilatus*	Muscicapidae	Robin	Least Concern	
216	Golden Bush Robin	*Tarsiger chrysaeus*	Muscicapidae	Robin	Least Concern	
217	Oriental Magpie Robin	*Copsychus saularis*	Muscicapidae	Robin	Least Concern	
218	Plumbeous Water Redstart	*Rhyacornis fuliginosa*	Muscicapidae	Redstart	Least Concern	
219	White-capped Redstart	*Chaimarrornis leucocephalus*	Muscicapidae	Redstart	Least Concern	
220	Black Redstart	*Phoenicurus ochruros*	Muscicapidae	Redstart	Least Concern	
221	Hodgson's Redstart	*Phoenicurus hodgsoni*	Muscicapidae	Redstart	Least Concern	
222	Daurian Redstart	*Phoenicurs auroreus*	Muscicapidae	Redstart	Least Concern	
223	Blue-fronted Redstart	*Phoenicurs frontalis*	Muscicapidae	Redstart	Least Concern	
224	Blue-fronted Robin	*Cinclidium frontale*	Muscicapidae	Robin	Least Concern	
225	Little Forktail	*Enicurus scouleri*	Muscicapidae	Forktail	Least Concern	
226	Black-backed Forktail	*Enicurus immaculatus*	Muscicapidae	Forktail	Least Concern	
227	Slaty-backed Forktail	*Enicurus schistaceus*	Muscicapidae	Forktail	Least Concern	
228	Spotted Forktail	*Enicurus maculatus*	Muscicapidae	Forktail	Least Concern	
229	Common Stonechat	*Saxicola torquatus*	Muscicapidae	Stonechat	Least Concern	

230	Grey Bushchat	*Saxicola ferreus*	Muscicapidae	Bushchat	Least Concern	
231	Blue Rock Thrush	*Monticola solitarius*	Muscicapidae	Rock Thrush	Least Concern	
232	Blue-capped Rock Thrush	*Monticola cinclorhynchus*	Muscicapidae	Rock Thrush	Least Concern	
233	Chestnut-bellied Rock Thrush	*Monticola rufiventris*	Muscicapidae	Rock Thrush	Least Concern	
234	Dark-sided Flycatcher	*Muscicapa sibirica*	Muscicapidae	Flycatcher	Least Concern	
235	Ferruginous Flycatcher	*Musicapa ferruginea*	Muscicapidae	Flycatcher	Least Concern	
236	Slaty-backed Flycatcher	*Ficedula hodgsonii*	Muscicapidae	Flycatcher	Least Concern	
237	Rufous-gorgeted Flycatcher	*Ficedula strophiata*	Muscicapidae	Flycatcher	Least Concern	
238	Little Pied Flycatcher	*Ficedula westermanni*	Muscicapidae	Flycatcher	Least Concern	
239	Ultramarine Flycatcher	*Ficedula superciliaris*	Muscicapidae	Flycatcher	Least Concern	
240	Verdeter Flycatcher	*Eumyias thalassinus*	Muscicapidae	Flycatcher	Least Concern	
241	Pale Blue Flycatcher	*Cyornis unicolor*	Muscicapidae	Flycatcher	Least Concern	
242	Grey-headed Canary Flycatcher	*Culicicapa ceylonensis*	Muscicapidae	Flycatcher	Least Concern	
243	Snowy-browed Flycatcher	*Ficedula hyperythra*	Muscicapidae	Flycatcher	Least Concern	
244	Rufous-bellied Niltava	*Niltava sundara*	Muscicapidae	Niltava	Least Concern	
245	Samall Niltava	*Niltava macgrigoriae*	Muscicapidae	Niltava	Least Concern	
246	Large Niltava	*Niltava grandis*	Muscicapidae	Niltava	Least Concern	
247	Orange-bellied Niltava	*Chloropsis hardwickii*	Choloropseidae	Leafbird	Least Concern	
248	Yellow-bellied Flowerpecker	*Dicaeum melanoxanthum*	Dicaeidae	Flowerpecker	Least Concern	
249	Fire-breasted Flowerpecker	*Dicaeum ignipectus*	Dicaeidae	Flowerpecker	Least Concern	
250	Mrs Gould's Sunbird	*Aethopyga gouldae*	Nectariniidaae	Sunbird	Least Concern	
251	Green-tailed Sunbird	*Aethopyga nipalensis*	Nectariniidaae	Sunbird	Least Concern	
252	Black-throated Sunbird	*Aethopyga saturata*	Nectariniidaae	Sunbird	Least Concern	
253	Crimson Sunbird	*Aethopyga siparaja*	Nectariniidaae	Sunbird	Least Concern	

254	Fire-tailed Sunbird	*Aethopyga ignicauda*	Nectariniidaae	Sunbird	Least Concern	
255	Streaked Spiderhunter	*Arachnothera magna*	Nectariniidaae	Spiderhunter	Least Concern	
256	Russet Sparrow	*Passer rutilans*	Passeridae	Sparrow	Least Concern	
257	Eurasiam Treesparrow	*Passer montanus*	Passeridae	Sparrow	Least Concern	
258	Scaly-breasted Munia	*Lonchura punctulate*	Estrildidae	Munia	Least Concern	
259	Alpine Accentor	*Prunella collaris*	Prunellidae	Accentor	Least Concern	
260	Rufous-breasted Accentor	*Prunella strophiata*	Prunellidae	Accentor	Least Concern	
261	Grey Wagtail	*Motacilla cinerea*	Monticillidae	Wagtail	Least Concern	
262	White Wagtail	*Montacilla alba*	Monticillidae	Wagtail	Least Concern	
263	Paddyfield Pipit	*Anthus rufulus*	Monticillidae	Pipit	Least Concern	
264	Olive-backed Pipit	*Anthus hodgsoni*	Monticillidae	Pipit	Least Concern	
265	Yellow-breasted Greenfinch	*Carduelis spinoides*	Fringillidae	Finch	Least Concern	
266	Plain Mountain Finch	*Leucosticte nemoricola*	Fringillidae	Finch	Least Concern	
267	Dark-breasted Rosefinch	*Carpodacus nipalensis*	Fringillidae	Finch	Least Concern	
268	Common Rosefinch	*Carpodacus erythrinus*	Fringillidae	Finch	Least Concern	
269	Scarlet Finch	*Haematospiza sipahi*	Fringillidae	Finch	Least Concern	
270	Red-headed Bullfinch	*Pyrrhula erythrocephala*	Fringillidae	Finch	Least Concern	
271	White-browed Rosefinch	*Carpodacus thura*	Fringillidae	Finch	Least Concern	
272	Brown Bullfinch	*Pyrrhula nipalensis*	Fringillidae	Finch	Least Concern	
273	Gold-napped Finch	*Pyrrhoplectes epauletta*	Fringillidae	Finch	Least Concern	
274	Spot-winged Grosbeak	*Mycerobas melanozanthos*	Fringillidae	Grosbeak	Least Concern	
275	Crested Bunting	*Melophus lathami*	Emberizidae	Bunting	Least Concern	
276	Little Bunting	*Emberiza pusilla*	Emberizidae	Bunting	Least Concern	

Annexure V: Checklist of mammals

SL No	Order	Family	*Scientific Name*	Common Name	IUCN
1	Carnivora	Aluridae	*Ailurus fulgens*	Red Panda	EN
2	Feliformia	Bovidae	*Capricornis sumatraensis thar*	Himalayan Serow	VU
3	Feliformia	Bovidae	*Naemorhedus goral*	Himalayan Goral	NT
4	Feliformia	Bovidae	*Budorcas taxicolor*	Takin	VU
5	Carnivora	Canidae	*Cuon alpinus*	Dhole	EN
6	Primates	Cercopithecidae	*Macaca assamensis*	Assamese Macaque (Monkey)	NT
7	Primates	Cercopithecidae	*Trachypithecus pileatus*	Capped Langur	VU
8	Feliformia	Cervidae	*Muntiacus muntjak*	Barking Deer	LC
9	Feliformia	Cervidae	*Rusa unicolor*	Sambar Deer	VU
10	Carnivora	Felidae	*Panthera pardus*	Common Leopard	VU
11	Carnivora	Felidae	*Prionailurus bengalensis*	Leopard Cat	LC
12	Carnivora	Felidae	*Catopuma temminckii*	Asiatic Golden Cat	NT
13	Carnivora	Felidae	*Panthera tigris tigris*	Bengal Tiger	EN
14	Carnivora	Felidae	*Pardofelis marmorata*	Marbled Cat	NT
15	Rodentia	Hystricidae	*Hystrix bracyhura*	Himalayan Crestless Porcupine	LC
16	Carnivora	Mustelidae	*Lutrogale perspicillata*	Smooth-coated otter	VU
17	Carnivora	Mustelidae	*Martes falvigula*	Yellow-throated Marten	LC
18	Rodentia	Muridae	*Mus musculus*	House Mouse	LC
19	Feliformia	Suidae	*Sus scrofa*	Wild Pig	LC
20	Rodentia	Sciuridae	*Callosciurus pygerythrus*	Hoary-bellied Himalayan Squirrel	LC
21	Rodentia	Sciuridae	*Dremomys lokriah*	Orange-bellied Himalayan Squirrel	LC
22	Rodentia	Sciuridae	*Ratufa bicolor*	Black/Malayan Giant Squirrel	NT
23	Rodentia	Sciuridae	*Marmota Himalayana*	*Himalayan Marmot*	LC
24	Rodentia	Sciuridae	*Petaurista nobilis*	Bhutan Giant Flying Squirrrel	VN
25	Rodentia	Sciuridae	*Suncus murinus*	Asian House Shrew	LC
26	Rodentia	Sciuridae	*Tamiops macclellandi*	Himalayan Stripped Squirrel	LC
27	Carnivora	Ursidae	*Ursus thibetanus laniger*	Himalayan Black Bear	VU
28	Feliformia	Viverridae	*Paradoxuxus hermaphroditus*	Himalayan Palm Civet	LC

Annexure VI: Checklist of CF falling under BC7

Sl. no	CF_Name	Geog	Total CF Area_Ha	Area (Ha) under_BC.7
1	Umbra Khoma Community Forest	Khoma	123.966418	9.669983546
2	Pangkhar Community Forests	Khoma	131.011566	0.080979198
3	Takhambi Community Forest	Tsakaling	133.762007	132.155255
4	Ganglapong Kuenphen Community Forest	Tsamang	380.169845	380.1698447
5	Norbuling Community Forest	Gangzur	78.980635	31.83188022
6	Sisingbee Community Forest	Tsenkhar	62.29428193	62.29428193
7	Yangla Community Forest	Tsenkhar	45.98652091	45.98652091
8	Tsenkhar Community Forest	Tsenkhar	659.438543	387.9726118
9	Rawabee Community Forest	Menbi	69.9827899	20.88154809
10	Zhazela Community Forest	Minjey	84.53091383	84.53091383
11	Gakyid Denpai Community Forest	Menbi	55.44992198	0.048695702
12	Zhungkhar Youngchab Community Forest	Menbi	114.0719674	114.0719674
13	Pangkabrangsa Community Forest	Minjey	108.5291668	76.3114746
14	Tabung Yargay Community Forest	Menbi	88.49615671	5.579287213
15	Kharshong Norden Community Forest	Menbi	102.7410871	0.054291492
16	Ngar Pangkazur Community Forest	Gangzur	47.4105579	22.21365442
17	Dengkaling Community Forest	Gangzur	73.88489183	21.11211776
18	Tongling Kuenphen Community Forest	Gangzur	136.5528148	79.6858895
19	Jalang Community Forest	Minjey	194.1271126	110.8937772
20	Rashingbee Community Forest	Tsenkhar	56.52764628	54.36835261

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