

*Working Draft 2022*

# **KINGDOM OF BHUTAN**

*Country Profile and Context*

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## **Abbreviations and Acronyms**

AAC	Annual Allowable Cut
AFoCO	Asian Forest Cooperation Organization
AWBI	Association of Wood-Based Industries
BCCI	Bhutan Chamber of Commerce and Industries
BLC	Bhutan Logging Corporation
CBD	Convention on Biological Diversity
CF	Community Forestry
CFMG	Community Forest Management Group
cft.	cubic feet
CITES	Convention on International Trade in Endangered Species of Wild Fauna and Flora
COVID-19	Coronavirus Infectious Disease-19
CSI	Cottage and Small Industry
DAC	Development Assistance Committee
DoFPS	Department of Forest and Park Services
FAO	Food and Agriculture Organization
FDI	Foreign Direct Investment
FMUs	Forest Management Units
FPED	Forest Protection and Enforcement Division
FRA	Forest Resources Assessment
FRMD	Forest Resources Management Division
FTE	Full-time equivalents
FY	Financial Year
FYP	Five Year Plan
GCF	Green Climate Fund
GDP	Gross Domestic Product
GHG	Greenhouse Gas
GIS	Geographic Information System
GLOF	Glacial Lakes Outburst Floods
GNH	Gross National Happiness
GTC	Global Tiger Center
HDI	Human Development Index
ICT	Information & Communications Technology
INDC	Intended Nationally Determined Contribution
ISO	International Organization for Standardization
ITPGRFA	International Treaty on Plant Genetic Resource for Food and Agriculture
ITU	International Telecommunication Union
LDC	Least Developed Countries

masl.	metres above sea level
MoAF	Ministry of Agriculture and Forests
N/A	Not Applicable
NAP	National Adaptation Plan
NAPA	National Adaptation Program of Action
NBP	National Biodiversity Program
NBSAP	National Biodiversity Strategies and Action Plans
NC	National Certificate
NCD	Nature Conservation Division
NCSI	National Cottage and Small Industry Bank
NDC	Nationally Determined Contribution
NEC	National Environment Commission
NKRAs	National Key Result Areas
NPPC	National Plant Protection Centre
NRDCL	Natural Resources Development Corporation Limited
NTFP	Non-Timber Forest Productions
ODA	Official Development Assistance
PPP	Purchasing power parity
PRA	Pest Risk Analysis
R&D	Research and development
REDD	Reducing emissions from deforestation and forest degradation
RGoB	Royal Government of Bhutan
RNR	Renewable Natural Resource
RNR-RDC	Renewable Natural Resources Research Center
SAWEN	South Asian Wildlife Enforcement Network
SDG	Sustainable Development Goals
SFED	Social Forestry and Extension Division
SPWP	Secondary Processed Wood Products
SRF	State Reserved Forest
SRFL	State Reserve Forest Land
UN	United Nations
UNCCD	United Nation Convention to Combat Desertification
UNDP	United Nations Development Programme
UNESCO	United Nations Educational, Scientific and Cultural Organization
UNFCCC	United Nations Framework Convention on Climate Change
UNFF	United Nations Forum on Forests
UTC	Coordinated Universal Time
UWICER	Ugyen Wangchuck Institute for Conservation and Environment Research
WMD	Watershed Management Division

# 1. Introduction

The Kingdom of Bhutan is one of the few countries in the world with an extraordinary forest conservation model, largely due to the far-sighted leadership of the country, the tradition of people living in harmony with nature and the strong steps taken to maintain natural resources. Bhutan has 71 % (2.7 million ha) of the total geographical area (3.8 million ha) of the country under forest cover (FRMD, 2017) and has also pledged to maintain at least 60% of its land as forests in perpetuity. Along with that, 51.44% of the area is set aside as a protected area network for the conservation of biodiversity.

Due to the high forest cover and exceptionally diverse climatic conditions, Bhutan has a rich biodiversity with one of the highest species densities and flourishing populations of some of the rarest flora and fauna on earth. Apart from being a rich repository of biodiversity, forests also provide many ecosystem services, including carbon sequestration, water provision, natural resources to local communities and source of revenue through hydropower ecotourism in the country.

In 2009, Bhutan made a voluntary commitment to remain carbon neutral at COP-15 and the commitment was reiterated in the first Nationally Determined Contribution (NDC) in 2015. In 2021 by submitting its 2<sup>nd</sup> NDC, Bhutan further pledged to maintain emission of greenhouse gases below the sequestration capacity of our forests and extended regional and international corporations to fight global climate crises.

Although the country is committed to a high level of environmental protection, over the years, forests have been facing challenges in terms of the increase in deforestation and forest degradation, which is further worsened by climate change impacts and adhering to the environmental obligation which is enshrined in the constitution to secure an ecologically balanced, sustainable form of development when confronted with more challenges.

As part of the budgeting for the current Five-Year Plan (FYP), which has as one of its objectives the establishment of a carbon-neutral and climate-resilient society, Bhutan is already allocating money to adaptation and mitigation measures for climate change. For instance, projects are being developed at substantial additional expenditure to account for the need to survive catastrophic glacial lakes outburst floods (GLOF) events in the hydropower sector, which is the primary source of income for the government and development operations.

The amount of funds that will be made available to meet both development demands and the increased expense of mitigation and adaptation will be much greater than what is currently available. As a Least Developed Country with a young population and significant demands and imperatives for economic development, the degree of financial and technical support we receive will determine how well we can implement our intended mitigation measures.

This document provides a general overview of Bhutan including the geographic profile, administrative setup, population, socio-economic situation, climatic condition and biodiversity.

The document also highlights the state of the forest in the country, its policy priorities and strategies, forest products and trade. The gaps and challenges encountered in forest conservation are also highlighted followed by applicable recommendation actions. Overall, the document intends to provide baseline information to assist in the designing of the cooperation framework under AFoCO and the information contained in this document has been gathered mainly through desk-based research and the review of available national statistics, national laws and policies, technical reports, and other secondary data sources, and subsequently validated by the focal agency of Bhutan. Should there be significant changes in national forest policy or context, they will be reflected accordingly.

## 2. Country Overview

### 2.1 Geographic profile

Bhutan is a small, landlocked country with a total area of 38,394 sq.km situated on the southern slope of the Eastern Himalayas. The country is almost entirely mountainous and lies between two giant countries; China in the north and India in the east, west and south. The lowest elevation is at around 100 meters above sea level (masl) in southern Bhutan, and the highest peak, rises to 7,570 masl in the north. The country is situated between 26°45'N and 28°10'N latitudes and 88°45'E and 92°10'E longitudes. Bhutan's topography is made up of high, rocky mountains, glaciers, moraines, deep valleys, ravines, and depressions that mark watercourses, drainage basins, and waterfalls.



Figure 1. Bhutan is highlighted in red

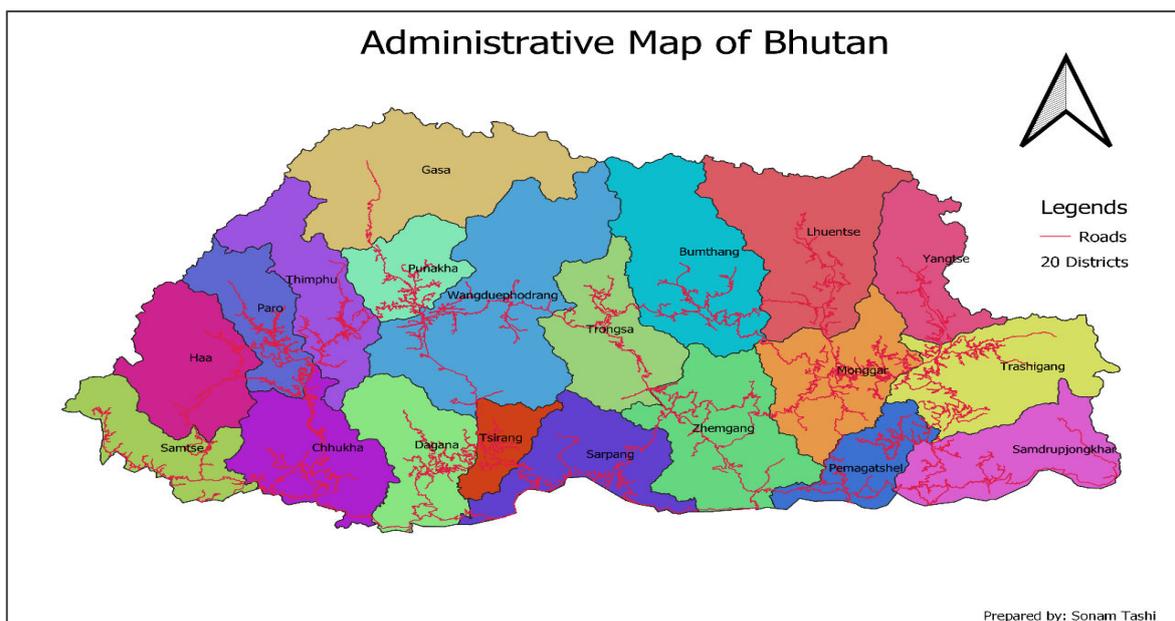


Figure 2. Administrative map in Bhutan

Table 1. Summary of country profile

Official name (ISO 3166 code)	Kingdom of Bhutan (BT)
Capital	Thimphu
Population	735,553 (PHCB, 2017)
Language	Dzongkha
Currency (ISO 4217 code)	Ngultrum (Nu.)
Land Area	38394 km <sup>2</sup>
Forest Area	27171 km <sup>2</sup>
GDP per capita	USD 3,411,94
HDI	0.654, 129 <sup>th</sup> rank (UNDP,2020) <sup>1</sup>
DAC-ODA Recipients	Least Developed Countries
Time zone	UTC +6
Calling code	+975

## 2.2. Government and Administration

Bhutan is a democratic constitutional monarchy with His Majesty the Druk Gyalpo as the head of the state and the elected Prime Minister as the head of the Government. At the central level, the 10 different Ministry is headed by the Cabinet Ministers and at the local level, Bhutan is administratively divided into 20 *Dzongkhags* (districts). The *Dzongkhags* are sub-divided into small blocks or *geogs*. There are 205 *geogs* in the country, grouped under 47 constituencies.

Table 2. Ministries of Bhutan

1	Ministry of Agriculture and Forests
2	Ministry of Economic Affairs
3	Ministry of Education
4	Ministry of Finance
5	Ministry of Foreign Affairs
6	Ministry of Home & Cultural Affairs
7	Ministry of Health
8	Ministry of Information and Communications
9	Ministry of Labour and Human Resources
10	Ministry of Works and Human Settlements

Three main branches of Government are; Legislative, Executive and Judiciary. The Parliament in Bhutan (HM the King, National Assembly and National Council members) forms the Legislative branch, the Executive is the *Lhengye Zhungtsho* (the council of ministers) and the Judiciary authority of Bhutan is vested in the Royal Courts of Justice.

<sup>1</sup> "Human Development Reports," *Hdr.undp.org*, last modified n.d., accessed May 19, 2021, <http://hdr.undp.org/en/countries/profiles/BTN>.

### 2.3. People and Population

Bhutan is one of the least populated countries in Asia. The total population is 735.553 (thousand Persons) and Population Growth Rate (PGR) is 1.1% per annual. The population density of Bhutan increased from 18 persons per km<sup>2</sup> in 2010 to 20 persons per km<sup>2</sup> in 2020<sup>2</sup>. The distribution of the population over the land area is not uniform throughout the country. 62% of the population still resides in rural Bhutan and the urban populations form about 37.8 % of the total population, with the majority of it concentrated in the capital Thimphu. Major population centers are located in the west and south. The northern region is very sparsely populated.

The sex ratio is 110 males to every 100 females. The literacy rate of Bhutan is 71.4%, which is an increase of 12 % from 2005 (59.5%). The country's labor force participation rate is 63.3%. The labor force participation rate for females is 52.2% and 73.1% for males. In 2017, 8.8 percent of the population lived in poverty compared with 23.2 percent in 2007. Almost all (99.5%) households have access to improved water sources. 92% of households in Bhutan have access to an improved sanitation facility. Almost all households (99.0%; 100 % in urban areas and 98 % in rural areas) have access to electricity in Bhutan.

### 2.4. Sociocultural context

The national language of the country is Dzongkha, although there are around nineteen local dialects<sup>3</sup> spoken in the 20 Dzongkhags (Districts). The three main ethnic groups; *ngalops*, *sharchops* and *lhotsampas* form the majority of the Bhutanese community. Buddhism mainly influences Bhutan's culture and there is often a thin line between religion and culture. Hinduism is the second-largest religion, followed by *lhotshampa* community and Christianity in the minority.

Poverty has reduced but it still remains a challenge in rural areas of Bhutan which has attributed to high rural-urban migration as compared to the other flows of migration stream, with a total of 18 % of the total population the Bhutanese population migrating to the urban cities in search of better opportunities.

More than 62% of the population live in rural areas and predominantly subsist on a farming system, which integrates crop agriculture, livestock rearing and forest resource use. Forest plays an integral part in their lives and is part of their culture and beliefs. Forests are preserved in the form of '*ridham*' and '*ladham*'; a sacred or forbidden forests where people do not enter or destroy any tree. Local people have, through generations, protected the forest through the *risups* (local forest guard) and *misup* (fire guard) before the duties were officially taken over by the forestry officials after the enactment of the Bhutan Forest Act in 1969<sup>3</sup>.

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<sup>2</sup> World Bank, population total, population growth, population density - Bhutan. (2020). [World Bank Open Data | Data](#)

<sup>3</sup> Dorjee 2004, Linguistic landscape of Bhutan: *An overview of number of languages, language policy, language education, and language use in Bhutan*, Bhutan Journal of Research & Development, Spring 2014

## 2.5. Economic Situation

Gross National Happiness (GNH), which is founded on the four pillars of sustainable economic growth—preserving and promoting culture and tradition, protecting the environment, and practicing good governance—serves Bhutan's economic development.

Although Bhutan's economy is one of the smallest in the world, there has been impressive growth over the years, mainly due to investments in the hydropower sector. Bhutan's GDP per capita in 2019 increased to USD 3,411,94 from USD 3,331,40 in 2018<sup>4</sup> and the economy recorded growth of 5.46% in 2019 which is 2.41% higher in 2018.

The main sectors that influenced the increase in GDP in 2019 were education & health, mining quarry, transport and communication and electricity. Agriculture, livestock and forest contribute 15.82% to the GDP. However, there is a decrease in the direct contribution of the forestry sector to GDP. There was a 2.07% drop in the industry sector in 2019 from 2017. Tourism is another sector contributing significantly to the country's economy, particularly foreign exchange and creating jobs.

The export accelerated to 14.39% in 2019 from 4.58% in the previous year. Within exports, goods accounted for 79.40% while services accounted for 20.59%. The total value of imports was recorded as 50.35% of the GDP, while goods accounted for 81.66% and services 18.34%. On the demand side, the government final consumption expenditure and private final consumption expenditure were the main drivers of the growth in 2019, with the growth of 10.80 percent and 6.13 percent, respectively. The trade deficit in 2019 also improved with a drop in growth by -32.42 percent from the previous years. The gross domestic capital formation (GDCF) recorded negative growth of -16.51 percent, mainly due to a fall in investment in construction and machinery & equipment as compared to 2018.

## 2.6. Climate and Biodiversity

The country is distinctly divided into three climatic regions: subtropical, temperate and alpine zone. Bhutan's climate is affected by the monsoons and the annual rainfall varies from 1,020 mm to 1,520mm<sup>5</sup>. The north above 5000masl is permanently covered with snow and experiences only about 40mm of annual precipitation (primarily snow), the sub-tropical forests in the southern plains receive more than 7,800mm per year. The temperate central regions experience a yearly average of around 1,000mm.

Region	Climate	Elevation (m)
Southern foothills	Subtropical, high humidity, heavy rainfall	100 -1,500
Inner Himalayas	Cool winters, hot summers, moderate rainfall	1,500 - 3,000
Higher Himalayas	Alpine, cool summers, cold winters	3,000 - 7,550

*Figure 3. climatic zones of Bhutan*

<sup>4</sup> National Statistics Bureau, *National Accounts Statistics*, 2020, RGoB

<sup>5</sup> NAPA 2006 or 2012 <https://unfccc.int/resource/docs/napa/btn01.pdf>

Bhutan's dry spring starts in early March and lasts until mid-April. With sporadic showers, summer weather begins in mid-April and lasts until the early monsoon rains in late June. Heavy rains from the southwest fall during the summer monsoon, which lasts from late June until late September. The monsoon weather delivers strong rainfall, extreme humidity, flash floods and landslides, as well as frequent misty, cloudy days since the Himalayas prevent it from moving northward. The rainy season is continued by autumn, which lasts from late September or early October through late November. Bright, sunny days and a few early snowfalls at higher elevations are its defining characteristics. Winter comes in late November and lasts until March, with frost covering much of the nation and snowfall occurring often above elevations of 3,000 meters. Gale-force winds are sent down via high mountain passes by the northeast monsoon during the winter.

There is a pronounced difference in the vegetation cover in three different zones of the country and it is mostly due to the prevalence of varied climatic conditions across the kingdom. The southern foothills are mostly covered by dense and thick deciduous trees, while the inner regions are dotted by an infinite variety of plants, flowers and trees including birch, pine, chestnut, oak, apples, peaches and plums are also grown in the fertile valleys. The northern part with the tundra type of climate allows the growth of coniferous trees and other alpine growths like magnolia, rhododendrons, birch, fir, spruce etc. The vegetation is the overall expression of various ecological factors, and it is one of the basic analytical tools for developing and understanding the mountain environment.

Bhutan is part of the Eastern Himalayan region, one of the global biodiversity hotspots in the world. Recognized as global 200 eco-regions<sup>6</sup>, the country houses a vast repository of the ecosystem and species biodiversity. The forest forms the dominant ecosystem with approximately 71% of the Country's area under forest cover. The altitudinal and topographical variation combined with diverse weather conditions is the propelling factor that the country today has more than 5600 vascular plants, 411 ferns, 46 rhododendron and around 469 rare orchid species. There are 200 recorded species of mammals and within that 27 are globally threatened species, including tiger (*Panthera tigris*) and snow leopard (*Panthera uncia*). Further, more than 739 species of birds are known to nest in the country.

Rivers, lakes, marshlands and hot springs form the aquatic ecosystem offering fish diversity, including the IUCN threatened species, Golden mahsheer (*Tor putitora*). The country is also known for wetlands of international importance with three sites recognized under the Ramsar site namely Bumdeling Wildlife Sanctuary, Gangtey-Phobji and Khotokha. These sites are home to vulnerable Black-necked Crane (*Grus nigricollis*) in Bhutan<sup>7</sup>.

Bhutan's mountain ecosystem is fragile like the other Himalayan country and susceptible to topographical and physical influences. Further, the inevitable effect of climate change poses a greater threat to biodiversity.

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<sup>6</sup> Convention on Biological Diversity, Biodiversity Facts, 3<sup>rd</sup> National Communication to UNFCCC, 2020 (NEC, RGoB) 79

<sup>7</sup> List of Wetland of International Importance, Bhutan, <https://www.ramsar.org/wetland/bhutan>

## Climate Change Vulnerability

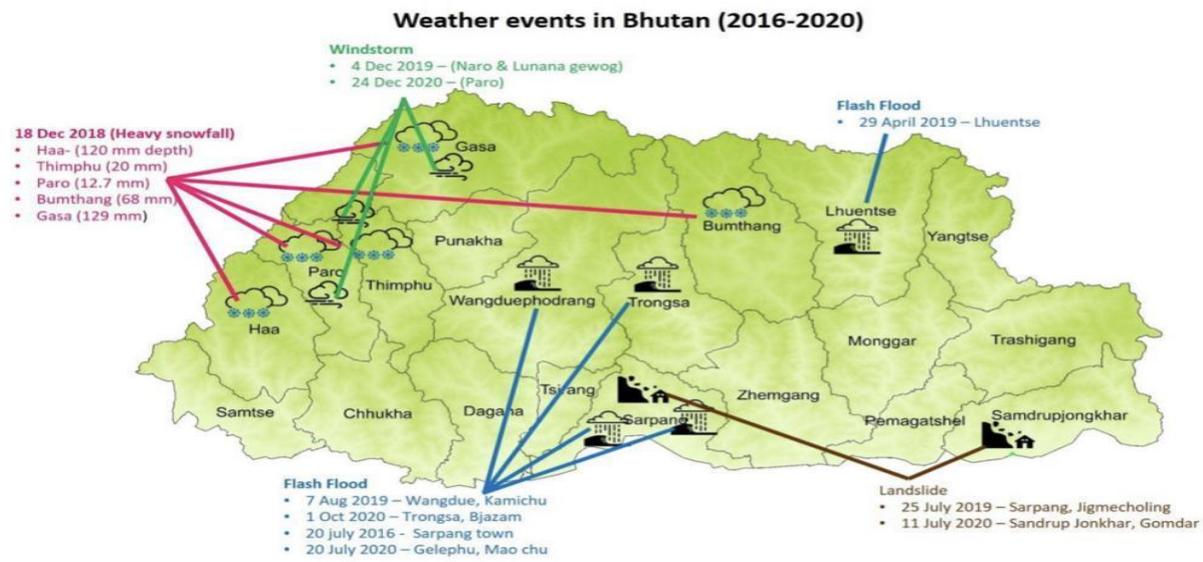


Figure 4. Weather Event of Bhutan from 2016-2020<sup>8</sup>

World Bank Reports that on average, Bhutan's temperature has been rising faster in the last half-century<sup>9</sup>. In Bhutan, temperatures are higher during summer and decrease over winter months.

Climate change and variability are becoming increasingly visible. Precarious geographical location and effects of climate variability and change have highly exposed Bhutan to a diversity of hazards, including cyclone induced storms, flash/floods, landslides, earthquakes, glacial lake outburst floods (GLOF) and droughts. Heavy seasonal monsoon rains and glacial melt are the most common cause of flooding and landslides in Bhutan. Over 70 per cent of settlements (MoWHS, 2017) including infrastructures and fertile agricultural lands are located along the main drainage basins, hence posing threats from flooding.

Although Bhutan is committed to a high level of environmental protection, it is still experiencing the impacts of global climate change. With prolonged dry winters already resulting in localized water shortages and exacerbated incidents of forest fires and unprecedented rainfall causing landslides and flash floods, glacial melting and resultant glacial lake outburst floods (GLOF) and the potential outbreak of new pests and diseases.

The high dependence of the population on agriculture and the significant role of hydropower for economic development increase the vulnerability. Bhutan's development philosophy of Gross National Happiness (GNH) concept and policy directives open avenues to address these concerns that are useful to build on in tackling climate change risks. Bhutan's current disaster management policies, risk reduction, and preparedness plans in Bhutan can address recurrent natural hazards in the country; they are not yet prepared to deal with the new GLOF threat.

<sup>8</sup> National Center of Hydrology & Meteorology, Royal Government of Bhutan

<sup>9</sup> World Bank, Asian Development Bank, Climate Risk Country Profile, Bhutan 2021, 7

As a least developed, mountainous and landlocked country, Bhutan's population and ecosystems are vulnerable to climate change. The situation is further worsened by the country's low adaptive capacity, poor economic status constrained by limited financial, technical and human capacity. Almost all the sector is vulnerable to the impacts of climate change in Bhutan, however the key vulnerable sectors are:

*Table 3. Climate change vulnerability<sup>10</sup>*

Sector	Vulnerabilities
Forestry & Bio-diversity	<ul style="list-style-type: none"> <li>● Drought in combination with increased lightning risks triggering forest fires</li> <li>● Change in phenological characters of plants/ Loss of endemic species</li> <li>● Change in migratory pattern of the trans boundary wildlife resulting in loss/degradation of forest ecosystem and reduction of alpine range lands. Furthermore, possible increase of vector-borne disease in wildlife due to warming</li> <li>● Increase infestation of invasive species</li> <li>● degradation of forest ecosystem and reduction of alpine range lands</li> <li>● Hamper the livelihood of the people depended on natural resources</li> </ul>
Agriculture	<ul style="list-style-type: none"> <li>● Crop yield instability. Loss of production and quality</li> <li>● Decreased water availability for crop production.</li> <li>● Increased risk of extinction of already threatened crop species (traditional crop varieties)</li> <li>● Loss of soil fertility due to erosion of topsoil and runoff</li> <li>● Crop yield loss (flowers &amp; fruit drop) to hailstorms. Deteriorated produce quality (fruit &amp; vegetables) by untimely incessant heavy rains and hailstorms</li> <li>● Delayed sowing (late rainfall)</li> <li>● Outbreak of pests and diseases in the fields and during storage where they were previously unknown</li> <li>● Damages to road infrastructures</li> <li>● Loss of agricultural land to flash floods, landslides and rill &amp; gully formations</li> </ul>
Natural Disaster and infrastructure	<ul style="list-style-type: none"> <li>● Increase retreat rate of glaciers causing GLOF</li> <li>● Impact to Hydropower systems the main revenue source of source of country.</li> <li>● Impact to Human settlements: urban, sub-urban and rural settlements</li> <li>● Impacts the historical and cultural monument</li> <li>● Impact to roads, bridges and communications.</li> </ul>
Water Sources and Energy	<ul style="list-style-type: none"> <li>● Disrupts the electricity production due to disruption of average water flows for hydropower generation</li> <li>● Increased sedimentation of rivers, water reservoirs and distribution productivity/ agricultural crop yields</li> <li>● Reduced ability of catchment areas to retain water/increased runoffs with enhanced soil erosion (deterioration of environment)</li> <li>● increased runoffs</li> <li>● Deterioration of drinking water quality</li> </ul>
Health	<ul style="list-style-type: none"> <li>● Loss of life from frequent flash floods, GLOF and landslides (recent Trashigang floods and landslides)</li> <li>● Spread of vector-borne tropical disease (malaria, dengue) into more areas (higher elevations) with warming climate</li> <li>● Loss of safe (drinking) water resources increasing water borne diseases.</li> </ul>

<sup>10</sup> (NEC, RGoB) NAPA 2006, 8

### 3. Major Trends and Issues in Forest and Forestry

#### 3.1. State of Forest

##### 3.1.1. Land Use and Forest Cover

The land use and land cover of Bhutan (Figure 5) reports that forest is the dominant land cover in Bhutan which accounts to 70.77% of the total geographical area. The Alpine Shrub covers 3.39% of the land area, shrubs constitute 9.74%, cultivated agriculture land covers 2.75% and meadows 2.51%. The snow cover constitutes 5.35% and rocky areas is 4.15% while water bodies, built-up areas, non- built-up areas, landslides and moraines each constitute less than 1% (Table 4).

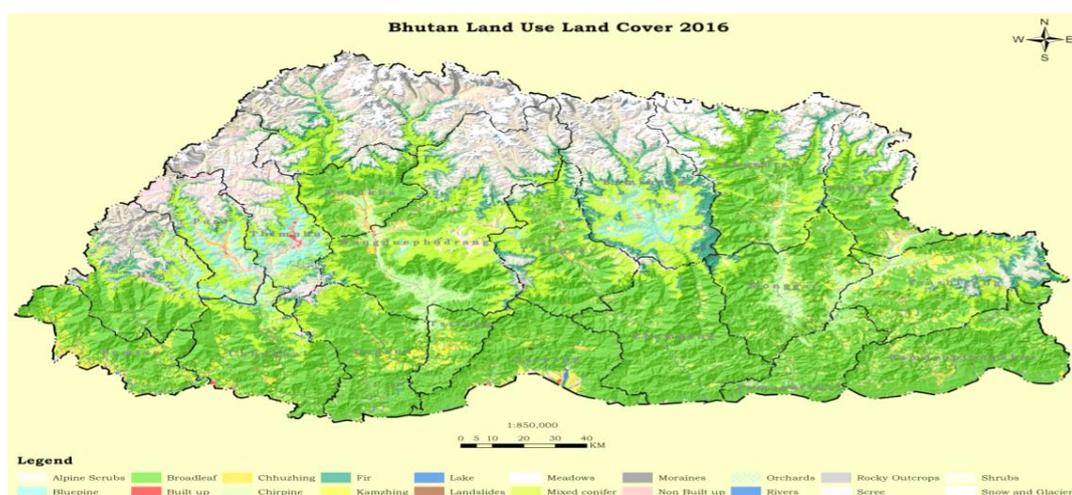


Figure 5. Land Cover Map of Bhutan<sup>11</sup>

Table 4. Land Use Percentile of Bhutan<sup>12</sup>

Classes	Area (Ha)	Area (%)
Forest	2717161.64	70.77
Shrub	274032.56	9.74
Meadows	96273.61	2.51
Agriculture land	105682.43	2.75
Built up	7457.03	0.19
Non-Built up	595.89	0.02
Snow Cover	205343.63	5.35
Water bodies	25175.78	0.65
Meadows	96273.61	2.51
Landslides	3730.22	0.10
Moraines	14393.94	0.37
Rocky Outcrops	159455.55	4.15
<b>Total</b>	<b>3839400.00</b>	<b>100.00</b>

<sup>11</sup> Forest Resources Management Division, *Land Use & land Cover of Bhutan 2016* (Thimphu: DoFPs, MoAF, RGoB)

<sup>12</sup> Forest Resources Management Division, *Land Use & land Cover of Bhutan 2016* (Thimphu: DoFPs, MoAF, RGoB)

### Forest Area

As per the National Forest Policy of Bhutan and Forest and Nature Conservation Rules and Regulations of Bhutan forest is defined as “Land with tree spanning more than 0.5 ha with trees higher than 5 meters and a canopy cover of more than 10 percent”

Forests occupy a total of 2.7 million ha which is approximately 71% of the total geographical area of the country<sup>13</sup>. The forest area has been slightly decreasing recently, but it has increased by about 4 percent compared to 1990 (Figure 6).<sup>14</sup> Almost all of the forests in the country are naturally generated while plantation forests form a minimal part of the forest.

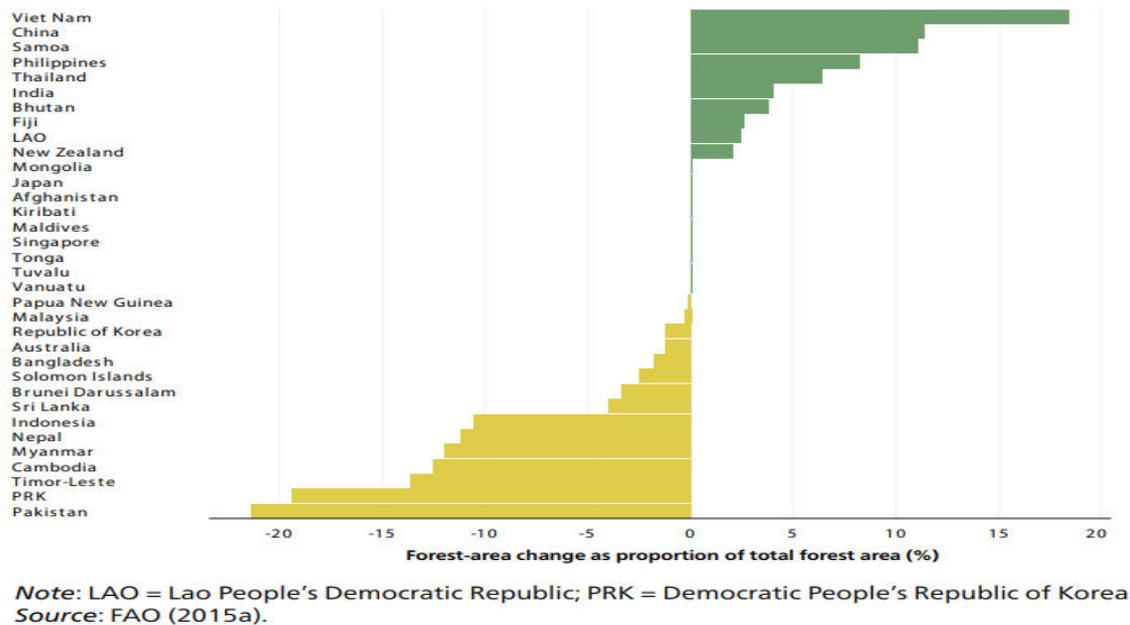


Figure 6. Forest Change in the Asia-Pacific region by country 1990-2015



Figure 7. Forest Composition<sup>15</sup>

<sup>13</sup> Natural Resources Management Division, *National Forest Inventory Report, 2015* (DoFPs, MoAF), XIII

<sup>14</sup> FAO, *Forest futures – Sustainable pathways for forests, landscapes and people in the Asia-Pacific region. Asia-Pacific Forest Sector Outlook Study III* (Bangkok: FAO, 2019), 28-29.

<sup>15</sup> FAO, *Global Forest Resources Assessment 2020 Report: Bhutan* (Rome: The FAO, 2020), 11-15

### **Forest Types**

According to the National Forest Inventory, there are eleven types of forests (Figure 8) namely Subtropical Forest, Warm Broad-leaved Forest, Chir Pine Forest, Cool Broad-leaved Forest, Evergreen Oak Forest, Blue Pine Forest, Spruce Forest, Hemlock Forest, Fir Forest, Juniper-Rhododendron Scrub and Dry Alpine Scrub<sup>16</sup>. The Cool broadleaved forest forms the major portion of the forest of Bhutan with 26% followed by warm broadleaved forest and fir forest with 18 % and 9 % respectively. Fir forests constitute a major part of the conifer forest in Bhutan. These forests have a wider range of altitudinal variation from the subtropical forest at 100m in the southern foothills to the highest coniferous forest standing at 4,750m in the north, followed by forest alpine meadows and snowcapped mountains.

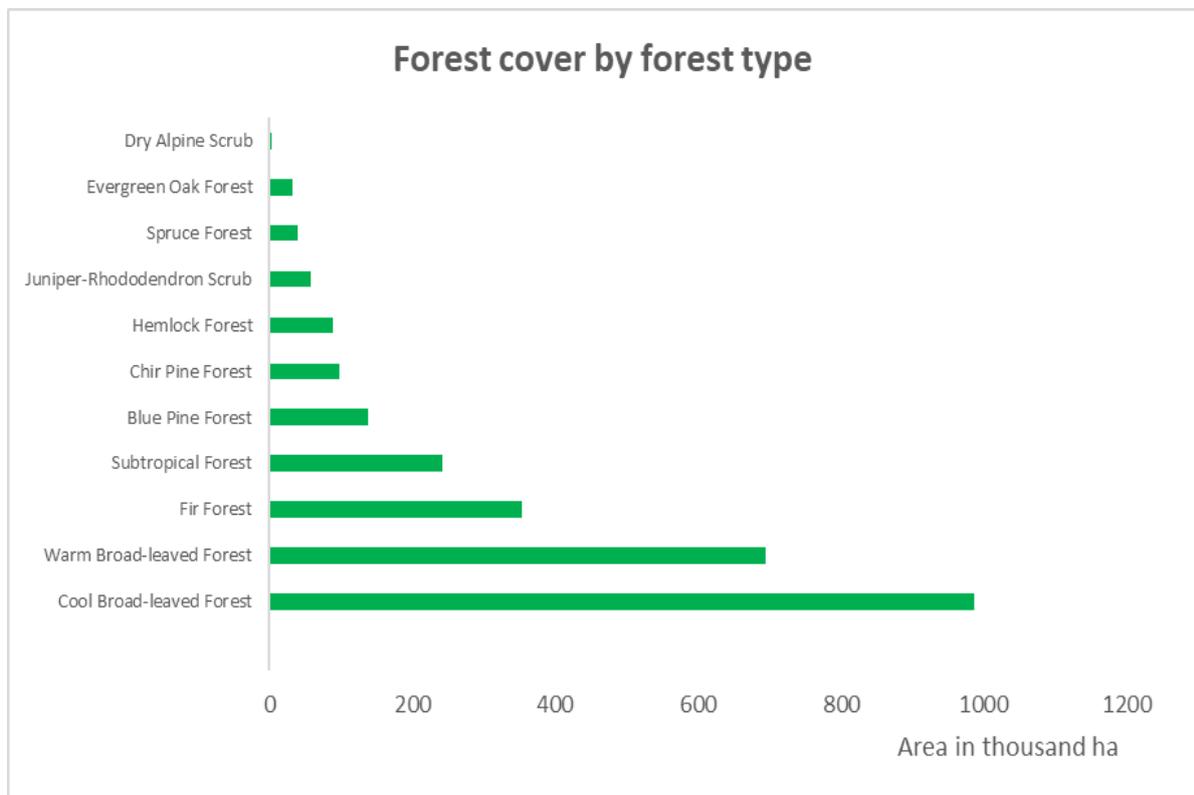


Figure 8. Forest cover by forest type<sup>17</sup>

<sup>16</sup> Natural Resources Management Division, *Field Manual National Forest Inventory of Bhutan 2012*, (DoFPs, MoAF)

<sup>17</sup> Natural Resources Management Division, *National Forest Inventory Report 2015*(DoFPs, MoAF)

Table 5. Eco-floristic zones of Bhutan<sup>18</sup>

Eco-Floristic Zones	Main Forest Types and dominant flora (plants)	Characteristic fauna (animals)
Alpine Zone Altitude (4,000 + masl)	Alpine meadows and scrubs dominated by Rhododendron scrubs, Juniper, and medicinal plants and herb species such as <i>Aconitum</i> , <i>Gentiana</i> , <i>Nardostachys</i> , <i>Delphinium</i> , <i>Rhodiola</i> , <i>Meconopsis</i> , <i>Osnoma</i> , <i>Dactylorhiza</i> , <i>Ophiocordyceps sinensis</i> , <i>Picrorhiza</i> , <i>Fritillaria</i> , etc.	Snow leopard, Lynx, Blue sheep, Himalayan marmot, Tibetan wolf, Takin, Musk deer.
Temperate Zone Altitude (2,000-4,000 masl)	<p><b>Fir Forest – &gt; 3,000 masl.</b> Fir forest consists either of largely pure stands of <i>Abies densa</i> or mixed with other species such as <i>Juniperus</i>, <i>Taxus</i>, and <i>Larix</i>.</p> <p><b>Mixed Conifer Forest – 2,500-3,500 masl.</b> Mixed conifer forest includes mixed stands of spruce, hemlock, juniper, fir, larch, taxus. Some broadleaf species are also common particularly <i>Quercus semecarpifolia</i>, <i>Quercus griffithii</i>, <i>Rhododendron spp.</i>, <i>Acer spp.</i>, <i>Betula spp.</i></p> <p><b>Blue Pine Forest – 1,500-3,200 masl.</b> Blue pine forest consists of pure or dominant stands of blue pine. It is sometimes mixed with <i>Quercus semecarpifolia</i>, <i>Populus rotundifolia</i>, and <i>Rhododendron spp.</i></p> <p><b>Broadleaf mixed with Conifer Forest – 2,000- 2,500 masl.</b> Consists of blue pine mixed with poplar, and other species such as <i>Castanopsis</i>, <i>Quercus</i>, <i>Persea</i>, <i>Litsea</i>, <i>Populus ciliate</i>.</p>	Goral, Serow, Black bear, Grey langur, Red panda, Assamese macaque, Leopard, Tiger, Golden cat, Clouded leopard.
Sub-Tropical Zone Altitude (150-2,000 masl)	<b>Broadleaf Forest – 1,000-2,000 masl.</b> Represented by species of <i>Castanopsis</i> , <i>Lithocarpus</i> , <i>Schima</i> , and <i>Quercus</i> .	Water buffalo, Golden langur, Sambar deer, Tiger, Golden cat, Clouded leopard, Capped langur, Gaur.
Other	<p><b>Chir pine Forest – 700- 2,000 masl.</b> Pure stands of Chir pine or in association with <i>Quercus lanata</i>, <i>Quercus griffithii</i>, <i>Quercus glauca</i>, and <i>Alnus nepalensis</i> along with watercourses.</p> <p><b>Tropical Lowland Forest - &lt;700 masl.</b> Broadly classified as semi-evergreen but varies from almost deciduous on exposed dry slopes to almost evergreen in the moist valleys. Forests are multi-storied with high species diversity. Floristic composition consists of tropical species like <i>Shorea robusta</i>, <i>Terminalia myriocarpa</i>, <i>Bombax ceiba</i>, <i>Daubanga grandifolia</i>, <i>Sterculia villosa</i>, <i>Acacia catechu</i>, and <i>Terminalia nudiflora</i>.</p>	

<sup>18</sup> National Biodiversity Centre, *National Biodiversity Strategies and Action Plan of Bhutan*, 2014 (MoAF, RGoB), 5-6.

### Forest Growing Stock and Carbon Stock

The forest management code of Bhutan, 2004 defines growing stock as the standing volume of all living trees in a given area of a forest. In 2015, the National Forest Inventory estimated the total growing stock as 1,001million m<sup>3</sup> and the average growing stock as 261m<sup>3</sup>. The cool Broad-leaved Forest has the highest total volume of 438 million m<sup>3</sup> and dry alpine scrub forest has the least volume of 95 thousand m<sup>3</sup>. In 2020, the total forest growing stock was 943.10million m<sup>3</sup>(over bark), and the forest growing stock per hectare was 346.08m<sup>3</sup>/ha (over bark) (Table 6 and 7).

Bhutan's forest stores 645million tons of carbon in the form of biomass carbon and soil organic carbon. About 70% of the carbon is constituted from trees, shrubs and herbs while soil accounts for only 26%<sup>19</sup>

Table 6. Growing Stock<sup>20</sup>

FRA categories	Growing stock (million m <sup>3</sup> ) (over bark)	Growing stock per hectare (m <sup>3</sup> /ha) (over bark)
	2020	
Forest	943.10	346.08
Other wooded lands	25.72	51.00

Table 7. Growing Stock Composition<sup>21</sup>

FRA categories		Scientific name	Growing stock in forest (in million m <sup>3</sup> , over bark)
			2020
Total (Forest)			943.10
Native tree species	Sub-total		941.75
	Rank no.1 in terms of volume	<i>Abies densa</i>	142.00
	Rank no.2 in terms of volume	<i>Terminalia bellirica</i>	53.00
	Rank no.3 in terms of volume	<i>Sloanea decicarpus</i>	47.00
	Rank no.4 in terms of volume	<i>Talauma hodgsoni</i>	39.00
	Rank no.5 in terms of volume	<i>Sapindus rarak</i>	37.00
	Rank no.6 in terms of volume	<i>Trewia nudiflora</i>	27.00
	Rank no.7 in terms of volume	<i>Cinnamomum impressinervium</i>	24.00
	Rank no.8 in terms of volume	<i>Tamarindus indica</i>	22.00
	Rank no.9 in terms of volume	<i>Syzygium formosum</i>	21.00
	Rank no.10 in terms of volume	<i>Sigesbeckia orientalis</i>	20.00
	Remaining native tree species		
Introduced tree species	Sub-total		1.35
	Rank no.1 in terms of volume	<i>Tectona grandis</i>	1.00
	Rank no.2 in terms of volume	<i>Eucalyptus sp</i>	0.32
	Rank no.3 in terms of volume	<i>Cryptomeria japonica</i>	0.03

<sup>19</sup> DoFPs, Forestry Facts Figure 2019 (MoAF, RGoB) 16.

<sup>20</sup> FAO, *Global Forest Resources Assessment 2020 Report: Bhutan* (Rome: The FAO, 2020), 24-25.

<sup>21</sup> FAO, *Global Forest Resources Assessment 2020 Report: Bhutan* (Rome: The FAO, 2020), 26-28.

Table 8. Biomass stock and carbon stock<sup>22</sup>

	FRA categories	Forest Biomass or Carbon (tonnes/ha)
		2020
Above-ground biomass	269.32	
Carbon in above-ground biomass	127.05	
Below-ground biomass	121.00	
Carbon in below-ground biomass	54.52	
Biomass in deadwood	6.44	
Carbon in deadwood	3.03	
Carbon in litter	6.23	
Soil carbon (Soil depth: 30 cm)	64.05	

### 3.1.2. Forest Use Categories

Forests play a critical role in the livelihood of people in Bhutan as their source of food, shelter, medicinal plant, culture, firewood and timber. Forests are also a major source of carbon sequestration, climate regulation and aesthetic value to people. Forests in Bhutan are known as State Reserved Forest land and uses categories including production, protection of soil and water, conservation of biodiversity and social services.

Through Forest Management Units, production is emphasized on scientific management, while social services are delivered through community forests as well as from State Forest land on subsidized timber for various purposes. About 51% of the total territorial areas are protected areas and biological corridors for the conservation of wildlife and biodiversity.

The primary area designated for production is 368.03 thousand ha, 1104.2 thousand ha for the conservation of biodiversity and 1,252.85 thousand ha for multiple-use forestry as shown in the following Table 9.

Table 9. Primary designated management objective<sup>23</sup>

FRA 2020 categories	Forest area (in thousand ha)
	2020
Total	2,725.08
Production	368.03
Protection of soil and water	0
Conservation of biodiversity	1,104.2
Social Services	0
Multiple-use	1,252.85
Other (specify in comments)	0
None/unknown	0

<sup>22</sup> FAO, *Global Forest Resources Assessment 2020 Report: Bhutan* (Rome: The FAO, 2020), 29-32.

<sup>23</sup> FAO, *Global Forest Resources Assessment 2020 Report: Bhutan* (Rome: The FAO, 2020), 33-34.

### 3.1.3. Main Drivers of Forest Changes

While there is an increasing trend of forest cover in Bhutan, the forest is degrading and there are multiple underlying contributing factors which are unique to Bhutan. The Department of Forests and Park Services in 2017 highlighted the drivers of forest deforestation and forest degradation in Bhutan. They are:

#### *Driver of Deforestation*

- Allotment of State Reserve Forest Land (SRFL) for various purposes
- Hydropower project
- Agriculture
- Mines and quarries
- Power lines

#### *Drivers of Forest Degradation*

- Timber harvesting
- Firewood
- Forest fires
- Livestock

*Table 10. Ranking of drivers of deforestation<sup>24</sup>*

Driver	Area affected annually (ha/year)	Annual GHG emissions as a result of forest area loss (tCO <sub>2</sub> e/year)	Ranking in the extent of deforestation
SRF land allotment for various purposes	1,923	604,852	1 <sup>st</sup>
Hydropower projects	1,880	591,327	2 <sup>nd</sup>
Roads	820	257,919	3 <sup>rd</sup>
Agriculture	778	244,709	4 <sup>th</sup>
Mines and quarries	633	199,101	5 <sup>th</sup>
Power lines	542	170,478	6 <sup>th</sup>

*Table 11. Ranking of drivers of forest degradation*

Driver	Annual degradation in the corresponding (m <sup>3</sup> /ha)	Annual GHG emissions as a result of forest degradation (tCO <sub>2</sub> e/ ha)	Ranking in the extent of deforestation
Timber harvesting	163,009	117,394	1 <sup>st</sup>
Firewood	84,936	61,168	2 <sup>nd</sup>
Forest fires	111,969	88,560	3 <sup>rd</sup>
Livestock	Not available	Not available	4 <sup>th</sup>

<sup>24</sup> Watershed Management Division, 2017, *Drivers of Deforestation and Forest Degradation in Bhutan* (Department of Forests and Park Services, MOAF) 20-25a

## **3.2. Forest Policy Direction and Strategies**

### **3.2.1. Forest Legislations**

#### **Constitution of the Kingdom of Bhutan (2008)**

The conservation and protection of the natural environment are enshrined in the constitution of the Kingdom of Bhutan, wherein it mandates the Government to ensure that *“in order to conserve the country’s natural resources and to prevent degradation of the ecosystem, a minimum of 60% of Bhutan’s total land shall be maintained under forest cover for all time”*. The constitution also vests the government, the parliament, and every Bhutanese citizen with the right and responsibility for environmental conservation and stipulates several provisions to ensure that development does not take place at the cost of the natural environment, which include:

1. Every Bhutanese is a trustee of the Kingdom’s natural resources and environment for the benefit of the present and future generations. It is also the fundamental duty of every citizen to contribute to the protection of the natural environment, conservation of the rich biodiversity and prevention of all forms of ecological degradation, through the adoption and support of environment friendly practices and policies.
2. The Royal Government shall: protect, conserve, and improve the pristine environment and safeguard the biodiversity of the country; prevent pollution and ecological degradation; secure ecologically balanced sustainable development; and ensure a safe and healthy environment.

#### **12th Five Year Plan (2018-2023)**

The national plan of the government is based on the development philosophy of Gross National Happiness (GNH) which transcends every aspect of socio-economic development to secure an ecologically balanced and sustainable development, while promoting justifiable economic and social development and ensuring a safe and healthy environment. The planning cycle started with the first Five-Year Plan (FYP) in 1961. Under the guidance of the Gross National Happiness Commission Secretariat (GNHCS), the FYPs articulate the socio-economic development priorities and programs to be implemented.

Similarly, the current 12th FYP covers the period from 2018 through to 2023 and adopts nine domains: education, health, living standards, ecological diversity and resilience, time use, culture, psychological well-being, community vitality, and good governance. The 12th FYP identifies national key results areas (NKRAs), which have been formulated based on national aspirations, priorities and international and regional commitments such as the Sustainable Development Goals. The forest related NKRAs in the 12<sup>th</sup> FYP are 1) health ecosystem, 2) carbon neutrality, climate and disaster resilient, 3) sustainable human settlement and 4) sustainable water.

## **Bhutan 2020 (A vision for peace, prosperity and happiness)**

Formulated in 1999, Bhutan 2020 document outlines the country's development goals, objectives, and targets with a 20-year perspective to maximize gross national happiness. Vision Statement's includes five thematic headings comprising: our nation, our people, our economy, our environment and our institution. It promotes a development path within the limits of environmental sustainability, without impairing ecological productivity and natural diversity.

## **Bhutan E-RNR Master Plan 2016**

The Master plan involves the use of conceptualization, design, development, evaluation, and application of innovative ways to use ICTs in the rural domain, with a primary focus on agriculture, forests, and livestock. ICTs have a great potential to contribute to the growth of the RNR sector respecting the sustainability and equitable well-being principles through bridging the opportunity gaps posed by geographic, demographic, knowledge, and economic factors. Recognizing the critical role that ICTs can play in enhancing the efficiency of the RNR sector and facilitating the achievement of the adopted goals, the Royal Government of Bhutan has developed this National E-RNR Masterplan.

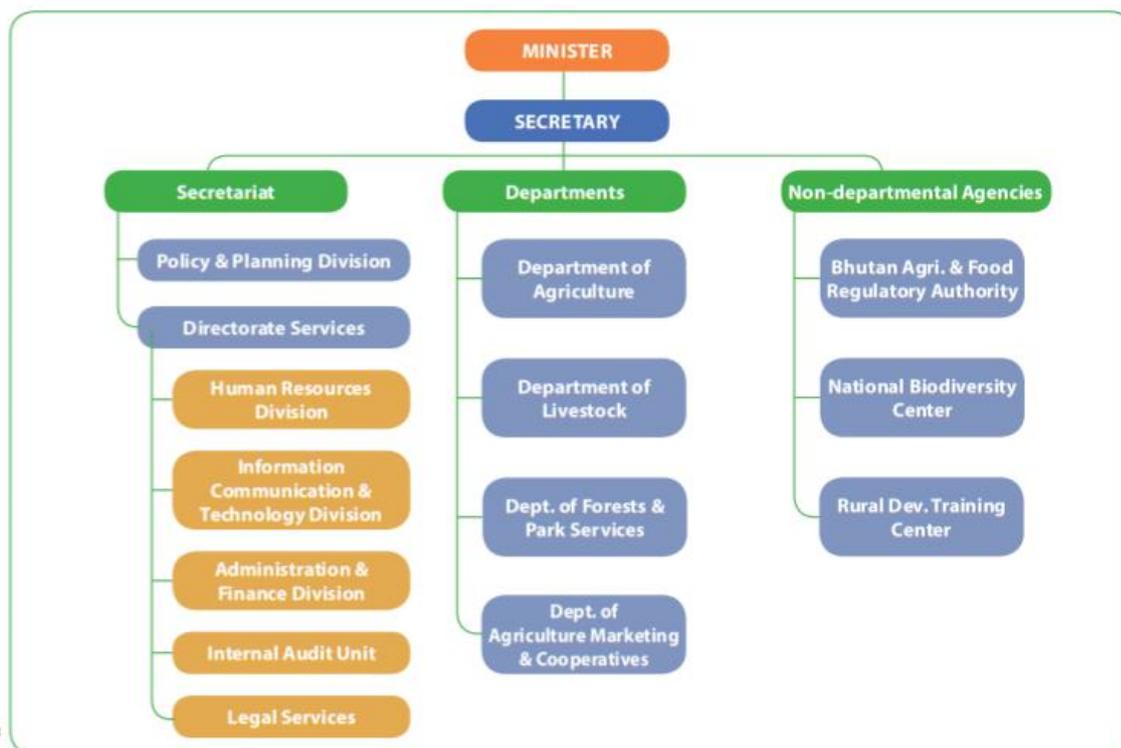
### **3.2.2. Institutional Settings for National Forest Management**

#### ***Core Responsible Organization***

#### **Department of Forests and Park Services**

The overall responsibility of managing forest resources lies with the Department of Forest and Park Services (DoFPS) under the ministry of Agriculture and Forest. Established in 1952, the DoFPS is one of the oldest MoAF departments in Bhutan. Key mandates of the department include:

1. Maintaining at least 60 percent of the country's total land area under forest cover at all times, as also mandated by the country's Constitution from 2008;
2. Conserving, protecting, sustainably managing, and utilizing state forests, forest soil, water resources, and biodiversity; and
3. Ensuring Bhutan's commitments to international and regional conventions, treaties, and non-legally binding instruments.



Source: MoAF, *Twelfth Five Year Plan (2018-2023)* (MoAF), v.

Figure 9. MoAF Organization Chart

The DoFPS has five functional divisions; two research teaching institutes at the central level, 14 territorial divisions, 10 national parks, and wildlife sanctuaries at the field level. Several Range Posts provide service to local communities at the *gewog* level. The functional divisions prepare programs within their mandate and provide technical support to field staff. The field offices (territorial division and protected areas) take the lead in implementing the programs of the Forest Department as shown in the figure below.

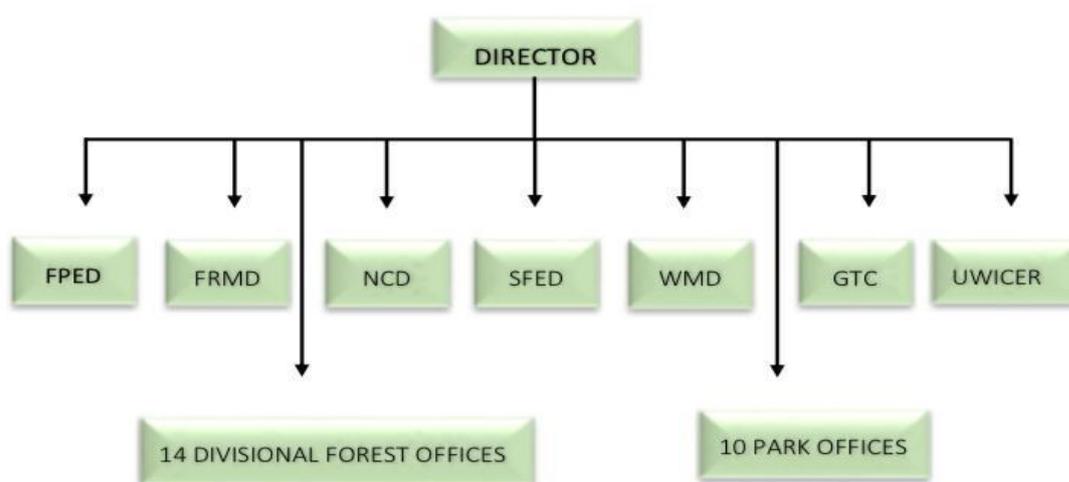


Figure 10. Organogram of department of forests and park services<sup>25</sup>

<sup>25</sup> DoFPS, *Forestry Facts and Figures of Bhutan*, 2019.

The functional divisions include the Forest Protection and Enforcement Division (FPED), Social Forestry and Extension Division (SFED), Forest Resources Management Division (FRMD), Watershed Management Division (WMD), Nature Conservation Division (NCD); the two research teaching institutes are the Bhutan Tiger Center (BTC) and the Ugyen Wangchuck Institute for Conservation and Environmental Research (UWICER).

The DoFPS is responsible for providing forestry clearance for establishing any enterprises requiring forestry resources. The FPED processes clearance regarding forest land, while the FRMD processes clearance for the establishment of any wood or non-timber-based enterprise. The department also provides advice on resource availability and technology to the private sector and local communities and interacts with associations such as the Association of Wood-Based Industries (AWBI) and the Bhutan Chamber of Commerce and Industries (BCCI). Rural non-commercial timber harvesting is approved by the DoFPS and extracted by the requesting individuals. Per the Forest Act, the DoFPS also prepares management plans for the forests, wildlife, and related natural resources of Bhutan.

### ***Other Responsible Institutions***

*Table 12. Other related ministries, Departments and NGOs*

<b>National Environment Commission (NEC)</b>	Formulates policies and regulations related to natural resource management, coordinates inter-sectoral programs, and implements policies and legislation about the environment. The NEC serves as a Focal Point to the UNFCCC and is responsible for coordinating the preparation and submission of National Communications and Biennial Update Reports. The NEC also reports on Bhutan’s REDD+ actions to the UNFCCC. The NEC is the National GHG Coordinator and each sector provides the required data to the NEC for national and international reporting.
<b>National Biodiversity Centre (NBC)</b>	Serves as the national focal agency to regulate access to and utilization of biological resources of the country. The Centre works in coordination with relevant stakeholders to manage biodiversity effectively and maximize the benefits from it, as well as to contribute to international efforts towards conserving biodiversity. It is also national biorepository for genetic resources, botanical collections, and collection of other biological resources.
<b>Bhutan For Life (BFL)</b>	BFL is an innovative funding initiative of the Royal Government of Bhutan and World Wildlife Fund (WWF). It was launched in 2017 with the objective to support long term improved management of Bhutan’s protected area and biological corridor. The programs under the fund strive to increase forestry and land use climate mitigation, and to support ecosystem-based adaptation, improve natural resources, livelihoods and biodiversity.
<b>Bhutan Trust Fund for Environmental Conservation</b>	BTFEC is a conservation grant-making organization, independent of the government. It was established in 1992 as a collaborative venture between the Royal Government of Bhutan (RGoB), the United Nations Development

<b>(BTFEC)</b>	Programme (UNDP), and the World Wildlife Fund (WWF), with an endowment of US\$20 million to finance conservation programs over the long term in Bhutan. The trust fund is governed by the Royal Charter of 1996. It funds projects on conservation, sustainable resources management, solid waste management, and other programs based on its thematic areas. <sup>26</sup>
<b>Green Bhutan Corporation Limited (GBCL)</b>	GBCL is mandated to carry out any kind of afforestation and reforestation plantation across the country, including areas such as degraded watersheds, dried and degraded drinking water sources and degraded wildlife habitats contributing to the national climate change mitigation efforts. For this, the government and other relevant sectors sanction budgets annually.
<b>Natural Resources Development Corporation Limited (NRDCL)</b>	The NRDCL has a government mandate to manage timber, sand, stone, and other natural resources. Forest field offices prepare forest management plans for the Forest Management Units (FMUs) which entails detailed information on harvesting, as well as the Annual Allowable Cut (AAC). The logging activities in the FMUs are carried out by the NRDCL. Until 1979, NRDCL was the Logging Division under the Forest Department to harvest timber departmentally on a scientific basis. Due to the lack of government financing through normal budget the Logging Division was upgraded to a corporation known as Bhutan Logging Corporation (BLC) in 1984. In 1996, BLC was upgraded to Forestry Development Corporation Limited (FDCL) and entrusted with commercial mandates. In November 2007, FDCL was restructured as Natural Resources Development Corporation Limited (NRDCL)
<b>Royal Society for Protection of Nature (RSPN)</b>	RSPN is a registered public benefit organization under the Civil Society Organization Authority of Bhutan since 2010. Society has been engaged in environmental conservation through environmental education and advocacy, conservation of natural resources, and sustainable livelihoods since 1987. It also focuses on research and emerging issues such as climate change, solid waste, and water management.

### 3.2.3. Forest Tenure and Governance

All forests in Bhutan as defined in the Forest and Nature Conservation Act 1995, are declared as State Reserved Forest Land. The Department Forests and Park Services is given responsibility for sustainably managing Government Reserved Forests, and for regulating the production, protection, transport and trade of timber, other forest produces and wildlife, whether or not they are located in Government Reserved Forests, and as provided by the rules for community or private forests or where responsibility for regulating a particular type of minor forest produce has been given to another agency or department of the Royal Government.

<sup>26</sup> Environment and Natural Resources Global Practice, South Asia Region, *Bhutan Forest Note: Pathways for Sustainable Forest Management and Socio -equitable Economic Development* (Washington DC : The World Bank, 2019), 19-21.

In accordance with the National Forest Policy (2011), forests in Bhutan are managed under different management regimes; Protected Area (PA) network, Forest Management Units (FMU), Community Forests (CF) and Local Forest Management Areas (LFMA)

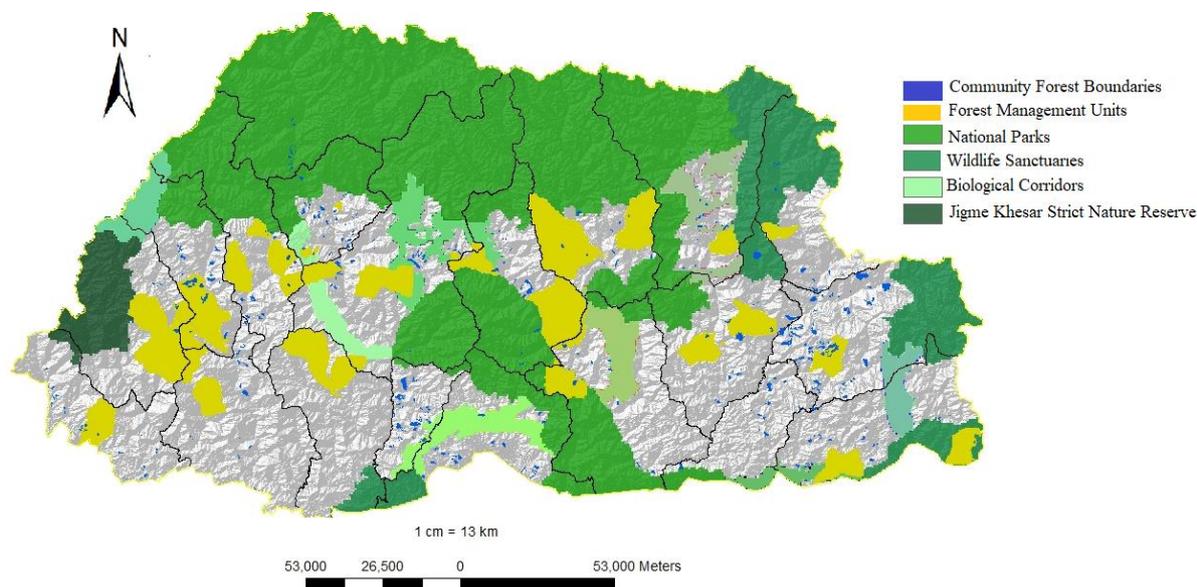


Figure 11. Protected area network of Bhutan

### **Protected Area Network**

Protected Area network consists of National Parks, Wildlife Sanctuaries, Strict nature Reserve and Biological Corridors of the country, which corresponds to 51.44% of the country’s area. The objective of these areas is for the in-situ conservation of flora and fauna, including the wild relatives of domesticated species. Biological corridors on the other hand, connects all the protected areas in Bhutan. As of 2021, there are eight Biological Corridors. These protected areas cover vegetation from subtropical to alpine and are well dispersed all over 20 Dzongkhags of Bhutan. Protected areas follow the management guidelines which are integrated between conservation and sustainable use for the benefit of the people.

Table 13. Protected areas of Bhutan

Sl.No	Protected Area	Area coverage (Districts)	Year of
1	Jigme Khesar Strict Nature Reserve	Haa	1993
2	Jigme Singye Wangchuk National Park	Zhemgang, Sarpang, Trongsa, Wangdue & Tsirang	1995
3	Jigme Dorji National Park	Paro, Thimphu, Punakha & Gasa	19951
4	Wangchuk Centennial National Park	Bumthang, Wangdue, Gasa & Lhuentse	2008

5	Phrumsengla National Park	Bumthang, Lhuentse & Mongar	2000
6	Royal Manas National Park	Sarpang & Zhemgang	1966
7	Phibsoo Wildlife Sanctuary	Dagana & Sarpang	1993
8	Jomotsangkha Wildlife Sanctuary	Samdrup Jongkhar	1993
9	Bumdeling Wildlife Sanctuary	Lhuentse, Mongar & Trashiyangtse	1998
10	Sakteng Wildlife Sanctuary	Trashigang	2003

The Department may initiate the process of declaring a protected area, in accordance with the regulations, by presenting a proposal and preliminary report to the Ministry. An area may be designated as a PA if the Department determines that;

- (1) any area is of biological significance to the country, or the world at large;
- (2) a specific habitat area is under threat, and its protection is of national interest; or
- (3) an area is necessary for protection or conservation for hydrological or watershed reasons;
- (4) an area is of cultural or natural heritage significance.

As per the Forest and Nature Conservation Rules and Regulations (FNCRR) 2017, the Management Plan shall be prepared in accordance with the Technical Regulations specified in Forest and Nature Conservation Code of Best Management Practices of Bhutan issued by the Department. The Department shall have the administrative responsibility and technical oversight for the preparation and adoption of Management Plans for Protected Areas.

The Department shall prepare Management Plan in consultation with:

- (1) local community, local authority and other member of the public who are affected by the Protected Area;
- (2) other relevant stakeholder or recognized Civil Society Organization (CSO)

### ***Forest Management Units***

Sustainable harvesting of timber for rural use and commercial purposes is carried in Forest Management Units (FMUs). There are 21 designated FMUs in the country covering 5.10% of the total area(1,95,790.57ha). FMU are scientifically managed based on the management plan formed with provisions under Forest and Nature Conservation Code of Best Management Practices of Bhutan. As per rule no. 61 of FNCRR 2017, the Department may identify and declare production forests such as Forest Management Unit (FMU) or any other suitable management regimes primarily for the production of timber and other forest products as per the Technical Guidelines specified in the Forest and Nature Conservation Code of Best Management Practices of Bhutan issued by the Department.

### ***Community Forests (CF)***

Bhutan established its first CF in 1997 at Dozam covering area of 379 ha with 144 member households. CF has shown an increasing trend in Bhutan and as of December 2019, there are

839 registered CFs covering an area of 107866.39 ha with 34,761 households. Wangdiphodrang Dzongkhag has highest number of CF and Gasa has the least CF<sup>27</sup>.

As per rule no. 74 of FNCRR, the Department may designate any area of State Reserved Forest Land, including degraded and barren areas for improvement, in vicinity of human settlement, suitable for control and management by Community Forest Management Group (CFMG), as Community Forest (CF).

The CF plan period is valid for 10 years and the renewal and revision of the CF is based on monitoring and Evaluation of the CF report.

*Table 14. List of community forests*

Sl. No	Dzongkhag	Community Forest (No)	Member Household (No)	Area (ha)
1	Bumthang	39	1,081	3897.04
2	Chukha	62	2,030	4540.18
3	Dagana	34	1,504	3354.85
4	Gasa	7	186	556.08
5	Haa	19	584	1839.73
6	Lhuntse	37	1,095	3576.86
7	Mongar	38	2,276	11878.53
8	Paro	30	1,590	4842.92
9	Pemagatshel	58	2,920	5772.52
10	Punakha	45	1,512	4551.17
11	Samdrup Jongkhar	50	2,454	7141.80
12	Samtse	64	2,609	6919.18
13	Sarpang	36	1,487	4612.31
14	Thimphu	22	898	3039.07
15	Trashigang	54	3,112	11177.81
16	Trashiyangtse	39	1,743	5111.38
17	Trongsa	30	1,009	3579.70
18	Tsirang	51	2,897	9696.89
19	Wangduephodrang	89	2,423	7010.26
20	Zhemgang	35	1,351	4768.12
Grand Total		839	34,761	107866.39

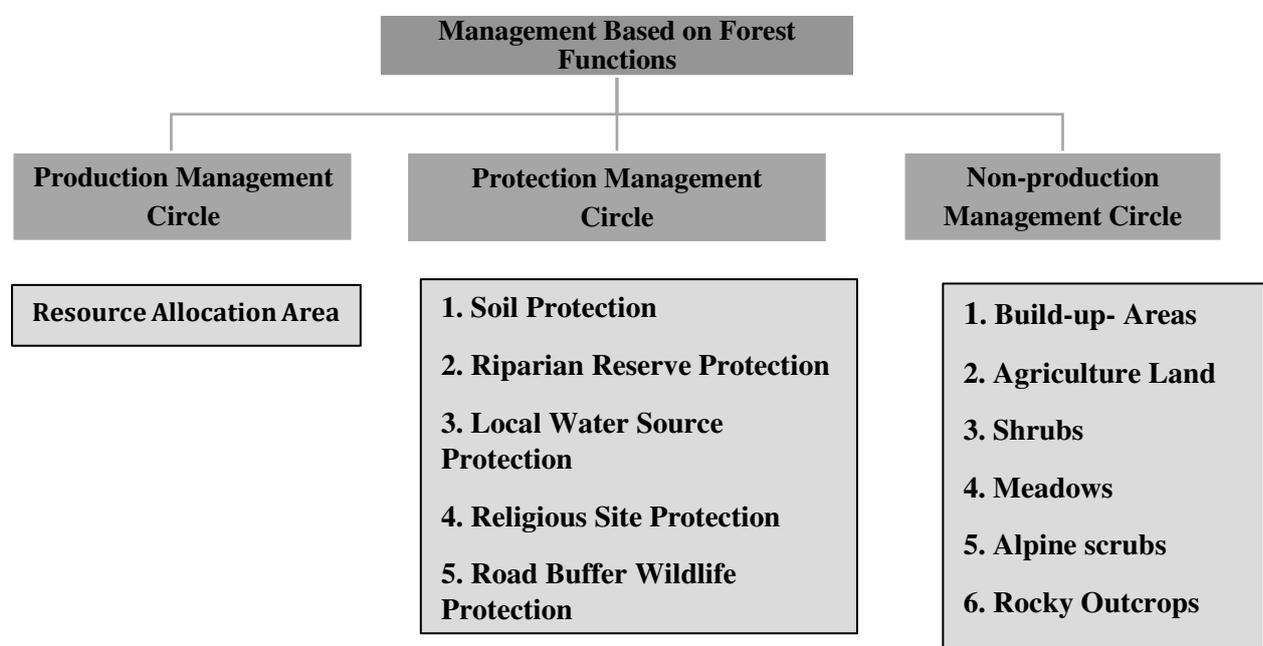
<sup>27</sup> DoFPs, *Forestry Facts & Figure*, 2021, (MoAF).

### **Local Forest Management Plans (LFMP)**

The main objective of Local Forest Management Planning is to manage the forest outside existing management regimes on a multiple use, sustained yield basis for the production of timber, fuel wood and other forest produce and for watershed, wildlife and environmental protection. As of December 2021, there are 73 LFMPs designated and under implementation.

Principles of Management Planning System include; 1) simple and practical system 2) adjusted to the capacity and technical knowledge of field staffs 3) time requirement is less 4) required information is collected and 5) it's a participatory approach of management.

The management area usually covers Geog (Sub-block) and includes all the area of State Reserve Forest except areas that are already under the management of Protected Area Network, Community Forest and areas set aside for future management. The management area is plan is valid for 10 years.



Source: Forest Resources Management Division, *Local Forest Management Planning Guidelines*, 2019(DoFPs, Thimphu)

*Figure 12. Management circles and its components*

### **3.2.4. Government Budget Allocation for Forest and Forestry Sector**

The overall mandate of the Ministry of Agriculture and Forests (MoAF) is to enhance food and nutrition security, and conserve and manage natural forest resources and biodiversity. The total estimated cost required for the MoAF to successfully implement programs in 12<sup>th</sup> Five Year Plan (2081-2023) is 4,679.65 million whereas the capital outlay allocation is just Nu.3050 million which is 2.63% share of the national capital outlay<sup>28</sup>. This is a 37.24% reduction from

<sup>28</sup> MoAF, *12<sup>th</sup> Five Year Plan RNR Sector 2018-2023*, (Thimphu) 45.

11<sup>th</sup> FYP as shown in figure below. Table 15 shows the budget distribution within RNR Sector in the 12<sup>th</sup> FYP (Figure 13) and table 16 & 17 show the forest related budget allocation in the 12<sup>th</sup> FYP.

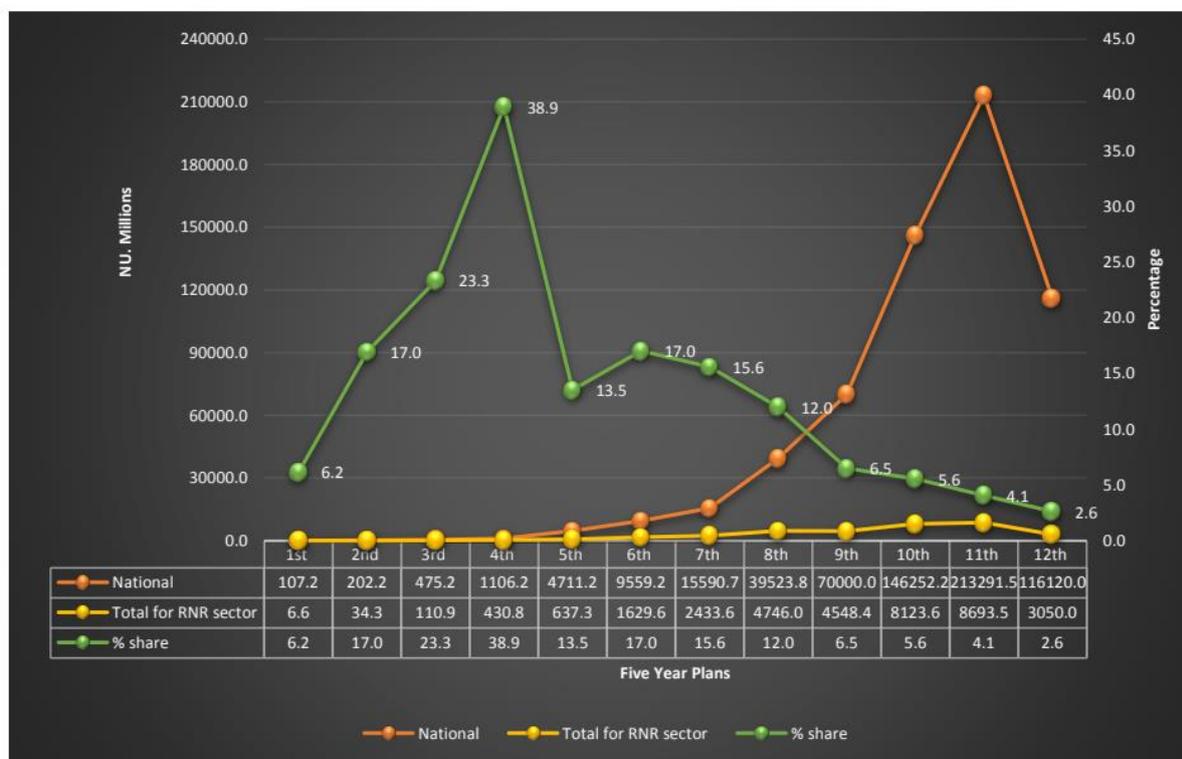


Figure 13. Share of 12th FYP budget allocation for RNR29

Table 15. Overall budget outlay for primary sector (Agriculture, forest and livestock) in 12th FYP

Programs	Indicative Budget Outlay (Nu.in Million)
<b>Total</b>	<b>3,050.35</b>
Food and Nutrition Security	1,228.19
Value Chain and enterprise Development	297.28
Sustainable Natural Resources Management and Utilization	655.90
Research and extension Services	224.08
Climate Smart and Disaster Resilient Development	535.68
Highland Development	56.64
Coordination and Support Services	52.58

From the renewable natural resources sector, forestry and forest related activities comprised of sustainable management and utilization of timber, carbon stock assessment, community forest

<sup>29</sup> MoAF, 12<sup>th</sup> FYP RNR sector (2018-2023), 45

management and conservation and protection of wetlands, wildlife biodiversity and professional capacity development as reflected in table 16. Below.

*Table 16. Sustainable natural resource management and utilization budget outlay for activities in 12th FYF of Bhutan<sup>30</sup>*

Activities	Plan Outlay Capital (Nu.in million))
<b>Total</b>	<b>655.90</b>
Sustainable management and utilization of timber	69.0
State of forest and carbon stock assessment	32.0
Enhance Community based forest management and conservation	15.0
Improve Professional capacity	55.0
Strengthen Protected and Conservation Area management	98.0
Reduce Forestry and wildlife offences/conflicts	41.0
Strengthen Nature-based Eco-tourism	35.0
Enhance Conservation and sustainable utilization of biodiversity	24.9
Enhance Effective management of wetlands and watersheds	290
Enhance Natural capital accounting system	4.0
Enhance Urban and Agro-forestry landscape management	2.0

*Table 17. Climate smart and disaster resilient development outlay for activities under 12th FYP*

Activities	Plan Outlay Capital (Nu.in million))
<b>Total</b>	<b>535.68</b>
Promote Climate Resilient Livestock Farming	77.11
enhance livelihood choices for marginalized farmers	10.20
Adopt Climate Smart irrigation and water efficient technologies	270.00
Release and adopt Climate smart technologies	73.00
Strengthen RNR Disaster management institution	3.00
enhance knowledge management, education and awareness in DM	8.00
Strengthen Pest and diseases risk reduction on RNR hazards	5.00
Reduce forest fire incidences	36.10
National REDD+ readiness phase for mitigation of climate change impacts	53.27

The Renewable Natural Resource (RNR) sector plays an important role in securing food sufficiency by increasing domestic production. By taking advantage of the COVID-19 situation to boost the contribution of the agriculture sector to GDP growth, the Government is supporting the enhancement of agricultural and livestock production through commercial ventures, youth groups, and easy access to financing with the establishment of NCSI development bank which

<sup>30</sup> RGoB, *12<sup>th</sup> FYP of Government of Bhutan*, 2018-2023, 21,22

provides microloans up to Nu. 0.500 million at an interest rate of 2 percent for agriculture and livestock-related activities. For the FY, the MoAF has been allocated a budget of Nu. 7,170.380 million which is about 10 percent of the total budget appropriation. Major activities include Land Development and construction of cold storages, installation of input supply infrastructure facilities, RNR Enterprise development program and promotion of climate-smart agriculture in the six eastern *Dzongkhags*, conservation and protection of the environment, promotion and development of livestock sector and rural development and climate change response program. Further, Nu. 341.798 million has been allocated under the Organic Flagship Program for the production of organic manure and up-scaling production of selected crops and marketing purposes.

Among them, forest-related activities are as follows:

1. National forest inventory Survey (GCF: Nu.58.856 million, World Bank: Nu.44.984 million and UNDP-GEF: Nu.2.8 million)
2. Nationwide Tiger Survey (Funding: GCF) - 25.000 Nu. in million

### 3.2.5. Key National Forest Policies and Programs

Bhutan's commitment to environmental conservation has been translated into numerous Policies and Legislations which are reflected below:

*Table 18. Acts, policies and strategies for forest management in Bhutan*

Sl. No	Year	Forest Act, Policy and Rule of Bhutan
1	1995	Forest and Nature Conservation Act of Bhutan
2	2011	National Forest Policy of Bhutan
3	2017	Forest and Nature Conservation Rules and Regulations of Bhutan
Sl. No	Year	National Acts and Policies Related to Forest
4	2000	The Environmental Assessment Act
5	2003	The Biodiversity Act of Bhutan
6	2007	The National Environment Protection Act
7	2007	The Land Act of Bhutan
8	2009	Waste Prevention and Management Act of Bhutan
9	2011	The Water Act of Bhutan
10	2016	Economic Development Policy of the Kingdom of Bhutan
11	2018	The Land Lease Rules and Regulations
12	2020	The Climate Change Policy of the Kingdom of Bhutan
Sl. No	Year	Plans, Program and Strategies Related to Forests
13	2018	The 12 <sup>th</sup> Five Year Plan 2018-2023
14	2020	National Environment Strategy 2020-2030
15	2020	National REDD+ Strategy & Action Plan
16	2020	A Roadmap and Strategy for Strengthening Climate Change Research in Bhutan, 2021-2025

### **Forest and Nature Conservation Act of Bhutan 1995**

The act covers forest management, prohibitions and concessions in State Forests, forestry leases, social and community forestry, transport and trade of forestry produce, protected areas, wildlife conservation, soil and water conservation, and forest fire prevention. The act also emphasizes on community and social forestry and encourages the participation of community and private individuals.

### **National Forest Policy 2011**

The policy necessitates the requirement to maintain at least 60 % forest cover for all times and highlights the evolution of the management of the State Reserved Forests (SRF). The Policy aims to manage Bhutan's forests and biodiversity for the benefit of the people and their social and economic wellbeing without compromising the conservation efforts. The Policy which mentions different management regimes, also has provisions on forest-based industries and needs of proper utilization and marketing in developing private sector and rural communities.

### **Forest and Nature Conservation Rules and Regulation (FNCRR) 2017**

FNCRR provides comprehensive rules and regulations in governing forests in Bhutan, including provision for sustainable forest management, forest research, forest-based industry, trade of forest produce, wildlife management includes rules guiding forest offences. Emphasis is placed on people's dependency on forests by reflecting various forest produce allotment to rural communities like rural house building timber, firewood, flagpoles and NWFP etc.

### **The Environmental Assessment Act 2000**

The Environment Assessment Act directs the government to ensure that environmental concerns are taken into account when formulating, renewing, modifying, and implementing any policy, plan, or program. It requires the issuance of environmental clearance as a prerequisite to the approval of any development activity.

### **The Biodiversity Act of Bhutan 2003**

The Biodiversity Act of Bhutan provides conservation and sustainable utilization of biological resources and associated traditional knowledge and ensures the protection of new plant varieties through a Sui Generis system. It also authorizes the implementation of the Access and Benefit-sharing regime to derive additional benefits fairly and equitably.

### **The National Environment Protection Act 2007**

The National Environment Protection Act ensures an effective system to conserve and protect the environment through the National Environment Commission or its successors, designation of competent authorities, and constitution of other advisory committees, to independently regulate and promote sustainable development in an equitable manner. The Act calls for the conservation of natural resources to be based on a participatory approach aimed at achieving an equitable sharing of the costs and benefits of conservation among resource users.

### **The Land Act of Bhutan 2007**

The Act regulates, manages, and administrates the ownership and use of land for socio-economic development and well-being through an effective land administration. The Act also covers the leasing of State land for economic and various other activities. The important feature

of this act related to forest is, the act reverted age-old tradition of *Tsamdro* (grazing land) and *Sokshing* (forest land for collection of leaf litter) rights to the State.

### **Waste Prevention and Management Act of Bhutan 2009**

This Act aims at preventing and reducing volumes of waste generation, and at promoting the reuse, recycle and management of waste in an environmentally sound manner. Waste includes solid, liquid, gaseous, hazardous and non-hazardous, organic or inorganic waste from all kinds of sources, the materials being stored for recycling, and the transportation, import and export of waste. The Act defines responsibilities of implementing agencies and of the public in managing the different categories of waste.

### **The Water Act of Bhutan 2011**

The Water Act of Bhutan establishes water resources as state property and ensures that it is protected, conserved and/or managed in an economically efficient, socially equitable and environmentally sustainable manner. The act also includes measures in case of water emergencies such as drought and flood.

### **Economic Development Policy of the Kingdom of Bhutan 2016**

With vision of “a green and self-reliant economy sustained by a knowledge-based society guided by the philosophy of GNH” this Policy provides the basis for government intervention to enhance productivity of the economy as a whole. Wherever necessary, policies, laws, rules and regulations shall be harmonized or amended in line with the provisions of the EDP.

### **The Land Lease Rules and Regulations 2018**

The Land Lease Rules and Regulations generally cover leasing of State Reserve Forest Land for different purposes and for different durations. One of the most notable features of the Act is nationalization on *Tsamdro* (Grazing ground) and *Sokshing* (leaf litter collection) while still providing provisions to lease them based on herd size, land holding, and Management Plan developed by MoAF.

### **The Climate Change Policy of the Kingdom of Bhutan 2020**

This policy aims to provide strategic guidance to ensure that Bhutan remains carbon neutral and protect the wellbeing of the people of Bhutan by adapting to climate change in an efficient and effective manner. It also ensures meaningful participation of all relevant stakeholders in climate change action in a coordinated and coherent manner with clear roles and responsibilities. Ensure that the challenges and opportunities of climate change are addressed at all appropriate levels, through adequate means of implementation (finance, technology, capacity building and awareness) and integration into relevant plans and policies.

### **The Middle Path- National Environment Strategy for Bhutan 2020**

The National Environmental Strategy (The Middle Path) 2020 document contains strategies and measures to integrate environmental consideration in the four broad categories such as land, air, water and life. These needs pertain to the information system and research, institutional development and community participation, policy and legislation, training and education and monitoring and evaluation and enforcement.

### **National REDD+ Strategy & Action Plan 2020**

The strategy seeks to achieve the REDD+ objectives with a broad vision that provides co-benefits, including enhancing livelihoods, protecting ecosystem services, and biodiversity conservation. Therefore, the NRS focuses on continuing to strengthen the conservation of existing forests and increase the adaptive capacity to climate change impacts without compromising opportunities for future economic development and prosperity.

**A Roadmap and Strategy for Strengthening Climate Change Research in Bhutan 2021-2025** The Policy of Bhutan stipulates overarching guidelines to strengthen research and bring about coherence in approach and strategies. The strategies include: I) Tackle issues which matter II) Strengthen institutions and networks, inspire leaders and empower researchers III) Operationalize a Climate Research, Information, and Service Portal (CRISP): IV) Mainstream and strengthen pedagogy, outreach and capacity building organized and V) Establish the Bhutan Science Foundation.

### **3.2.6. Forest Sector's Alignment to National Imperatives**

#### **National REDD+ Strategy & Action Plan 2020**

The strategy seeks to achieve the REDD+ objectives with a broad vision that provides co-benefits, including enhancing livelihoods, protecting ecosystem services, and biodiversity conservation. Therefore, the NRS focuses on continuing to strengthen the conservation of existing forests and increase the adaptive capacity to climate change impacts without compromising opportunities for future economic development and prosperity.

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### 3.2.7. International Engagement & Commitment to International/Regional Goals

Bhutan is committed to regional and international commitments and in 2018, with formulation of the 12<sup>th</sup> Five Year Plan of Bhutan, the 2030 Agenda for Sustainable Development Goals was incorporated within 17 National Key Result Areas of Bhutan. The SDGs resonate strongly with the concept and principles of Gross National Happiness of Bhutan.

Bhutan declared to remain carbon neutral at the 15th Conference of Parties to UNFCCC in 2009 in Copenhagen, Denmark. Bhutan submitted its Intended Nationally Determined Contribution (INDC) to the Paris Agreement on 30 September 2015. On ratification of the Paris Agreement on 19 September 2017 the INDC became Bhutan's first NDC. On 5 June 2021, Bhutan established its stronghold by submitting Bhutan's 2<sup>nd</sup> Nationally Determined Contribution with ambitious targets under forestry sector.

The Royal Government of Bhutan's Department of Forests and Park Services (DoFPS) has been implementing programs such as a sustainable management of State Reserve Forest Land (SRFL), sustainable management of forest landscapes and conservation of biodiversity, and integrated watershed management to ensure sustainable environmental service delivery and REDD+ activities<sup>31</sup> with the support of the UN-REDD Programme and the World Bank Forest Carbon Partnership Facility. The important International and Regional commitments and cooperation supported by Bhutan are reflected in table 19 below.

*Table 19. List of International and Regional Commitments of Bhutan*

Treaties/Agreements	Year of Ratification/ Acceded
Asian Forest Cooperation Organization	April 2018
RAMSAR Convention on Wetlands	January 2012
South Asian Wildlife Enforcement Network (SAWEN)	January 2010
Vienna Convention for the Protection of the Ozone Layer	April 2004
Montreal Protocol on Substances that Deplete Ozone Layer	April 2004
International Treaty on Plant Genetic Resource for Food and Agriculture (ITPGRFA)	September 2003
UN Convention to Combat Desertification (UNCCD)	August 2003
Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES)	August 2002
UNESCO World Heritage Convention	October 2001
UN Framework Convention on Climate Change (UNFCCC)	August 1995
UN Convention on Biological Diversity (CBD)	August 1995
International Plant Protection Convention	June 1994
UN Convention on the Law of Sea	December 1982

<sup>31</sup> Watershed Management Division, *Drivers of Deforestation and Forest Degradation in Bhutan*, 2017 (DoFPS, MoAF), 17.

### 3.3. Forestry and Forest Products

#### 3.3.1. Forest Sector Production

##### Timber

Department of Forests and Park Services is the sole sector authorized to allot timber from State reserved forest land, both for rural and commercial purposes in accordance with Forest and Nature Conservation Rules and Regulation 2020(Amendment). Timber supplied for rural purposes include rural house building, repairing, cowshed construction, fencing and flag poles, firewood on rural subsidized rate. Whereas the commercial royalty rate is a little high.

In 2021, a total of 63,028.52 m<sup>3</sup> timber in standing volume was allotted for various purposes. 38,393.98 m<sup>3</sup> of the total was allotted on rural royalty rate while 34,634.54 m<sup>3</sup> total of timber was allotted on commercial royalty. A total of Nu. 8.81 million (USD 0.11) million was realized from the supply of forest timber in 2021<sup>32</sup>.

##### Non-Wood Forest Products (NWFP)

The Non-Wood Forest Products include edible non-timber products like bamboo shoots, cane shoots, damru, fern shoots, nuts, mushrooms, oilseeds, pan-leaves, and orchids. The medicinal plants such as cordyceps, lemongrass oil, star anis, chirata, pipla, resin, and other medicinal plants and handicraft items made of forest products *bangchung*, mats, baskets, daphne, dyes, incense, dhapa, cups, and furniture. In 2021, total of Nu. 32.51 million (USD 0.43) royalty was collected from the Non- Wood Forest Products utilization.

Over 99 NWFP management groups formed in the country. The most well-known insect fungus, *Ophiocordyceps sinensis*, found in the alpine meadows of the country, is a highly valued biological resource due to its medicinal properties. It plays a significant role in uplifting the livelihood and economic prosperity of alpine dwellers due to its commercial value. In 2014, a total of 671.5 kg of *Ophiocordyceps sinensis* was declared of which 554.6 kg was auctioned and traded, fetching as high as Nu. 1.326 million per kilogram and earning Nu. 5.64 million in royalties to the government.

Table 20. Revenue generated through realization of royalties for supply of timber for rural and commercial purposes by Dzongkhags in 2021<sup>33</sup>

SL no.	Offices	Rural		Commercial	
		Volume(m3)	Royalty (Nu.)	Volume(m3)	Royalty (Nu.)
1	Divisional Forest Office, Bumthang	2496.92	90,214.44	6724.38	1,934,363.12
2	Divisional Forest Office, Dagana	586.53	15,544.49	567.15	113,042.83

<sup>32</sup> DoFPS, *Forest facts and Figures*, 2021 DoFPS, (MoAF, RGoB).

<sup>33</sup> DoFPS, *Forest Facts and Figures*, 2021 (MoAF).

3	Divisional Forest Office, Gedu	1054.90	15,057.24	1014.24	152,204.70
4	Divisional Forest Office, Mongar	11942.12	41,935.54	3566.65	655,372.09
5	Divisional Forest Office, Paro	12252.70	185,502.11	2442.27	936,550.59
6	Divisional Forest Office, Pema Gatshel	89.74	2,360.05	2026.29	44,827.95
7	Divisional Forest Office, Samdrup Jongkhar	50.60	2,304.91	825.88	353,876.48
8	Divisional Forest Office, Samtse	435.61	8,995.96	1105.79	196,892.43
9	Divisional Forest Office, Sarpang	50.19	2,315.41	175.62	39,369.44
10	Divisional Forest Office, Thimphu	2362.05	18,360.05	1496.81	358,686.84
11	Divisional Forest Office, Trashigang	1160.39	43,240.77	121.83	16,837.08
12	Divisional Forest Office, Tsirang	3.74	1,084.00	35.56	5,251.88
13	Divisional Forest Office, Wangdue	578.45	39,295.84	2976.34	533,681.35
14	Divisional Forest Office, Zhemgang	392.26	6,194.43	299.76	50,672.30
15	Bumdeling Wildlife Sanctuary	1809.76	52,703.11	273.25	121,438.58
16	Jigme Dorji National Park	1367.54	26,845.30	9203.50	2,311,686.95
17	Jigme Khesar Strict Nature Reserve	185.70	2,860.00	175.88	19,042.04
18	Jigme Singye Wangchuck National Park	293.49	10,844.70	87.39	26,032.27
19	Jomotsangkha Wildlife Sanctuary	12.79	140.00	304.86	79,723.53
20	Phibsoo Wildlife Sanctuary	72.64	3,240.00	0.00	0.00
21	Phrumsengla National Park	314.35	18,029.00	769.44	137,166.68
22	Royal Manas National Park	119.61	1,400.00	332.32	85,910.76
23	Sakteng Wildlife Sanctuary	643.31	25,894.09	109.32	29,592.71
24	Wangchuck Centennial National Park	118.59	720.00	0.00	0.00
<b>Total</b>		<b>38393.98</b>	<b>615,081.44</b>	<b>34634.54</b>	<b>8,202,222.60</b>

\* The sum may vary during the decimal point rounding process.

Table 21. Revenue generated through realization of royalties for firewood for rural purpose supply by divisional and park offices in 2021

SL no.	Offices	Rural		Commercial	
		Volume(m3)	Royalty (Nu.)	Volume(m3)	Royalty (Nu.)

1	Divisional Forest Office, Bumthang	1937.20	23,580.22	2780.61	32,647.54
2	Divisional Forest Office, Dagana	2377.61	52,297.89	1480.23	31,659.40
3	Divisional Forest Office, Gedu	664.00	15,000.00	7225.35	156,600.00
4	Divisional Forest Office, Mongar	1396.85	35,450.01	1294.93	27,010.88
5	Divisional Forest Office, Paro	1648.16	22,798.16	152.22	7,059.68
6	Divisional Forest Office, Pema Gatsel	304.69	7,380.00	152.44	4,374.45
7	Divisional Forest Office, Samdrup Jongkhar	76.00	1,710.00	931.80	25,756.46
8	Divisional Forest Office, Samtse	2454.66	70,839.50	1232.85	29,520.00
9	Divisional Forest Office, Sarpang	34.57	3,182.96	180.00	4,049.93
10	Divisional Forest Office, Thimphu	483.40	6,716.24	474.16	19,675.79
11	Divisional Forest Office, Trashigang	1567.08	33,939.51	1138.92	25,779.94
12	Divisional Forest Office, Tsirang	186.56	4,635.00	48.00	0.00
13	Divisional Forest Office, Wangdue	956.12	10,774.07	350.41	9,211.54
14	Divisional Forest Office, Zhemgang	126.00	5,418.36	54.62	3,987.66
15	Bumdeling Wildlife Sanctuary	1724.24	40,653.11	302.18	12,691.80
16	Jigme Dorji National Park	1088.17	20,273.16	1476.50	33,128.07
17	Jigme Khesar Strict Nature Reserve	1.36	880.00	0.03	180.00
18	Jigme Singye Wangchuck National Park	204.53	4,660.00	48.00	1,080.72
19	Jomotsangkha Wildlife Sanctuary	256.00	30,469.51	1280.00	28,800.00
20	Phibsoo Wildlife Sanctuary	131.06	4,824.00	0.00	0.00
21	Phrumsengla National Park	522.28	9,330.00	1094.00	24,000.00
22	Royal Manas National Park	0.00	0.00	215.14	4,848.46
23	Sakteng Wildlife Sanctuary	661.12	14,895.00	485.56	10,845.00
<b>Total</b>		18801.66	419,706.70	22397.95	492,907.32

*\*The sum may vary during the decimal point rounding process.5.2.*

### 3.3.2. Forest Sector Trade

#### In-country Wood Based Industries

The commercial consumption of timber in Bhutan is mostly by wood-based WBI) industries such as Sawmills, Furniture Units, joinery, briquette factory, charcoal factory, handicraft, particle board and wood panel units. The timber is purchased through auction from NRDCL which works FMUs of forest department. Each FMU is managed and operated by the NRDCL on the sustainable principle.

#### Import

Forest products such as charcoal, sawlogs (softwood), sawn timber, veneer sheets, fiber board, wooden household utensils, and furniture, etc. to paper, cartons, journals, and periodicals forms major import forest products in Bhutan. In 2020, wood charcoal was one of the top 10 imports

of the country with Nu.2051.00 million worth of value<sup>34</sup> which is higher than Nu.1882.58 million worth wood charcoal imported in 2019. The major import partner remains India, while Nu.35.64 million worth of wood products were imported from Bangladesh and Thailand in 2020.

## **Export**

The export of wood and wood products comprises of wood fuel, sawlogs, tea-chest battens, furniture, handicraft items, sawn timber, beadings, and packing cases, and non-wood forest products like Matsutake mushroom, *Cordyceps sinensis*, incense stick, handicrafts, etc. In 2020, Cordyceps were exported to Nepal, Viet Nam, Japan and Singapore. Wood furniture and timber was exported to India, Nepal, and Bangladesh.

Bhutan's forests consist of broadleaf (45.9 percent), mixed conifer (13.5 percent), fir (6.0 percent), chirpine (2.6 percent), and blue pine (2.6 percent). Other land uses and land covers include shrubs (9.7 percent), snow cover (5.4 percent), rocky outcrops (4.2 percent), alpine scrub (3.4 percent), cultivated agricultural land (2.8 percent), and meadows (2.5 percent) (FRMD, 2017). Currently, around 3.5 percent of Bhutan's total land area is managed for commercial forest production purposes<sup>35</sup>. The total growing stock of Bhutan's forests is estimated at 1,001 million cubic meters (m<sup>3</sup>). The average growing stock per ha is 261 m<sup>3</sup> as per the National Forest Inventory Report (NFI) 2016. There is a scope for sustainable utilization and commercializing the forest products, especially broadleaved forest. However the rugged mountain terrains, steep valleys, and the inaccessibility and poor infrastructure makes it unfeasible for extraction.

### **3.3.3. Forest Sector Employment**

Bhutan is a small country and a demographically young nation with 45.8% of total population below the age of 24 years. The employment to population ratio is 65.2% (ages 15 and older)<sup>36</sup>. Of the major occupation groups, skilled agriculture, forest and fishery workers employed the highest number of people (49.7%)<sup>37</sup>. The employment in agriculture is 55.3% of total employment<sup>38</sup>. The 12<sup>th</sup> Five Year Plan of the government further projected to employ 4,287 people in the renewable natural resource sector. As of 2019, the forest department has a total of 1,480 staff comprising 1,402 technical and 78 non-technical members. Out of the total forest staffs, 1258 are male and 222 are female<sup>39</sup>.

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<sup>34</sup> Ministry of Economic Affairs, *Annual Trade Statistics*, 2020, 3

<sup>35</sup> MoEA, *Productivity Assessment of Wood and Agro-industries of Bhutan*, 2020, 29

<sup>36</sup> "Human Development Reports," *Hdr.undp.org*, last modified n.d., accessed May 17, 2021, <http://hdr.undp.org/en/countries/profiles/BTN>.

<sup>37</sup> *Labour Force Survey Report of Bhutan*, 2020

<sup>38</sup> "Human Development Reports," *Hdr.undp.org*, last modified n.d., accessed May 17, 2021, <http://hdr.undp.org/en/countries/profiles/BTN>.

<sup>39</sup> Forest facts and figures, DoFPs, MoAF, 2019

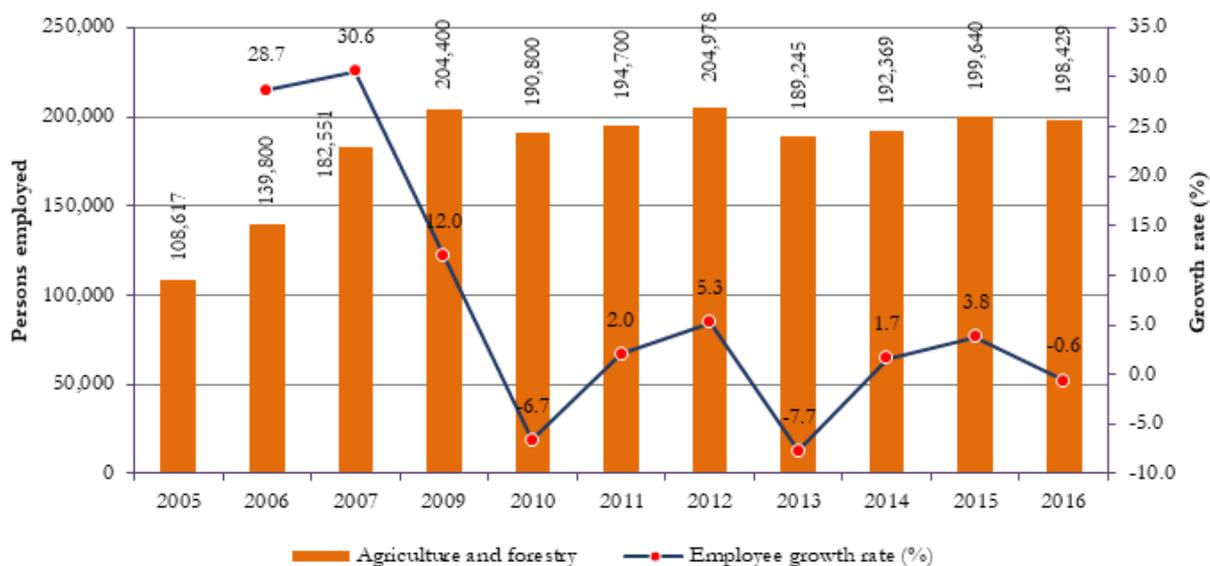


Figure 13. Employment trend in agriculture sector

Source: 12<sup>th</sup> FYP of Bhutan

### 3.4. Forest and Climate Change

#### 3.4.1. Roles of Forest Sector in National Climate Change Policy

##### Greenhouse Gas Sequestration and Emission from Forest

Bhutan stands out as one of the very few countries with net sequestration of greenhouse gas emissions, largely due to the vast forest cover (71%), limited industrialization, and use of clean energy. Total GHG emissions in 2015 was 3,814.098 Gg CO<sub>2</sub>e that includes 707.917 Gg CO<sub>2</sub>e from energy, 796.423 Gg CO<sub>2</sub>e from IPPU, -7203.346 from AFOLU (552.87 Gg CO<sub>2</sub>e from agriculture and -7756.220 Gg CO<sub>2</sub>e from Land Use, Land Use Change and Forestry) and 126.506 Gg CO<sub>2</sub>e from waste as shown in figure below.

GHG sources & sinks	GHG, Giga grams				
	CO <sub>2</sub>	CH <sub>4</sub>	N <sub>2</sub> O	Nox	CO
Energy	691.556	0.361	0.028	0.000	0.000
IPPU	791.834	0.219	0.000	0.000	0.000
Agriculture	1.073	20.549	0.388	0.000	0.000
LULUCF	-7977.606	3.515	0.194	2.244	80.028
Waste	0.000	5.849	0.012	0.000	0.000
<b>Total emission</b>	<b>-6493.142</b>	<b>30.493</b>	<b>0.623</b>	<b>2.244</b>	<b>80.028</b>
<b>CO<sub>2</sub>e</b>	<b>-6493.142</b>	<b>640.36</b>	<b>193.00</b>	<b>-56.77</b>	<b>144.05</b>
<b>Net emission</b>	<b>-5,572.50</b>				

Figure 14. Bhutan's sector wise total GHG emission and sequestration

According to the 3rd National Communication to UNFCCC (2020), the total emissions from Land Use Land Use Change and forestry (all land-use types, including Forest Land, Cropland, Grassland, Wetlands, and Settlements (as well as Other Land)) excluding removals in 2015

was 1630.37 Gg CO<sub>2</sub>e, representing 42.75% of net national emission. The total sequestration capacity of forests for the same period was -9,386.59 Gg CO<sub>2</sub>e. The total carbon sink or sequestration by LULUCF in 2015 has increased from the previous estimate of 6,309.6 Gg CO<sub>2</sub>e for the year 2000. The gain in total carbon sink has attributed mainly to the change in use of definition of managed forest, natural expansion and plantation.

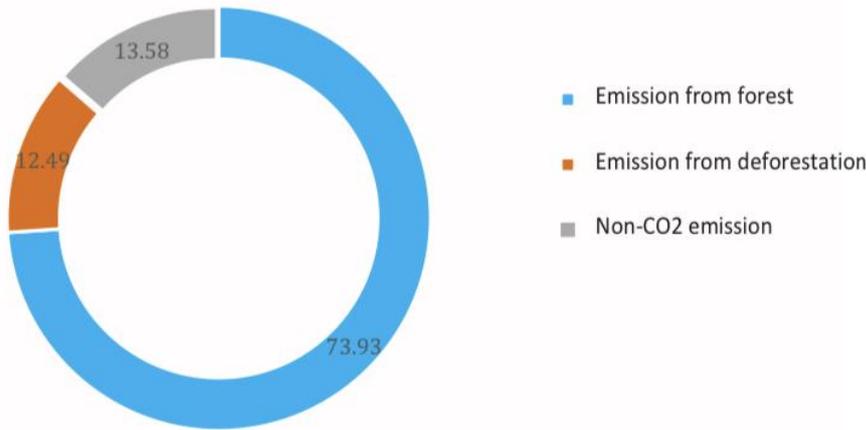


Figure 15. Percentage share of emission in LULUCF in 2015<sup>40</sup>

The emission level from Forest Land Use Land Use Change & Forestry (LULUCF) is 42.75% which is one of the highest contributions compared to other sectors. However, in comparison to the year 1994 and 2000, it has reduced as in figure 1, while emission from the energy sector has increased drastically.

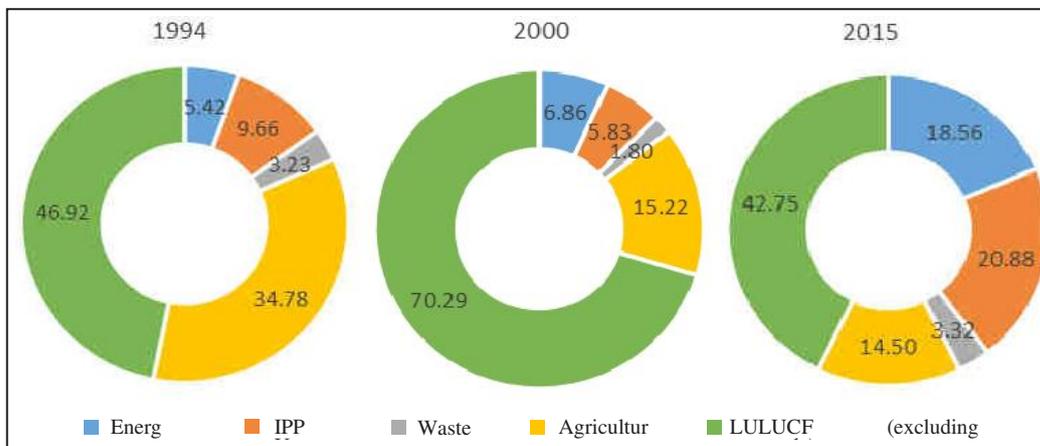


Figure 16. Sectoral % contribution of GHG emission to national net emission excluding removals by forest (1994,2000,2015)<sup>41</sup>

### Climate Change Policies and Strategies

Anchored by far-sighted leadership and stable political order, the country has pursued a development path that is based on the Bhutanese belief and premise that true development takes place when social, economic, spiritual, and environmental well-being occur side by side to

<sup>40</sup> 3<sup>rd</sup> National Communication to UNFCCC, 2020 (NEC, RGoB) 47

<sup>41</sup> 3<sup>rd</sup> National Communication to UNFCCC, 2020 (NEC, RGoB) 37

complement and reinforce each other. Climate Change in Bhutan is supported by number of national acts, policies and strategies as follows:

*Table 22. Climate change polices and strategies*

<b>Sl. No</b>	<b>Year</b>	<b>Acts and Policies Related to Climate Change</b>
1	2020	Climate Change Policy of Bhutan
2	2016	Economic Development Policy of the Kingdom of Bhutan
3	2011	The Water Act of Bhutan
4	2009	Waste Prevention and Management Act of Bhutan
5	2008	Bhutan Sustainable Hydropower Policy
6	2007	The National Environment Protection Act
7	2006	National Transport Policy
8	2000	Environment Assessment Act
9	1995	Forest and Nature Conservation Act of Bhutan
<b>Sl. No</b>	<b>Year</b>	<b>Strategies Related to Climate Change</b>
10	2021	2 <sup>nd</sup> Nationally Determined Contribution
11	2021	Low Emission Development Strategy for Human Settlement 2021
12	2021	Low Emission Development Strategy for Surface Transport 2021
13	2021	Low Emission Development Strategy for Food Security 2021
14	2021	Low Emission Development Strategy for Industry 2021
15	2020	National REDD+ Strategy and Action Plan
16	2020	A Roadmap and Strategy for Strengthening Climate Change Research in Bhutan, 2021-2025
17	2013	Transport 2040: Integrated Strategic Vision

*Table 23. Climate change adaptation measures*

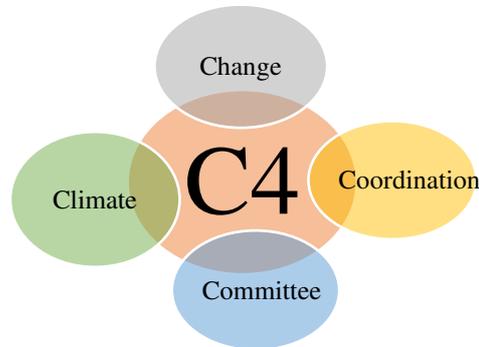
National Adaptation Programme of action (NAPA) 2006 <sup>42</sup>	Clean Development Mechanism <sup>43</sup>
The Bhutan NAPA preparation has been a timely opportunity to look at the country's climate change related vulnerabilities in its unique geographical setting. The process began with the assessment of vulnerabilities due to climate change across all development sectors represented by the five main working groups (Agriculture and Livestock, Forestry and Biodiversity,	Allows emission reduction projects in developing countries to earn Certified Emission Reductions (CERs) which can be sold and used by industrialized countries to meet part of their emission reduction target under the Kyoto Protocol. Although there have been several initiatives to register CDM projects in Bhutan, so far, only two projects have been registered.

<sup>42</sup> <https://unfccc.int/resource/docs/napa/btn01.pdf>

<sup>43</sup> National Strategy and Action Plan for Low Carbon Development 2012 (NEC, RGoB) 67

Health, Water Resources and Energy, and Natural Disasters and Infrastructure).

**Coordination Mechanism for Climate Change**



*Figure 17. Climate change coordination*

The Climate Change Coordination Committee (C4) is the technical body to serve as a forum for discussion and coordination of matters related to climate change in Bhutan and makes recommendations for consideration by the National Environment Commission (NEC). The C4 is composed of high-level executive representation from stakeholder agencies and organizations and is chaired by the Secretary of NEC Secretariat. The committee derives its mandate from the Executive Order of the Prime Minister of October 16, 2016. The C4 is supported in implementing its mandates and functions through the Climate Change Division of NEC Secretariat <sup>44</sup>.

**Bhutan’s National Determined Contribution**

Joined UNFCCC and all the UN conventions	1 <sup>st</sup> Green House Gas Inventory Report	Pledged to remain carbon neutral at COP-15	2 <sup>nd</sup> communication to UNFCCC	Submitted 1 <sup>st</sup> INDC	Signed Paris Agreement	3 <sup>rd</sup> Communication to UNFCCC	Submitted 2 <sup>nd</sup> NDC
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*Figure 18. Highlights of climate change journey of Bhutan until 2021*

The Royal Government of Bhutan committed to remain carbon neutral at COP-15 of UN Framework Convention on Climate Change in 2009 and reiterated the commitment under its 1<sup>st</sup> Nationally Determined Contribution (NDC) to the Paris Agreement in 2015 as a contribution to keep the planet safe for the benefit of present and future generations.

<sup>44</sup> Climate Change Policy of Bhutan, 2020 (NEC, RGoB,) 12

In June 2021, Bhutan submitted its 2<sup>nd</sup> NDC, further pledging to maintain the commitment to remain carbon-neutral where emission of greenhouse gasses will not exceed carbon sequestration by our forests. At the same time, Bhutan also called on the international community to continue and enhance the support for Bhutan’s efforts to mitigate and adapt to climate change.

Bhutan’s 2nd NDC elaborates the mitigation action in key sectors in Bhutan's Second Nationally Determined Contribution in the form of low emission developments, action plans, and priority needs, to meet the objective of remaining carbon neutral while pursuing our sustainable development goals.

### 3.4.2. Climate Change Adaptation and Disaster Risk Reduction in Forest Sector

#### *Forest Based Mitigation*

Bhutan’s Nationally Determined Contribution (NDC) outlay Sustainable forest management and conservation of biodiversity through 1) Sustainable management of forest management units (FMUs), protected areas, community forests, forest areas outside FMUs, and private forests 2) Enhancing forest information and monitoring infrastructure through national forest inventories and carbon stock assessments and 3) Forest fire management and rehabilitation of degraded and barren forest lands as important areas to focus in Bhutan’s commitment remain carbon neutral.

Within forestry, the Department activities are aligned towards:

- Reducing emission from deforestation
- Reducing emissions from forest degradation
- Conservation of forest carbon stocks
- Sustainable management of forest and
- Enhancement of forest carbon stocks.

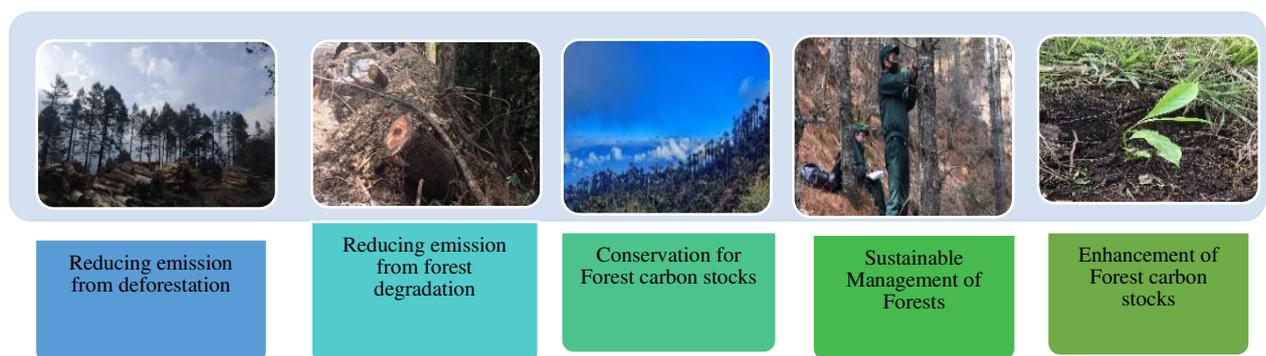


Figure 19. Forest related mitigation<sup>45</sup>

<sup>45</sup> Watershed Management Division, DoFP

The REDD+ Strategy and Action Plan 2020-2030<sup>46</sup> also highlights forest-based strategies to reduce emission from deforestation and forest degradation, and increase carbon dioxide sequestration through following strategies:

- Strengthen institutional and sectoral capacity to achieve sustainable forest management
- Strengthen the effectiveness of existing policies and approaches
- Strengthen cross-sectoral land use planning and management, coordination & collaboration
- Strengthen Environment Impact Assessment processes for infrastructure proposals
- Achieve a highly diversified and technology-based timber supply chain Rationale
- Adopt fire management approaches that limit impacts on the environment and communities
- Establish plantations to provide sustainable wood-based products supply, increase carbon-stock, and enhance biodiversity
- Promote the development of enterprises that sustainably manage NWFP
- Broaden opportunities for income generation from ecosystem services
- Develop climate smart approaches in agriculture
- Broaden opportunities for income generation from ecosystem services

Apart from being a major source of carbon sequestration, forests in Bhutan are also related to socio-economic, cultural and economic aspects. A large proportion of the population depends on forests for timber, wild vegetables, medicinal herbs, firewood and recreational values. Forests provide a major watershed and can be a source of drinking water, as well as sustaining hydropower projects in Bhutan.

### **Mitigation Targets and Contributions**

Bhutan intends to remain carbon neutral where emission of greenhouse gases will not exceed carbon sequestration by our forests, which is estimated at 6.3 million tons of CO<sub>2</sub>. Bhutan will maintain a minimum of 60 percent of total land under forest cover for all time in accordance with the Constitution of the Kingdom of Bhutan. Efforts will also be made to maintain current levels of forest cover, which currently stands at 71% through sustainable forest management and conservation of environmental services.

Hydropower from run-of-the-river schemes account for almost 100% of electricity generation in Bhutan with almost 100% access to electricity in urban areas and 94% in rural areas. Presently, Bhutan offsets 4.4 million tons of CO<sub>2</sub>e through exports of hydroelectricity. In addition, Bhutan can offset up to 22.4 million tons of CO<sub>2</sub>e per year by 2025 (1<sup>st</sup> NDC) in the region through the export of electricity from our clean hydropower projects.

Various other policies and initiatives are also already in place that contribute to mitigation such as sustainable land management practices, Climate Change policy of Bhutan (2020) improved livestock management, promotion of organic agriculture and promotion of zero emission

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<sup>46</sup> National REDD+ Strategy and Action Plan 2020 (DoFPs, RGoB) 5-11

vehicles. The present five-year development plan (2018-2023) has also integrated carbon neutral development as a part of the national key result areas to guide planning and implementation of development activities within all sectors. As a least-developed country, Bhutan has a development imperative and will pursue ecologically balanced sustainable development in line with our development philosophy of Gross National Happiness.

Bhutan’s second NDC covers broad priority mitigation actions in the form of LEDES, roadmaps and strategies as presented below:

*Table 24. NDC mitigation strategies and targets*

Mitigation Strategy	Target (2030)
Forest conservation and management under the National REDD+ Strategy	Maintain 436 million tonnes of forest carbon stock
Low Emission Development Strategy for Food Security	710 Gg CO <sub>2</sub> e reduction
Low Emission Development Strategy for Human Settlement	4,122 Gg CO <sub>2</sub> e reduction
Low Emission Development Strategy for Industry	9,990 -11,370 Gg CO <sub>2</sub> e reduction
Low Emission Development Strategy for Surface Transport	5,283 Gg CO <sub>2</sub> e reduction
Waste Management	Zero Waste Bhutan by 2030
Sustainable Hydropower Development	Complete 4 hydropower project by 2030
Alternative Renewable Energy	mini hydro, solar, wind and waste-to-energy technologies will be pursued
Green Hydrogen Roadmap	initiate feasibility studies, preparation of the Green Hydrogen Roadmap and pilot projects.
National Energy Efficiency & Conservation Policy 2019 and Energy Efficiency Roadmap 2019	0.59 million tCO <sub>2</sub> e reduction
Cooperative mechanisms to achieve sustainable development and mitigation ambitions	Continue to participate

### **Responsible Institutions**

Climate Change is cross sectoral and all most all the ministries/entities and individual are responsible, however government setting for climate change actions and mitigation in Bhutan are:

### **Core Institutions**

- **National Environment Commission (NEC)** is the national focal point for UNFCCC and deal agency for all the environmental agreement in Bhutan since the establishment of the NEC and Bhutan’s signing of the Rio Conventions in 1992.

### **Other Related Ministries, Departments and Institution**

- **Gross National Happiness Commission** is the central agency for approving any plans/ strategies and projects in the country to ensure that national target of sustainable

development is not compromised.

- **Ministry of Agriculture and Forests** major roles includes management of forest and soils as carbon sinks and as areas for ecosystem-based adaptation, management of emissions from agriculture and livestock sector and resilience of food, livestock and biodiversity.
- **Ministry of Economic Affairs** sets an agenda for the integration of low emission development strategies in energy and industry and provision of incentives for environmental performance as per EDP and Building resilience in energy and industry sectors.
- **Ministry of Works and Human Settlement** for managing resilience of human settlements, infrastructure and emission of GHG from settlements, waste management.
- **Ministry of Information and Communications** manages emission from transport sector.
- **Ministry of Labor and Human Resources** builds capacity and supports integration into training institutions.
- **Ministry of Health** fall incorporates the actions relevant to the sector on climate change.
- **Ministry of Home and Cultural Affairs** prepares for climate induced disasters and local actions on climate change.
- **Ministry of Education** develops curriculum on environment and climate change and imparts knowledge at different levels of the education system.
- **The Ministry of Foreign Affairs** provides guidance on matters that are political in nature for multilateral engagements.
- **National Center for Hydrology and Meteorology** provides a national source of hydro-meteorological data, service and advice to meet the needs of the general public, emergency services and other specialized users.
- **The National Commission for Women and Children** provides support in mainstreaming gender responsive climate actions.
- **Other stakeholders (CSOs, NGOs and Private Sector)** facilitate implementation of climate change actions.

### 3.4.3. Global Partnership for Forest Protection

#### Adaptation and Contributions and Needs

Under the 2<sup>nd</sup> NDC of Bhutan, there are about 50 actions planned until 2030. The costs for the implementation for a few of the mitigation measures have been estimated as in table below. Further detailed feasibility assessments and cost benefit assessments will need to be undertaken for most of the LEDS priorities in the near future.

*Table 25. Estimated finance necessary*

Mitigation Strategy	Estimated finance necessary (million US \$)
Forest	54.5
Agriculture	61.65

Human Settlement	101.84
Industry	3.52 (Initial estimate to support capacity development and technical assessment)
Transport	3233
<b>Total</b>	<b>3454.51</b>

Apart from financial requirement to implement the NDCs, Bhutan also requires:

- Capacity building programs through trainings and workshops
- Technological assistance to implement the projects
- Adaptation capacity against Glacial Lake Outburst Flood (GOLF)
- Support Research Based Projects

### 3.5. Human Resources and Institutional Capacity in Forest Sector

#### 3.5.1. National Forest Administrative Capacity

As of 2019, a total of 1,480 staff works under the Department of Forests and Park Services which comprises 1402 technical forestry staff and 78 non-technical staff spread around the country under various Functional Divisions, Territorial Divisions, Parks Offices. Out of the total, 1258 are male and only 222 are females. In the process of making efficient and compact forest staff, there is an increase in technical staff compared to 2011. However, there is a decrease in the total number of employments compared to 2011 as shown in table below. This is in line with the Royal Civil Service Commissions' objective to form more efficient, resilient and compact public servants.

With forests faced with emerging challenges including climate change and natural forces, the forest staff need regular training, workshops and capacity development training.

*Table 26. Number of workers under the department of forests<sup>47</sup>*

	2011	2019
	Number of persons	
<b>Total</b>	1744	1480
Male	-	1258
Female	-	222
Technical staff	1324	1402
Non-technical staff	420	78

<sup>47</sup> Department of Forests and Park Services, *Forestry facts and figure of Bhutan, 2011 & 2019* (MoAF, Thimphu)

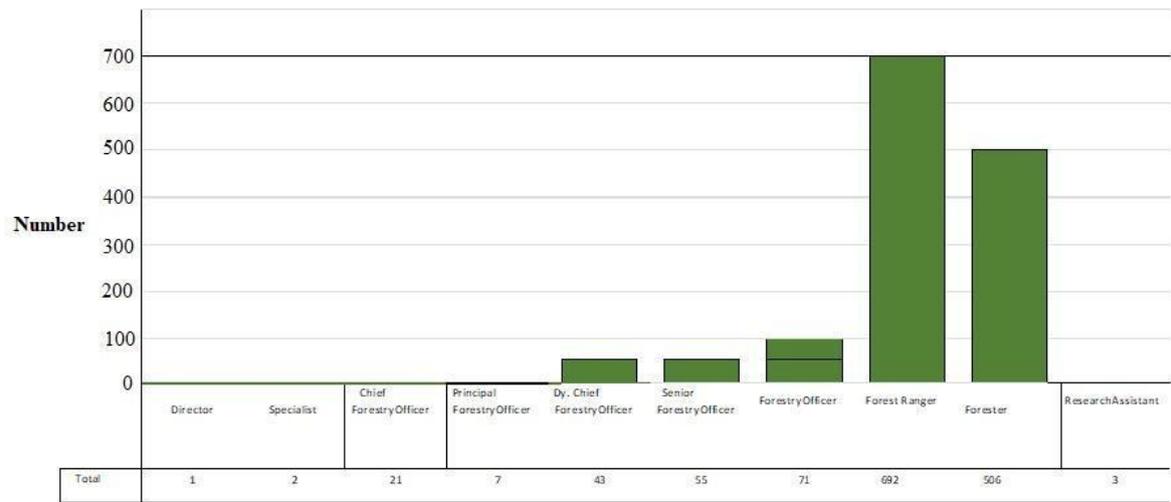


Figure 20. Human resources by position categories

Source: Forestry facts and figures, 2019

### 3.5.2. Research and Development

**Ugyen Wangchuck Institute for Conservation and Environmental Research (UWICER)**  
 Ugyen Wangchuck Institute for Conservation and Environmental Research (UWICER) is a major research and educational institution in the forest sector under the Ministry of Agriculture and Forests.

UWICER’s research efforts seek to understand and uncover the ecological, socio-economic, and policy dimensions of biophysical systems and their impact on human ecology. While it strives to conduct both basic and applied research in the fields of ecology and dynamics of biophysical systems, it also endeavors to foster integrated research and pay special attention to the human and policy dimension of natural resource use.



Figure 21. Research and education wings of the institute

Areas under research:

## 1. Sustainable Forestry

Proper use of forests and their ecological resilience can only be fostered through an in-depth understanding of forest ecosystems.

Our research efforts focus on understanding the ecological aspect as well as management and policy aspects of forest resources and lands. Current Research under Sustainable Forestry are:

- Forest use and livelihood dimensions in high altitude ecosystems of Bhutan (with the University of Montana)
- Community forests in Bhutan: their socio-economic and policy dimensions (with the University of Montana)
- Sacred groves of Bhutan: their biodiversity and cultural significance

## 2. Conservation Biology

There is an increase in awareness that biodiversity and wildlife have significant roles in maintaining and ensuring human welfare. Across the globe, the rise in anthropogenic impacts have been shown to negatively impact biodiversity and wildlife. The research efforts focus on understanding patterns, as well as the dynamics and functions of natural landscapes. Currently, research in this area includes:

- Carnivore population dynamics in montane ecosystems of Bhutan (with the University of Montana)
- Predator-prey dynamics with implications on understanding human-wildlife conflicts (with the University of Montana)
- Small carnivore distribution and diversity and its implications
- Takin habitat use and movement (with the University of New England, Armidale, New South Wales)
- Altitudinal migration of high-altitude pheasants (with the Max-Planck Institute of Ornithology)
- Trans-Himalayan migration of the endangered, Black-necked cranes (with the Max-Planck Institute of Ornithology)
- Bird diversity in montane ecosystems in Bhutan

## 3. Water Resources

Water is vital for life. As such, understanding water as a system, stretching from the glaciers to the freshwater ecosystems, supporting both wildlife and human industry will be crucial in ensuring the conservation of this precious resource. The research efforts focus on understanding ecology, as well as management and policy aspects of water resources. Current research covers:

- Patterns of water use in Bhutan
- Biodiversity in freshwater ecosystems of Bhutan (with Naturalis, Netherlands & University of Montana, USA, WWF -Living Himalayas)
- Ecosystems services from forests and wetlands (with CIFOR)

- Snow cover mapping for the Himalayas and their impact on freshwater runoff (with Columbia University, NYC, USA)
- Climate change impacts on water resources and possible adaptation measures in Bhutan (with the Institute of Global Environmental Strategies & Tokyo Institute of Technology, Japan)
- Drought Stress tolerance and climate change adaptation potentials of two main forest ecosystems in Bhutan Himalayas: Large Scale Throughfall Exclusion Experiment (with University of Natural Resources and Life Sciences (BOKU), Austria)
- Assessment and geomorphological mapping of the major Riverine ecosystems in Bhutan
- Impacts of developmental activities such as farm road national highway constructions, on water quality and sedimentation load to the river ecosystem.

#### 4. Socio-Economics

Humans shape land and resource use through direct consumption, as well as through the formulation of policies to affect and dictate such use. The health and integrity of natural ecosystems is dependent on socio-economic conditions as well as policies framed to guide the use of such ecosystems. Ensuring sustainability of such natural ecosystems will require a thorough understanding of everchanging socio-economic variables and their related policy environments. The research efforts focus on understating the socio-economic and policy drivers of resource use particularly, and development in general. Current research includes:

- High and mid-altitude nomadic livelihood and grazing systems of Bhutan (with the University of Montana)
- Development and livelihood change in Sakteng and Merak
- Community forests and their role in improving livelihoods
- Wildlife depredation as an agent of livelihood impoverishment and poverty

#### **National Biodiversity Centre**

The Centre is the hub of biodiversity research, conservation and sustainable use programmes for biological resources in Bhutan. It also serves as the national focal agency to regulate access and utilization of biological resources, ensuring equitable sharing of the benefits arising from their access and utilization. Specialized technical services related to conservation and sustainable utilization of biodiversity in the country like taxonomic and systematics service is provided on the flora of Bhutan.

The Centre is known for promoting education, awareness, and participation in biodiversity conservation, and sustainable use to enhance peoples' participation and leadership in conservation.



*Figure 22. Work units of NBC*

**Programs include:**

- Established the first ever Biodiversity Interpretation Center in Bhutan. The Centre is located at the Royal Botanical Garden under the National Biodiversity Centre in Serbithang. It has a variety of plants on display from wood samples to invertebrate specimens. The Centre is mainly focused on raising awareness to our Bhutanese people and encouraging Bhutanese people to learn and to love nature and know more about biodiversity conservation. This Interpretation Center will help students, researchers, international visitors, and the general public to know about Bhutan's biodiversity as well as the biodiversity in the whole world.
- Archives Biodiversity Portal of Bhutan caters to a unique repository of information on Bhutan's biodiversity. It is an open platform that provides free access to information.

**Royal Society for Protection of Nature (RSPN)**

One of the important Non-governmental Organizations working towards environmental conservation through environmental education and advocacy, conservation of natural resources, and sustainable livelihoods since 1987. One of the main accomplishments of the Society is the conservation of the Black Necked Crane (IUCN: Near Threatened) in Bhutan. The background principles include innovation, engagement, empowerment, and education.

It also focuses on research and conservation programmes such as:

- Black Necked Crane conservation
- White Bellied Heron Conservation
- Wetland conservation
- ECO-Restoration
- Climate Change
- Community Based Sustainable tourism
- River and Water conservation
- Argo-ecological farming
- Waste Management and Environment education

**3.5.3. Forest Education and Training****Department of Forests Park Services**

As the nodal agency for forestry activities in the country, training and education programs are one of the mandates to build capacities of forestry officers and stakeholders involved in resource management. The specified training and education programs are coordinated and disseminated through seven functional divisions, fourteen territorial divisions, and ten protected areas under the forest department.

- Social Forestry and Extension Division Forest
- Nature Conservation Division
- Forest Resources Management Division
- Watershed Management Division
- Watershed Management Division
- Protection and Enforcement Division
- Bhutan Tiger Centre
- UWICER

## **Role of UWICER in Training and Education**

The Institute is mandated to provide training, education and capacity building programs related to the matters within the purview of forest science and technology, water and climate, conservation biology, and forest geomatics. This section caters to both National and International scholars by way of providing tailor made courses addressing burning issues facing the world, seminars, workshops, boot camps, meetings, awareness campaigns and hordes of other training programs.

- National Certificate Courses:

UWICER provides 2 years of training for students undertaking NC2 and NC3 courses both within and off the campus. This course encompasses a plethora of conservation, environment and forestry subjects including field botany, GIS, wildlife, ecology, statistics, entrepreneurial skills, etiquette, forest laws, research methodologies, uniform drill and field practical works.

Those with NC2 and NC3 certificates can later enroll into a Diploma or Bachelor's degree in a wider range of international universities.

- Student Agriculture Programme

Under the Student Agriculture Programme, the Institute has apiculture, mushroom farm, poultry and kitchen garden equipped with harsh winter offsetting technology.

- Training and workshops

The Institute holds short courses and hosts tailor-made training and seminars from time to time. These include GIS, R-Data analysis etc.

## **College of Natural Resource**

The College of Natural Resources (CNR) erstwhile known as Natural Resources Training Institute (NRTI) came into existence out of the need to support sustainable development in Bhutan. It is the premier Institution of Higher Education Bhutan in the fields of Agriculture, Forest, Environment, Food Sciences, Livestock, Rural Development, and Natural Resources Management. Since its establishment in 1992, the college has trained agriculture and forest extension officers, rangers and forest officers.

The College is committed to fulfilling the needs of the country and the society through provision of higher education that is targeted at poverty reduction, rural development, youth employment, and sustainable Natural Resources Management.

Role of CNR in forest education and training:

- Provides Diploma and graduate program on forestry
- Sustainable development
- Environment and Climate Studies
- Master of Science in Natural Resources Management

Through training and education, CNR has been producing Forest Rangers and Forestry Officers to serve in the Forest Department.

There are other institutes and colleges in Bhutan providing forest related courses as in the table below:

*Table 27. Other institute/ college*

Name	Year of Establishment	Fields
Sherubtse College	1968	Environment Science and Life Science
Royal Thimphu College	2009	Environmental Management

## 4. Challenges and Opportunities

### 4.1. Challenges

Conservation of environment, biodiversity and sustainable management of natural resources has been one of the predominant areas of focus in Bhutan. However, with the continued rapid pace of socio-economic development, added with climate change impacts, adhering to environmental obligation enshrined in the constitution to secure the ecologically balanced sustainable development is confronted with more challenges.

Natural resources are faced with challenges including the increasing pressure on biodiversity and natural resources, loss of forest and land use conversion for various purposes, which is a concern that could lead to a decline in biodiversity as well as habitat loss. Such pressures may lead to the extinction of globally threatened species and other biodiversity resources, thus creating an imbalance in the ecology. The National Biodiversity Strategic Action Plan for Bhutan, 2011 identifies the following drivers as the overall threat to natural resources and biodiversity conservation in Bhutan - Land use conversion, Over exploitation of timber and fuel wood, Forest Offenses and wildlife poaching, Unsustainable Agricultural Practices, Pollution, Invasive species, Human wildlife conflict, Climate Change, Population, Overgrazing, Waste and poverty. For a small country like Bhutan with limited financial, human, and technological capacity, addressing these challenges is a challenge in itself.

#### 4.1.1. Forest Protection and Restoration

##### Forest Fires Incidences

Forest fire incidents are a key threat to the coniferous forest in Bhutan. With more than half of the country's area under, it further aggravates the forest fire risk. While most fires in Bhutan are caused by human activity, the rising temperature and long spells of drought due to climate change are likely to increase the risk of forest fires, resulting in threat to natural resources and the people. In Bhutan, significant amounts of forest area are lost to fire annually, not to mention in 2019 itself, 3524.72 ha of forest area was burnt.

Although forest fires are essential for natural processes in certain ecosystems, fires often increase the vegetation and fuel density which further amplifies the risk over time.

##### Increase in invasive species

Some of the reported invasive species are *Mikania micarantha.*, *Parthenium spp.*, *Opuntia spp.*, *Eupatorium odoratum*, *Lantana camara*, *Commelina*, *Galinsoga* and *Phyllanthus*. An increase in these noxious invasive species may bring about the decline of diversity in native species, in addition to lowering the production of agricultural crops through competition. There is a need for area specific studies and intervention for the entry and establishment of invasive species.

##### Pest and Disease

Pests and diseases have considerable impacts on forests and the agriculture sector. They affect the growth and yield of wood and tree species and impact the biodiversity, wildlife habitat, and ecosystem. By nature, the damage caused to forests by pests and disease are not captured; however, it is assumed that the loss is more than of forest fire. The most common are diebacks and insect attacks in *Abies densa*, *Pinus wallichiana*, *Quercus glauca* and *Quercus griffithii* forests. The outbreak of bark beetles in spruce. This clearly emphasizes the need to strengthen the national capacity in surveillance, identification, and management of pests and diseases.

#### **4.1.2. Sustainable Forest Utilization**

##### **Loss of native and endemic species**

The species around the world is at risk of extinction due to human activities and natural processes such as climate change. This is due to a change in habitat with shifts in weather conditions. The risk of loss is high, especially for those that are already susceptible to extinction due to small population, slower life history trait, limited dispersal abilities, low reproduction rate etc. It is also projected that endemic species will be affected most which raises concern for Bhutan, as the country is home to a number of endemic plants and globally threatened species. Securing the habitat of these important vulnerable species is crucial, and there is a need for systematic studies and conservation programs related to these species.

##### **Human Wildlife Conflict**

Approximately 60% of the population depends on agriculture and livestock rearing. The developmental pressure with conservation, the human wildlife conflict is a pertinent issue in the country. Livestock depredation by large carnivores such as tiger, leopard, and wild dog arising especially in central Bhutan, while agricultural crop damage by herbivores like wild pig and deer is seen all over the country. Simultaneously, wildlife kills such as poaching, illegal trafficking, roadside kills of wildlife have also seen drastic rise in numbers.

##### **Depreciation of Livelihood and resources**

The Bhutanese have always lived in harmony with nature and have used biodiversity for vast of purposes ranging from fuelwood, food, fiber, shelter, medicine, household implements, and handicrafts to several other purposes. These dependencies often exert pressure to the limited natural resources.

##### **Limited research and training**

There is a need for building capacities of forest personnel to tackle the emerging challenges in the field of conservation. Research on climate change to tackle the emerging issues is needed. The high variation in altitude and climatic condition attributes to diverse forest types of attributes and vegetation cover, which entails challenges, regular and timely training and capacity building programs are required to forester.

## **4.2. Opportunities**

### **4.2.1. Global Partnership**

Bhutan being a developing country has many development partners who are also engaged in Forest and environment sector directly or indirectly. One of the key partner as a country is India in various sectors and Japan through JICA, European Union and Australia who are engaged in Environment sector. Other partners to name a few are Green Climate Fund (GCF), World Bank, UNDP, Global Environment Facility (GEF), WWF and GIZ who are major funding partners in green sector through various projects. Some private donors and organization also contribute and become partners through Bhutan Trust Fund for Environmental Conservation (BTFFC) and Bhutan Foundation.

Currently, project titled “Bhutan For Life” which is planned for 15 years is one of the major project underway for conservation in Bhutan. Bhutan being a member to AFoCO is also benefited through projects and is one of the potential partners for Bhutan in forest and environment sector.

### **4.2.2. Potentials**

The existing challenges and the opportunities of cooperation between AFoCO and Bhutan are:

#### **1) Forest Degradation and Excessive Extraction of Timber**

The key drivers of deforestation and forest degradation in Bhutan is the allotment of State Reserve Forest Land and forest conversion for a wide range of purposes such as hydropower projects, agriculture, mining and quarries and installation of electricity transmission lines (REDD+ Strategy 2020). Forest degradation is also said to negatively affect other land uses, affect the downstream water quality, and cause the emission of greenhouse gases. Therefore, the following activities are proposed:

- Promote innovative technology and approaches of restoration, rehabilitation, and reclamation of degraded forest ecosystem
- Invest in multi-purpose land management programs
- Support community plantation in degraded areas through the free supply of native species
- Support and promote existing policies and act to address increasing forest loss
- Promote efficient utilization of wood and wood products
- Establish plantations to provide sustainable wood-based products supply, increase carbon-stock, and enhance biodiversity

#### **2) Climate change**

As a geologically fragile and young mountain ecosystem, and as a least developed country, Bhutan is highly vulnerable to the impacts of climate change. Not to mention, its environmental, economic and social spheres are sensitive to climate change as well. Bhutan is already facing the impacts of climate change such as extreme weather, changing rainfall

patterns, water shortages, emergencies of diseases and pests, loss of important native and endemic species. Some of the proposed recommendations are:

- Adopt landscape approach/biological corridors to face climate change and support ecological resilience.
- Increase public awareness and understanding on climate change among different groups of people at all levels through education and outreach programs including through use of print, broadcast and online media.
- Develop guidance and tools for assessing, planning, integrating and implementing adaptation and mitigation measures.
- Introduce specie conservation activities like the domestication of endangered, endemic, and threatened plant species in disturbed terrestrial ecosystems.
- Facilitate the understanding of scientific evidence and interdependencies among climate variability and change, human livelihood, disasters, and disease vulnerability at both local and national level.

### **3) Forest Offenses and Wildlife Poaching**

The most common forest offenses reported pertains to illegal trade and transport of timber (FFF, 2021). Other offenses include wildlife poaching, illegal harvesting of NWFP, fishing, retaliatory killings of wildlife and encroachment of State Reserve Forest Land. Proposed activities are:

- Strengthen monitoring and patrolling capacities of field officers through training and workshops.
- Support studies and documentation of endemic and threatened species of flora and fauna.
- Introduce advanced technologies like the use of drones and Artificial Intelligence to monitor forests and check illegal activities.
- Provide training on legal procedures and law enforcement to local communities
- Support establishment of anti-poaching community programs in areas with high predator species.

### **4) Human-Wildlife Conflict Human (HWC)**

HWC is a growing concern in a country that has more than half of its total area under the protected area system, and at least two thirds of the populace dependent on agriculture and livestock farming. Livestock depredation, crop damage, and retaliatory killing are some of the encounters. The key conflict species are Elephant, Tiger, Leopard, Himalayan Black Bear and Wild boar (FFF, 2021). Records show about 55 per cent of the crop damage in the country is attributed to wildlife damages (NBSAP, 2014). Since human-wildlife conflict causes substantial economic and social costs to the rural communities, it also results in retaliatory killings, resentment against policies, and lack of support towards conservation initiatives. Recommended activities are:

- Set more awareness programs in the HWC hot spot areas
- Assist in establishing bio-fencing and solar electric fencing
- Facilitate wildlife research and studies such so that decision makers can make ground reality-based decisions
- Invest in wildlife habitat improvement programs in protected areas and non-protected areas
- Financial support for compensation/insurance schemes.

## **5) Forest Fire**

Forest fire incidents are a key threat to the forest in Bhutan, especially the coniferous forest. Annually, large forest areas are lost to fires, and in 2021 itself, 4311.77 ha of forest area was burnt (FFF, 2021). While most fires in Bhutan are caused by human activity such as burning of agriculture debris, reckless behaviors of picknicker and smokers, 90% of the incidences do not have ascertained sources. (FFF, 2021). Recommended activities are:

- Invest more in adaptation and mitigation programs and promote community-based forest fire fighting groups
- Adopt fire management approaches that limit impacts on the environment and communities
- Provide advocacy and awareness programs specifically, to minimize intentional fires for better agriculture production
- Conduct forest fire training for forest officials, volunteers, local communities
- Encourage more research study and real time data collection on disaster and its impacts
- Provide fire-fighting protective gears to the forest officials and volunteers

## **6) High dependency of Local Community on Natural Resources**

Almost all the rural residents (62.2%) of Bhutan (NSB, 2017), directly or indirectly depend on forests for their livelihood. The high dependency of communities often exert pressure on existing limited natural resources. To sustainably manage the resources along with meeting local communities' aspiration, following activities are recommended:

- Promote participatory forestry programs in the rural areas such as Community Forestry to provide employment for the rural people while sustainably managing the forest.
- Facilitate development of project profiles/business plans for selling the business ideas
- Support income diversifying programs such as enterprise development, strategic market linkages, product development etc.
- Strengthen approaches to upscale Payment for Ecosystem Services (PES) and Nature based ecotourism
- Provide technical and financial assistance to support communities in exploring more innovative livelihood enhancement programs
- Invest in field-based and specialized training to Community Forest and Non-Wood Forest Management groups to build capacities and competence in forest management.

## **7) Lack of Research and Capacity development**

At present, the Department has just a handful of officials specialized in different fields (FFF, 2019). With emerging vast challenges, forest department with limited human resources, lack adequate financial and technological capacities, there is need to:

- Initiate programs to train forestry officials of different levels to enable efficient management and conservation works.
- Strengthen the regional cooperation through workshops and exchange visits to share and learn about the best practices and success stories of the countries in the field of climate change adaptation and mitigation programs.
- Support capacity development of all relevant stakeholders and institutions including the local governments, community groups and beneficiaries to address climate change, including through relevant national training institutions.
- Provide specialization courses to generate expertise in specific fields in conservation
- Initiate youth involvement programs through training and attachment program
- Create, promote, and strengthen national, regional, and international working groups including non-governmental organizations, and civil society to develop appropriate adaptation options.

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