

# Bhutan Forest Note

## Pathways for Sustainable Forest Management and Socio-equitable Economic Development

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## Abbreviations

AAC	annual allowable cut
BLC	Bhutan Logging Corporation
BLSS	Bhutan Living Standard Survey
BT FEC	Bhutan Trust Fund for Environmental Conservation
CF	community forest
CFMG	community forest management group
CPF	Country Partnership Framework
DoFPS	Department of Forest and Park Services
EIA	Environmental Impact Assessment
FCPF	Forest Carbon Partnership Facility
FMU	forest management unit
FPED	Forest Protection and Enforcement Division
FRMD	Forest Resources Management Division
GEF	Global Environment Facility
GHG	greenhouse gas
GNH	gross national happiness
HFLD	high forest cover, low deforestation
KG GTF	Korea Green Growth Trust Fund
NDC	Nationally Determined Contribution
MoAF	Ministry of Agriculture and Forests
NEC	National Environment Commission
NKRA	National Key Result Area
NRDCL	Natural Resources Development Corporation Limited
NRPC	Natural Resource Pricing Commission
NTFP	non-timber forest product
PA	protected area
PES	payment for ecosystem services
PPP	public-private partnership
PRIME	Productivity, Rights, Investments, Markets, Ecosystems
REDD+	Reduced Emissions from Deforestation and Forest Degradation, Sustainable Management of Forests and Enhancement of Forest Carbon Stocks
RGoB	Royal Government of Bhutan
SCD	Systematic Country Diagnostic
SFM	sustainable forest management
SOE	state-operated enterprise
SMEs	small and medium enterprises
SRF	state reserved forest
SRTS	Subsidized Rural Timber Supply
UNDP	United Nations Development Programme
UNFCCC	United Nations Framework Convention on Climate Change

## Preface

The Kingdom of Bhutan is a high forest cover, low deforestation (HFLD) country known for its efforts to conserve biodiversity and its philosophy of gross national happiness, which is implemented through an innovative index assessing how policies contribute toward the well-being of its people. At the international level, attention is growing on the significance and value of HFLD nations' efforts to conserve forest cover amid rapid climate change. HFLD nations must attract more climate finance and payments for ecosystem services, such as carbon sequestration, that support and facilitate the countries' sustainable development path without jeopardizing forests. Thanks to Bhutan's effective and rigorous forest conservation framework, forest cover has increased over the past decades and deforestation is well curbed, yet the forestry sector has the potential to contribute significantly more to Bhutan's economy and peoples' livelihoods.

Bhutan's economic growth objectives and development aspirations are increasingly confronted with challenges that are closely interlinked with its natural resource endowment. Achieving sustainable and increasing productive use of Bhutan's natural resources is a key strategy of strengthening rural livelihoods and eradicating poverty. Conserving Bhutan's forest, which cover more than 70 percent of the land area, is an utmost priority for the government to protect one of a few global biodiversity hot spots and to preserve forest ecosystem services. Still, spatial assessments suggest that an increase in sustainable forest utilization is feasible, providing much needed rural employment during periods of seasonal underemployment and an opportunity to diversify Bhutan's economy without jeopardizing natural resources assets. Yet the current forest governance system primarily supports forest conservation, and opportunities for sustainable forest management supporting Bhutan's development aspirations are not fully explored.

Despite the vast forests covering Bhutan's territory, only 5 percent of the total forest area is currently under commercial management, making Bhutan a net importer of forest-based products. While in rural areas livelihoods are largely dependent on the sustainable use of natural resources (agriculture and forestry), forests contribute only about 2 percent toward Bhutan's gross domestic product (GDP). A lack of rural income sources and employment are fueling rural-to-urban migration, which is perceived as a national challenge adversely affecting urban development, particularly youth unemployment. The environmental benefits are arguably prioritized by Bhutan's forest policies, yet there is a clear rationale for a more balanced approach toward sustainable forest management allowing for synergies between environmental conservation and economic development objectives.

As manifested in the World Bank Group Forest Action Plan and the Climate Action Plan (2016–2020), the World Bank is committed to support developing countries with the integration of the sustainable management of forests into development decisions, addressing climate change and resilience, supporting rights and participation, and strengthening institutions and governance.

## Executive Summary

**The Bhutan Forest Note (“note”) articulates opportunities for supporting Bhutan’s sustainable development aspirations, including its constitutional commitment to maintain at least 60 percent of the country’s land area under forest cover (RGoB 2008) and to better respond or prepare for vulnerabilities such as climate change and natural disasters.** The note presents a forward-looking business case for Bhutan to support an increase in forest utilization without jeopardizing the integrity of forest and non-forest ecosystems. The business case is based on an analysis of challenges and opportunities for making the forestry sector a dynamic and effective contributor to Bhutan’s gross national happiness (GNH). The note is intended to serve as a basis for discussions with the government and other partners to work together on making the identified opportunities a reality.

**The forestry sector will be crucial to achieve the goals of the Royal Government of Bhutan presented in the 12th Five-Year Plan (2018–2023).** The objective of the plan is a “Just, Harmonious and Sustainable Society through enhanced Decentralization.” The plan emphasizes improved coordination, consolidation, and collaboration across all national and subnational agencies; the effective and efficient operation and maintenance of existing infrastructures; and an increase in regional cooperation in trade, transit, and energy to give rise to new technologies and opportunities (GNHC 2018). The proposed business case would support at least five National Key Result Areas: (1) economic diversity and productivity enhanced; (2) poverty eradicated and inequality reduced; (3) healthy ecosystem services maintained; (4) carbon-neutral, climate- and disaster-resilient development enhanced; and (5) productive and gainful employment.

**The World Bank acknowledges and values Bhutan as a high forest cover, low deforestation country and its efforts to conserve forest cover amid rapid climate change.** In that context, sustainable forest management provides the basis for a triple win: for Bhutan’s economic growth, for securing peoples’ livelihoods, and for the global environment agenda, including combating climate change and conserving biodiversity. Improving the productivity of Bhutan’s forestry sector, building up forest-based small and medium enterprises, and developing new job opportunities in the wood-based and construction industry would generate jobs, more revenue for the Royal Government of Bhutan (RGoB), and higher or new income sources especially for the rural population and urban youth, as well as non-monetary co-benefits linked to increased resilience, climate change mitigation, and biodiversity conservation.

**The World Bank has recently prepared a draft of the Bhutan Systematic Country Diagnostic (SCD), *Fostering Competitiveness, Diversification and Inclusion*, which when finalized will be the basis for the future Bhutan Country Partnership Framework FY20–24 to guide the future Bank Group investment portfolio.** The SCD argues “that a strategic realignment in Bhutan’s development model is ... needed to create jobs and to capitalize on the demographic window, especially, while the country still enjoys high dividends from hydropower.” The SCD makes the case that “developing a vibrant private sector will require continued investment in Bhutan’s asset base, comprising physical and human capital, as well as institutions. In addition, efforts aimed at developing an appropriate incentive framework and an efficient business and investment climate will take time to bear results. The resulting boost in job creation will also help Bhutan capitalize on the demographic window of opportunity as a larger, better educated workforce can be employed in more productive jobs.” The SCD presents five priority areas to achieve this realignment together with the goal of long-term sustainable poverty reduction and shared prosperity: (1) reducing macroeconomic volatility and vulnerability; (2) meeting the job creation challenge by boosting private sector development; (3) investing further in human capital and improving service delivery to expand opportunities to people living in remote areas; (4) promoting sustainability and mitigating the

impact of climate change; and (5) addressing implementation gaps. Implementing the opportunities for the forestry sector identified in this note would support these priority areas.

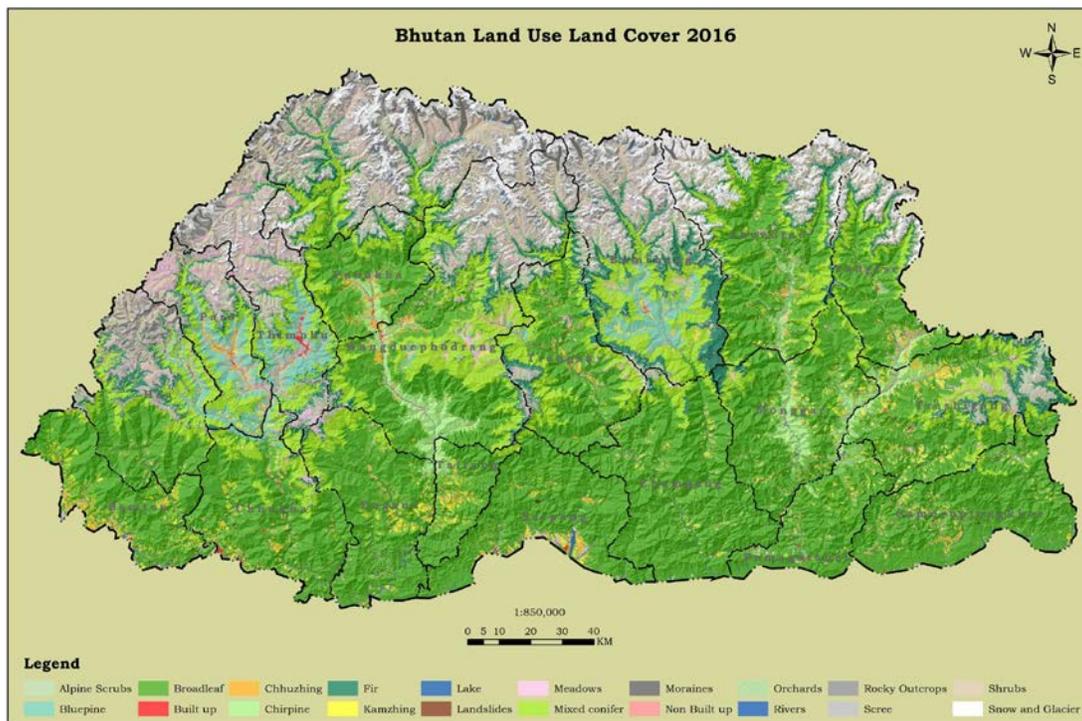
**The opportunities identified in this note are sensitive and responsive to Bhutan's uniqueness with regard to size, geography, and focus on forest conservation.** The enabling environment and management practices for the forestry sector to increase productivity need to embrace the principles of sustainable forest management. Opportunities to do so include the increase of timber harvesting volume within sustainable harvesting levels (Schindele 2004); the development of forest-based industries; the use of wood-based construction materials; building expertise on wood engineering and architecture; and moving parts of the timber market from a fixed-price to a competitive system. Potential challenges include the strong sense of favoring forest protection over forest utilization; lack of capacity and technologies for sustainable forest management; lack of skilled labor in forest-based industries; and lack of funding to invest in the development and modernization of the forestry sector and industries.

## Introduction

**Bhutan is a small, mountainous, landlocked country in South Asia, located in the eastern Himalayas.** The total geographic area of the country is 38,394 square kilometers (NSB 2018a). The country's landscape is dominated by mountain ecosystems and changes within 170 kilometers from elevations of about 130 meters in the foothills to over 7,500 meters above sea level along the main ridge of the Himalayas.

**The dominant land cover in Bhutan is forests (27,309 square kilometers), making up 71 percent of the total land area** (Map 1).<sup>1</sup> The Constitution mandates to maintain 60 percent forest cover in perpetuity (RGoB 2008). Bhutan's forests consist of broadleaf (45.9 percent), mixed conifer (13.5 percent), fir (6.0 percent), chir pine (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.

**Map 1. Land Use: Land Cover Map of Bhutan, 2016**



Source: FRMD 2017.

**Bhutan is a global biodiversity hot spot.** Centuries of isolation from the international community, a small population, topographical extremes, and a conservation-oriented development approach have all contributed to Bhutan being able to maintain an enormous biodiversity richness. The country is among the 34 biodiversity hot spots in the world, with Bhutan having the highest species density and a high degree of endemic flora and fauna (Banerjee and Bandopadhyay 2016; WWF Bhutan 2016). Furthermore, Bhutan has an abundant reservoir of water resources with over 3,000 lakes, high altitude wetlands, and a

<sup>1</sup> The definition of forest used in Bhutan: land with trees spanning more than 0.5 hectare with trees higher than 5 meters and a canopy cover of more than 10 percent.

wide net of rivers and streams that provide water for Bhutan and neighboring countries (MoAF 2012). The total annual value of services Bhutan's ecosystems provide was estimated at US\$15.5 billion/year, most of which was attributed to forested land (Kubiszewski et al. 2013).

**About 51 percent of the total land area is within Bhutan's protected area (PA) network.** Bhutan has five national parks, four wildlife sanctuaries, one strict nature reserve, and seven biological corridors (MoAF 2018). According to the IUCN Protected Area Categories System, most PAs allow the sustainable use of natural resources, including infrastructure development and residential areas. The estimated expenditure per hectare of PA in Bhutan of US\$3–\$4 is at the lower end of the range of expenditure values considered as sufficient for PA management (Damania et al. 2008).

**Bhutan's population numbers 735,553 (NSB 2018b).** In 2017, the population density was 21.2 people/square kilometer, the lowest in the South Asia region. In comparison, for the same year, Nepal had a population density of 204.43 people/square kilometer (World Bank 2018). According to the 2018 Population and Housing Census of Bhutan, 62.2 percent of the country's population still lives in rural areas. However, there are strong rural-urban migration patterns, especially among the youth, who leave rural areas because of the lack of employment opportunities. Measuring lifetime migration, the census also reports that 21.7 percent of people have migrated to urban hubs during their lives, abandoning agricultural land and farm houses.

**Bhutan's mountainous geography results in a highly dispersed population.** The central-western and central-eastern parts of Bhutan make up 49.5 percent of the country's land area, but only 28.1 percent of the total population is found there. Nearly half of the population (44.3 percent) lives in the western part of the country. This is where the three most populous *dzongkhags* (districts) are located: Thimphu (138,736 inhabitants), Chukha (68,966 inhabitants), and Samtse (62,590 inhabitants). Also, the two main urban centers are located in western Bhutan: the capital city, Thimphu (114,551 inhabitants), and Phuentsholing (27,658 inhabitants) (NSB 2018b).

**Bhutan is internationally recognized as a leader in nature conservation and as a champion for the environment.** The country has ratified international conventions such as the United Nations Convention on Biological Diversity (CBD), the United Nations Framework Convention on Climate Change (UNFCCC), the United Nations Convention on International Trade in Endangered Species of Wild Flora and Fauna (CITES), the United Nations Convention to Combat Desertification (UNCCD), and the Ramsar Convention on Wetlands. Bhutan is currently the only carbon-negative country globally—around 2.2 million tons of CO<sub>2</sub> equivalents are emitted every year, but because of its forests, more than 6.3 million tons of CO<sub>2</sub> are sequestered annually. In the Nationally Determined Contribution (NDC) submitted to the COP21 (Conference of the Parties) of the UNFCCC in December 2015 in Paris, Bhutan reaffirmed to remain carbon neutral and pursue a low-emission development path in support of the commitments of the Paris Agreement (NEC 2015).

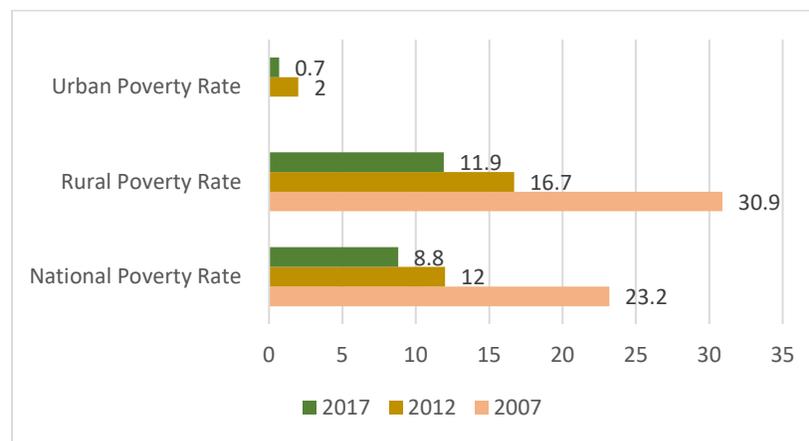
**Over the past few years, urban areas have experienced an onset of environmental degradation.** Especially in the few rapidly growing urban centers, the increase in the use of fossil fuel for transport and the associated road traffic, construction activities, manufacturing, and adjacent land use changes have caused air pollution measured by concentration of PM10 particles to sharply increase over the past years (Narain, Toman, and Jiang 2014). With increased urbanization and changing consumption patterns, other challenges are also emerging, such as solid waste management.

## Bhutan's Development Context

The economic development policy continues to be guided by the overarching philosophy of gross national happiness, based on four pillars: sustainable economic development, preservation and promotion of culture and tradition, conservation of environment, and good governance (GNHC 2019). The Gross National Happiness Commission (GNHC) recently published the 12th Five-Year Plan for 2018–2023.

Over the past years, Bhutan has achieved remarkable success in reducing poverty. Within just a decade, the national poverty rate was reduced by more than 60 percent. In 2017, 8.8 percent of the population lived in poverty compared with 23.2 percent in 2007 (Figure 1). However, poverty remains a challenge in rural areas, where the poverty head-count ratio is still high (11.9 percent in 2017). The Gini index, which measures inequality, has remained almost the same at the national level (0.36 in 2012 and 0.38 in 2017).

Figure 1. Annual Poverty Rate (%)



Source: NSB and World Bank 2017.

Bhutan has one of the smallest but fastest-growing economies in the world. Annual average growth between 2013 and 2017 reached 5.4 percent (4.63 in 2017), exceeding the average global growth of 4.4 percent (World Bank 2018). The GDP per capita increased almost tenfold since 1980, from US\$332 in 1980 to US\$3,438.2 in 2017. In 2017, the share of agriculture (including forestry) in Bhutan's GDP was 17.4 percent; industry contributed approximately 40.6 percent; and the services sector contributed about 42.1 percent (NSB 2018a).

Hydropower has contributed to rapid GDP growth, mainly through elevated investment and export earnings. Hydropower exports increased by a factor of five since the early 2000s and accounted for 29 percent of total exports in 2017. Bhutan's investment (that is, gross fixed capital formation) has been exceeding 50 percent of GDP, one of the highest in the world. Hydropower revenues accounted for 18 percent of the total government revenues. As hydropower development accelerated, the sectoral share of GDP shifted away from agriculture, whose relative contribution has fallen since 1981 from 45 percent to 13 percent (NSB 2018a).

Hydropower drove structural transformation in the economy, but the production base and export markets remain undiversified. In addition, the dominance of hydropower and the lack of diversification have resulted in macroeconomic volatility and vulnerability. The massive scale of hydropower investments has introduced large volatility to Bhutan's small economy (estimated at US\$2.5 billion in 2017). While

hydropower has served Bhutan’s development well—a large share of hydropower revenues has been judiciously invested in physical and human capital and for meeting other development needs—initiatives to develop the non-hydropower sectors have remained neglected.

**Improvements in agricultural productivity and better prices for cash crops likely contributed to poverty reduction.** Increases in agricultural output, combined with favorable price trends, have improved the earnings from high-value fruits and vegetables. However, agricultural output growth has mainly been driven by greater intensity of input use rather than land expansion or broad-based productivity growth (World Bank 2019). High volatility in prices also has led to volatile earnings. With agriculture being the largest employer (accounting for 60 percent of employment), especially of the poor, the presence of uninsured risks from price and weather shocks contributes to high vulnerability of households. In addition, the overall social protection system is weak, and while opportunities for non-farm diversification, including non-wood products, could mitigate negative impacts, such opportunities are limited. Almost 80 percent of poor households indicate that all their working household members are engaged in agriculture.

**Tourism is the second largest contributor to Bhutan’s GDP.** Tourism revenues averaged US\$5.18 million from 2009 until 2019.<sup>2</sup> Bhutan’s tourism sector is regarded as one of the most exclusive travel destinations in the world, and enjoys a reputation for authenticity, remoteness, and a well-protected cultural heritage and natural environment. It is a vibrant business with a high potential for growth and further development. The government adheres strongly to a policy of “high value, low impact” tourism, which serves the purpose of creating an image of exclusivity and high yield for Bhutan. With the rapid pace of socio-development in the country, in addition to high-end tourism, community-based sustainable tourism (that is, ecotourism) is seen as one of the most viable options to contribute to community development while incentivizing conservation of natural resources, including forests for tourism purposes.<sup>3</sup>

**The state has become a major player in the market through its large state-operated enterprises (SOEs).** In Bhutan, SOEs operate in various commercial sectors, including the financial and energy sectors (especially hydropower), manufacturing, and telecommunications. Because of the small domestic market and nascent private sector, SOEs provide essential goods and services. The Ministry of Finance is the sole shareholder of all SOEs. In 2017, the contribution of SOEs accounted for 37 percent of government revenues, and gross revenues were equivalent to 30 percent of GDP. That dominance may have crowded out private firms in some sectors, including forestry. The private sector is currently not able to compete with the public sector in offering attractive compensation packages that include higher job security as well as education and social protection programs. Despite efforts by the government to provide a more enabling environment for the private sector—for example, a public-private partnership policy was approved in 2016 (RGoB 2016c)—it remains underdeveloped and dominated by small and micro firms, primarily operating in the informal sector.

## Role of Forests in the National Economy

### Current Contribution

**Despite Bhutan’s forest wealth, only a small fraction of forests is currently utilized.** Only 5 percent of Bhutan’s total forest area is currently used for commercial forest production. The Natural Resources Development Corporation Limited (NRDCL) is the most important entity supplying commercial logs and

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<sup>2</sup> <https://tradingeconomics.com/bhutan/tourism-revenues>.

<sup>3</sup> [https://www.tourism.gov.bt/uploads/attachment\\_files/RTfL\\_Latest%20updated%20Guidelines%20\(Homestay\)%20\(final\).pdf](https://www.tourism.gov.bt/uploads/attachment_files/RTfL_Latest%20updated%20Guidelines%20(Homestay)%20(final).pdf).

fuelwood, covering almost 80 percent of the total forestry activities in the country (NSB 2018a). In addition, forest area designated to community forestry groups account for 3 percent. The forest area utilized by rural households for subsistence use outside of formal management regimes (that is, forest management unit areas and community forestry) accounts for another 7 percent (Feuerbacher et al. 2019). Hence, in total approximately 15 percent of Bhutan’s forests are used, excluding illegal logging activities. Forests inside the protected area network are currently accessed by rural households for subsistence consumption.

**The forestry sector constitutes an important but underutilized economic sector of the economy.** According to Bhutan’s national accounts, forestry contributed between 2.9 percent and 2.4 percent to the GDP between 2013 and 2017 (NSB 2018a). From the early 2000s onward, the forestry sector’s contribution to the real GDP has experienced a steady decline, and since 2016, the growth rate of the sector has been negative (Figure 2). Forestry’s low share in GDP is also reflected by the low employment numbers. In 2012, only 0.5 percent of Bhutan’s labor force (1,500 workers) worked in forestry according to the Bhutan Living Standard Survey 2012 (NSB and ADB 2012). Different forest resource assessments show that Bhutan could substantially increase its forest utilization (MoAF 2014; Schindele 2004).

**Figure 2. Renewable Natural Resources (RNR) Sector Growth (at constant price) (%)**



Source: MoAF 2019.

**Bhutan’s latest Forest Resources Inventory (MoAF 2017e) assessed the total growing stock of Bhutan’s forests at 1,001 million cubic meters and average growing stock at 261 cubic meters/hectare.<sup>4</sup>** To manage forests for production purposes, the government has established forest management units (FMUs) and developed local forest management plans (LFMPs) for state reserved forests (SRFs) outside FMUs, protected areas, community forests, and other management regimes. For harvesting in forest areas, an annual allowable cut (AAC) is determined to provide an evidence-based estimate of the harvest that can be sustained long term. In Bhutan, the ACC is determined by a combination of area, volume, and felling cycle.

**Current timber harvesting levels are low.** Harvesting of timber in FMUs cannot exceed the AAC. Not only is the AAC currently set well below the sustainability level, it is reported that most of the FMUs are unable to harvest the allocated volume of timber. Reasons for the underperformance include frequent

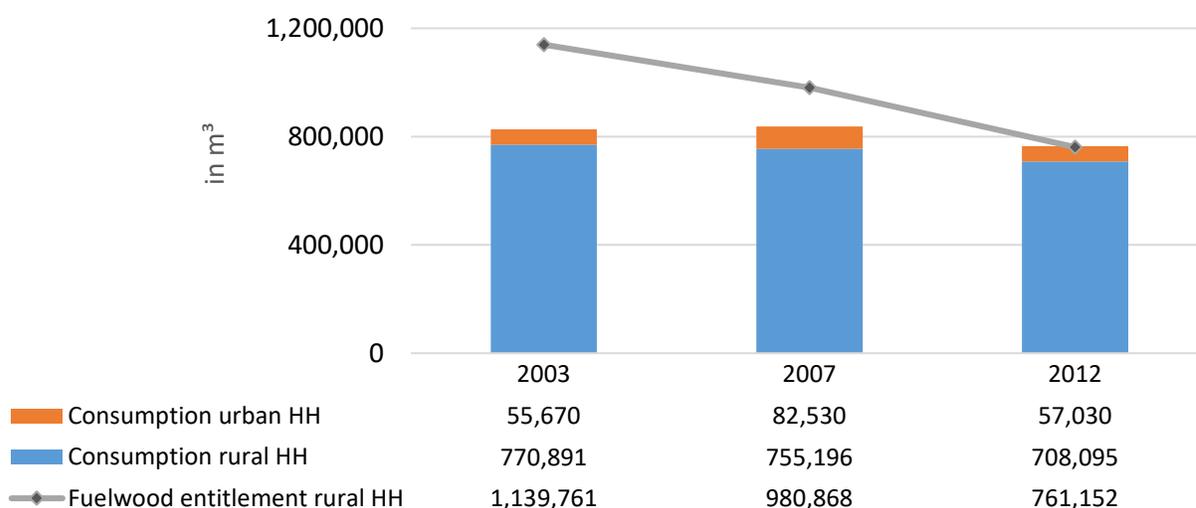
<sup>4</sup> including all trees whether they fall under Bhutan’s forest definition.

breakdown of equipment because of old age (for example, cable cranes), inadequate equipment, poor planning (for example, to identify a reasonable time frame when harvesting can take place), and unexpected weather conditions (for example, changing rainfall patterns).

**Rural households receive preferential access to timber. For the construction or renovation of rural houses, they are eligible to receive a fixed quantity of timber at discounted royalty through the Subsidized Rural Timber Supply (SRTS) program (Sears et al. 2017).** For the subsistence use of fuelwood, rural households are granted an annual extraction quota of either 8 or 16 cubic meters of stack volume, depending on whether they have access to electricity or not (RGoB 2017). A reduced royalty for fuelwood must be paid if the fuelwood is collected using mechanical devices. No royalty applies if fuelwood in the form of dead branches is collected.

**Fuelwood is the major source of energy for most Bhutanese and comprises 70 percent of national energy consumption (Siebert and Belsky 2015).** Ninety-five percent of households rely on trees for lighting, heating, and cooking, out of which more than 43 percent is attributed to space heating, 41 percent for fodder preparation, and the rest for cooking (Lhendup et al. 2015). Using data from the Bhutan Living Standard Survey,<sup>5</sup> rural and urban households consumed 826,561 cubic meters in 2003 and 765,126 cubic meters in 2012 (Figure 3). Rural entitlements for fuelwood are decreasing as substantial progress has been made to electrify rural households. In 2012, 87.3 percent of rural households had electricity access, and in 2013 a subsidy was introduced that granted rural households 100 kilowatt hours of electricity at no cost per month (BBS 2013).

**Figure 3. Estimation of Fuelwood Consumption, 2003–2012**



Source: Based on data from the 2012 Bhutan Living Standard Survey.

**Non-timber forest products (NTFPs) provide an important source of income for rural households.** For example, the collection and trade of Cordyceps (*Ophiocordyceps sinensis*), an insect parasite fungus, makes up 50 percent of the income of people living in the highlands (MoAF 2016). Other NTFPs include

<sup>5</sup> In the BLSS, households report annual fuelwood consumption measured in backloads and truckloads. It was assumed that a backload of fuelwood weighs 30 kilograms and a truckload of fuelwood equals 8 cubic meters. The reported fuelwood consumption data was cleaned by capping maximum fuelwood consumption of households at 60 backloads and two truckloads, respectively. To convert to a cubic meter of fuelwood, an average green density of 0.809 kilogram per cubic meter was applied.

incense, essential oils, fruits, seeds, grass, and bark (FAO 1996). There are 148 NTFP management groups in 17 *dzongkhags*, involving more than 5,500 rural households as members.

**In 2018, there were 781 community forests (CFs) covering about 92,165 hectares (3 percent) of forested area and benefiting 33 percent of the rural population (~32,400 households).** About 18,000 hectares (0.6 percent of total forest area) was used for forest plantations and there were 128 wood-based industries (105 sawmills and 23 manufacturers) (MoAF 2016). With the 2007 Land Act, farmers received the right to register abandoned rain-fed cropland as “private forest.” However, the process of registration is bureaucratic (see the Forest and Nature Conservation Rules in RGoB (2017)); hence, the private forest area remains limited and even on the decline with just 136 hectares of private forest registered in 2013 compared with 336 hectares in 2011 (MoAF 2015).

**Women are strongly engaged in community forestry and contribute to forest conservation.** A 2010 study (Buffum, Lawrence, and Tempel 2010) found that 58 percent of community forest committee positions are filled by women and that they receive more permits for timber and fuelwood than men. The study also stated that the involvement of women in decision making was associated with improved forest conditions because women could make sound management decisions based on knowledge gained through the collection of forest products. At the strategic level, the REDD+ Readiness process, supported by the World Bank, focuses on gender equity through the Strategic Environment and Social Assessment (SESA)—that is, governance challenges in community management of forests are being addressed by paying specific attention to the issues of equity and gender imbalance, reviewing the guidelines in the CF Manual, and focusing on capacity building for community forest management groups (CFMGs).

**Timber sales are managed using the fixed-price method, and the price is set by the Natural Resource Pricing Committee (NRPC).** The purpose of having the NRPC regulate the price of timber is to make it affordable, accessible, and available to the people of Bhutan. The produced timber is bought by the NRDC and further distributed to licensed wood-based industries (WBIs) registered with the Association of Wood-Based Industries through a lucky-dip system. To enhance efficiency of production, the NRDC is increasing its investment in improved harvesting technologies and diversifying its business ventures beyond harvesting by investing in the production of value-added timber produce. The Secretariat of NRPC is hosted by the Department of Forest and Park Services and is chaired by the secretary of the Ministry of Agriculture and Forests (MoAF). For the allotment of timber, the concerned forest officer and a representative from the Forest Resources Management Division are members of the allotment committee. The NRDC is then required to submit the timber allotment and auction report to the Department of Forest and Park Services.

**Bhutan’s forests generate indirect benefits for other economic sectors, such as agriculture (that is, nutrition), energy (that is, sedimentation control), tourism (that is, flora and fauna), and transport (that is, erosion control).** While forests provide such indirect benefits, these are often not fully understood and the policies and practices of these and other sectors (including infrastructure development and mining) are developed either without considering their impact on forests or accepting negative impacts as an unavoidable or acceptable trade-off. Bhutan’s Environmental Assessment Act (NEC 2000) and 2016 Regulation for Environmental Clearance of Projects (RGoB 2016c) mandates applicants and project developers to conduct an Environmental Assessment for their proposed activity. A comparative study on Bhutan’s Environmental Impact Assessment (EIA) (Dorji 2017) concluded that, while Bhutan has sound legal provisions with explicit guidance on EIA that are comparable to any international best practice, Bhutan has insufficient institutional capacity to conduct EIAs. The study identified areas for improvement, including the quality of EIA reports, impact assessment, monitoring of impacts and compliance, and auditing of predicted impacts.

## Economic Potential

**Despite the challenges of Bhutan’s steep terrain, a significant forest area is still available for increasing forest utilization.** Using various spatial criteria for sustainable forest management,<sup>6</sup> the most recent Forest Resources Potential Assessment (FRPA) of Bhutan was conducted in 2013 (MoAF 2014). The study identified that 11 percent of the forest area outside the protected area network has the potential to be used for commercial forest management, in addition to the present share of only 5 percent. This estimate largely excludes forest area already used by the rural population. Expanding the use area would demand investments such as developing access and connection roads. Given that about 21 percent of agricultural land in Bhutan is left fallow (MoAF 2013), private forest plantations could provide attractive alternatives compared to labor-constrained cropping activities. However, a conducive policy environment is needed to encourage forest activities on private lands.

**Bhutan can increase its timber harvest within sustainable levels.** The first National Forest Inventory (NFI) was published in 2017 and provides detailed data and information on Bhutan’s forests. Table 1 provides production-related forest data from the inventory, such as the total forest area currently used for production, the annual growing stock, the annual biomass increment and the annual allowable cut.

**Table 1. Forest Data Related to Production**

	Forest area used for production (ha)	Average growing stock (m <sup>3</sup> /ha)	Annual biomass increment (t/ha)	Annual allowable cut (m <sup>3</sup> /yr)
<b>Total – Bhutan</b>	<b>287,697</b>	<b>261</b>	<b>2.01</b>	<b>218,046</b>

Source: MoAF 2017e.

**Applying the principles of sustainable forest management to Bhutan’s production forests could significantly increase productivity and improve ecological resilience.** While the AAC focuses on sustaining harvesting levels over a long time, sustainable forest management (SFM) goes beyond sustaining harvesting levels by also addressing the ecological and economic dimension of forestry. SFM promotes silvicultural management practices for harvesting, such as thinning, selected harvesting (for example, of mature trees to support regeneration), and the removal of dead wood. In SFM, information on forest productivity is essential for planning silvicultural operations. Timing and type of final harvest, choice of regeneration methods, optimal number of saplings planted, and timing and intensity of thinning are factors affecting forest productivity and need to be taken into account by silvicultural operations. SFM manages forests as dynamic systems generating important ecosystem goods and services. Concerns that human interventions cause unalterable (negative) changes to natural processes of forests are not well founded—in fact, silviculture supports these processes with the objective of harvesting timber and non-timber forest products at sustainable levels without affecting the integrity of the forest ecosystem.

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<sup>6</sup> Different scenarios of forest resource potential were assessed by the MoAF (2014) using the following spatial criteria: below 4,000 meters altitude, not within 200 meters of roads, not within 30 meters from major drainages, not within 1 kilometer of rural settlements, not within 1.5 kilometers of towns, not within forest management units/working schemes, not within community forests, not within RAMSAR wetland sites.

**The RGoB is committed to supporting SFM.** As part of the 12th Five-year Plan, the MoAF intends to increase the area under SFM regime from 357,915 hectares to 425,495 hectares;<sup>7</sup> the forest area under scientific thinning from 381 to 15,000 hectares; and the number of SFM plans from 46 to 96. While the plan focuses on strengthening the existing CFs and NTFPs, the plan also commits to increasing the number of CF management plans from 750 to 1,170,<sup>8</sup> and the number of NTFP management plans from 140 to 294. To move to implementation and achieve these targets, it will be essential to (a) provide targeted capacity development to various stakeholder groups, including CF organizations, CFMGs, and the NRDLC; (b) invest in modern technology and infrastructure for timber and NTFP production; and (c) invest in value-chain addition activities.

**Bhutan’s Forest and Nature Conservation Rules (RGoB 2017) explicitly state that the “[e]xport of timber in either log form, sawn timber form or as firewood is banned.”** However, the ministry may consider an open auction for export of timber that does not have a market within the country and those timbers that remain unsold in three consecutive allotment systems. The only forest products that are currently exported are NTFPs, consisting mainly of Cordyceps. The most significant wood-based import item is charcoal. In 2012, Bhutan imported charcoal worth US\$16.8 million, comprising 1.4 percent of total imports and 60 percent of wood-based imports (MoF 2013). Charcoal is imported from India and used as a chemical reduction agent in the metallurgical industry. After charcoal, processed wood (for example, furniture) and bamboo were the second and third most important wood-based import items, accounting for 31 percent and 8 percent, respectively (MoF 2013). Imported bamboo is largely used for scaffolding in the construction sector.

**A recent study concluded that charcoal production would be profitable in 11 of the 20 districts when applying a discount rate of 12 percent (Feuerbacher et al. 2016).** Domestic charcoal production has the potential to offset up to 61 percent of charcoal imports, provided the share of commercially managed forest area increases from 5 percent to 15 percent. Enhancing charcoal production following strict sustainability criteria for the supply of needed raw materials and making smart use of wood waste—for example, using waste from sawmills and other residues—could help reduce imports, create jobs, and potentially preserve forest resources in neighboring countries.

**Community-based NTFP enterprises have the potential to significantly improve rural life because they would generate income and youth employment opportunities (Cheki 2017).** Non-timber forest resources hold promising economic opportunities for rural communities. Bhutan has around 400 medicinal and aromatic plant varieties. Using these resources to produce high-value products would give Bhutan a distinctive comparative advantage in the international market. For example, Nepal, India, and China account for close to half of all herbal exports to a US\$160 billion global herbaceutical market, while Bhutan’s herbal exports are very limited and confined to cross-border trade (RGoB 2005). As the global herbaceutical industry is expected to grow into a trillion-dollar industry by 2020, the government has started exploring opportunities for sustainable commercial cultivation and harvesting of high-value herbal plants. For example, Cordyceps (legally harvested) was recently sold through a public auction and demonstrated the promising commercial potential of medicinal and aromatic plants to contribute to Bhutan’s economy and peoples’ livelihoods.

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<sup>7</sup> This includes all forest management regimes with local forest management plans, including FMUs and CFs.

<sup>8</sup> Includes the plans that are to be revised.

## Forest Governance

**Almost all of Bhutan's forest area is state owned and a strict governance system distinguishes between management of forest resources designated for urban (commercial use) and rural areas (subsistence use).** The SRF category encompasses several governance types and management regimes, including FMU, local forest, and CF. The MoAF is responsible for resource management, while the largest volume of commercial extraction and sale of timber is done through the NRDCL. CF groups can sell surplus timber to the commercial market, but the marketed quantities are unknown (Feuerbacher et al. 2019). Since a revision in the 2017 forest rules, rural households may also sell surplus of subsidized construction timber, but they must pay a 25 percent royalty based on the regulated timber price.

**Until 1979, the government assigned timber extraction allotments through a tender system. However, contractors overused their allotments, leading to unsustainable practices.** Consequently, the Logging Division was established under the MoAF's Forest Department. This division incorporated in 1984 as the Bhutan Logging Corporation (BLC), and in 2007 it became part of the NRDCL. The NRDCL has a government mandate to manage timber, sand, stone, and other natural resources. Forest field offices prepare the forest management plans for the FMUs and CFs; the plans contain detailed information on the harvesting as well as the AAC. The logging activities in the FMUs are carried out by the NRDCL, whereas in the CFs, the harvesting is done by the communities.

**Community forestry is a key component of Bhutan's forest policy and is important for generating rural income and livelihood opportunities.** Community forests are state-owned forests for which rural communities, organized as CFMGs, receive management and use rights under conditions set out in a management plan. Following the adoption of a more decentralized and people-centered approach to forestry in the early 2000, the number of CFMGs has increased rapidly since 2007. By 2018, there were 781 CFMGs involving 32,402 rural households managing 92,165 hectares (3.0 percent) of forest land (MoAF 2018). Data on how much timber CFMGs annually harvest, use for subsistence, and sell to the market are not systematically available.

**With this transfer of responsibilities, local communities again become custodians of their surrounding forests.** Studies show that forests provide safety nets during times of hardship and reduce income gaps during lean seasons (Pullanikkatil and Shackleton 2019). Rural households with forestry-related activities in Bhutan were found to have higher income and to be less prone to poverty (Rahut, Ali, and Behera 2015). For the poorest households in Bhutan, up to 25 percent of their income comes from forestry activities, but among all rural households, forest income is less than 3 percent of total income (Rahut, Behera, and Ali 2016). In comparison, income from forests in other developing countries comprises 22 percent of total income on average (Wunder, Angelsen, and Belcher 2014). The contribution of Bhutan's forests toward rural livelihoods could thus be strengthened because they provide firewood, timber, fodder, and NTFPs such as medicinal and aromatic plants and exotic mushrooms that have a high economic value. These high-value forest resources could emerge as a key growth area and major source of revenue for rural communities (UNDP 2016).

**All forest areas designated for production have a management plan for timber and non-timber forest product harvesting.** For each FMU, a forest management plan (10-year time frame) is prepared by the respective field divisions with technical support from the Forest Resources Management Division. Public-level consultations are also carried out during the planning process. Each management plan is approved after obtaining environmental clearance from the National Environment Commission Secretariat. Annual operational plans are prepared by the respective division based on the management plan and handed over to the NRDCL for timber harvesting and extraction. There are currently 21 FMUs (RGoB 2018). Each

FMU is linked to a field division and managed by a range officer and supervised by the chief forestry officer. Technical support and approval are done by the Forest Resources Management Division. The implementation of the operational plans is monitored by the field division. Besides yearly monitoring, a midterm (fifth year) and final evaluation (ninth year) of the management plan period is also conducted. For forest areas handed over to communities, local forest management plans are prepared by the respective field divisions and approved by the department. The plans are used for sustainable supply of timber especially for rural timber allotment.

**The constitutional mandate to maintain at least 60 percent of land area in perpetuity is highly laudable and visionary but may lead to misconceptions about the potential of SFM.** The public debate is prone to the misconception that sustainably managed forests do not count toward forest cover (Namgyel 2017, 2018; Feuerbacher et al. 2016). SFM is possible even within a mountainous context, without resulting in degradation and deforestation. Hence, a dialogue is necessary to discuss how Bhutan can make better economic use of its forests without jeopardizing the forest conservation agenda, including leveraging synergies with other objectives such as biodiversity conservation. Moreover, awareness must be raised that relying on timber or wood product imports is potentially causing deforestation in exporting countries (that is, leakages), owing to their (possibly) lower forest conservation standards.

## Policy and Institutional Context

### Policies

**Conservation and sound management of forests, natural resources, and the environment are an integral part of Bhutan’s development objectives** and feature in the country’s Constitution, Bhutan 2020, and other national policies and plans (Table 2).

**Bhutan 2020 outlines the country’s development goals, objectives, and targets with a 20-year perspective to maximize gross national happiness.** It promotes a development path within the limits of environmental sustainability and without impairing the ecological productivity and natural diversity, providing the policy context for sustainable development.

**Table 2. Relevant Policies and Legislation Governing the Forestry Sector**

<b>Policies</b>	<b>Date</b>	<b>Acts</b>	<b>Date</b>
The Middle Path	1998	Bhutan Forest Act	1969
Timber Pricing and Marketing Policy	1999	Mines and Minerals Management Act	1995
RNR Sector Goals	2001	Forest and Nature Conservation Act	1995
Economic Development Policy of the Kingdom of Bhutan	2010	Environment Assessment Act	2000
National Forest Policy	1974, 2011	Regulation for Environmental Clearance of Projects	2002
Draft Access and Benefit Sharing Policy	2012	Biodiversity Act of Bhutan	2003
		Land Act	1969, 2007
		The Water Act of Bhutan	2011
		Forest and Nature Conservation Rules	2000, 2003, 2006, 2017

**The National Forest Policy ensures that forest resources, watersheds, and biodiversity are managed for sustainable production of economic and environmental goods and services to meet the long-term needs of society (RGoB 2011).** Emphasis lies on a more decentralized and people-centered approach to implementation, with a strong agenda directed at poverty reduction. A key feature of this policy is the application of an integrated landscape-level approach to sustainable forest management.

**Through the 1995 Forest and Nature Conservation Act (“Forest Act”), all forests are declared to be SRF (RGoB 1995).** The Forest Act “provides for the protection and sustainable use of forests, wildlife and related natural resources of Bhutan for the benefit of present and future generations.” The Forest Act authorizes the Ministry of Agriculture and Forests to establish community forests on SRF, and to develop rules regarding the management of community forests. The ministry can also issue Social Forestry Rules to encourage any person to grow or nurture forest crops on his own registered private land, excluding *tsamdrog* (grazing land) and *sokshing* (forest for leaf litter collections). In addition to the Forest Act, there is a comprehensive and periodically updated law of regulations and procedures related to the governance and conservation of Bhutan’s forest, the Forest and Nature Conservation Rules and Regulations of Bhutan (RGoB 2006, 2017).

**The government is finalizing its REDD+ strategy,<sup>9</sup> which proposes policies and measures that support the transition to low-emission, climate-resilient, and sustainable development pathways in forestry, agriculture, energy, tourism, and other cross-cutting areas.** The REDD+ strategy extends beyond simply reducing carbon emissions from deforestation and forest degradation by targeting additional benefits, including enhanced livelihoods, protected biodiversity, and other ecosystem services, improved forest governance, empowered relevant stakeholders by ensuring participation, and supported sustainable land use planning. The government is also preparing a fund mobilization strategy for the implementation of the proposed policies and measures and has reached out to various development partners, including the World Bank, for support.

**The 12th Five-Year Plan (2018–2023) will contribute to a “Just, Harmonious and Sustainable Society through enhanced Decentralization.”** The plan emphasizes improved coordination, consolidation, and collaboration across all national and subnational agencies; the effective and efficient operation and maintenance of infrastructures already in place, instead of expansion; and an increase in regional cooperation in trade, transit, and energy to give rise to new technologies and opportunities (GNHC 2018). There are five National Key Result Areas (NKRAs) directly relevant to the forestry sector: (1) economic diversity and productivity enhanced; (2) poverty eradicated and inequality reduced; (3) healthy ecosystem services maintained; (4) carbon-neutral, climate- and disaster-resilient development enhanced; and (5) productive and gainful employment.

## Institutions

**The Ministry of Agriculture and Forests is the central organization for the formulation and implementation of policies and legal frameworks related to biodiversity, forests, livestock, and agriculture.** Overall responsibility of managing forest resources lies with the Department of Forest and Park Services (DoFPS). Established in 1952, the DoFPS is one of the oldest MoAF departments in Bhutan. Key mandates of the department include (a) 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; (b) conserving, protecting, sustainably managing, and utilizing state forests, forest soil, water resources, and

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<sup>9</sup> REDD+: Reduced Emissions from Deforestation and Forest Degradation, Sustainable Management of Forests, and Enhancement of Forest Carbon Stocks.

biodiversity; and (c) ensuring Bhutan's commitments to international and regional conventions, treaties, and non-legally binding instruments.

**The DoFPS has five functional divisions and two research teaching institutes at the central level, and 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. 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 Global Tiger Center (GTC) 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 the clearances regarding forest land, while the FRMD processes clearances for the establishment of any wood or non-wood-based enterprise. The department also provides advice on resource availability and technologies 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 noncommercial 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.<sup>10</sup>

**The National Environment Commission (NEC), chaired by the prime minister or the minister of the Ministry of Agriculture and Forests and composed of high-level multisectoral representatives, is an independent apex body on all matters relating to the environment to regulate environmental impacts and promote sustainable environment.**<sup>11</sup> It formulates policies and regulation related to natural resources 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 preparation and submission of National Communications (NCs) and Biennial Update Reports (BURs). 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.

**The Royal Society for Protection of Nature is a registered public benefit organization under the Civil Society Organization Authority of Bhutan since 2010.** The 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.

**The Bhutan Trust Fund for Environmental Conservation is a conservation grant-making organization, independent of the government.** It was established in 1992 as a collaborative venture between the RGoB, the United Nations Development Programme (UNDP), and the World Wildlife Fund (WWF), with an

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<sup>10</sup> Each management plan should describe the area, resources, and their uses and role in biodiversity; state the management regime required for the protection and sustainable utilization of the resources, including logging and reforestation requirements and designation of protected areas; and assess the environmental and socioeconomic impact of the proposed management regime.

<sup>11</sup> Source: <http://www.nec.gov.bt/nec1/index.php/about-nec/vision/>.

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.

**The local administration (*dzongkhag* and *gewog*) operates at the subnational level.** Working in 20 *dzongkhags* containing 205 *gewogs*, the local administration includes locally elected representatives responsible for planning and implementation of plans and programs at the local level. They play an instrumental role in forest management and biodiversity conservation and provide government services to local communities.

**Established in 1969, the NRDCL is a state-owned enterprise governed under the Company Act 2000.**<sup>12</sup> It is the nation's premier supplier of commercial timber, sand, and stone based on the management plans and approval from the DoFPS and MoAF, and it makes these resources available, affordable, and accessible. For example, the NRDCL carries out the execution of works such as clearing and lifting of timber for installing transmission lines. The NRDCL, as the only authorized agency, is involved in forest road construction and maintenance, timber harvesting, and reforestation in FMUs and working schemes. Outside FMUs and working schemes, the NRDCL undertakes other operational activities that need to be done urgently (such as clearing trees for road widening, power transmission lines, pressing sanitation operations).

## National Forest Challenges

**As discussed, Bhutan has one of the highest percentage forest covers in the world and is a leader in forest conservation. Yet Bhutan must deal with various challenges to its forests and the forestry sector to maintain at least 60 percent of Bhutan's land area under forest cover.** These challenges relate to four thematic areas: (1) drivers of deforestation and forest degradation, (2) vulnerability to climate change and natural disasters, (3) underdeveloped wood and non-wood industries, and (4) challenging policy and institutional environment.

### Drivers of Deforestation and Forest Degradation

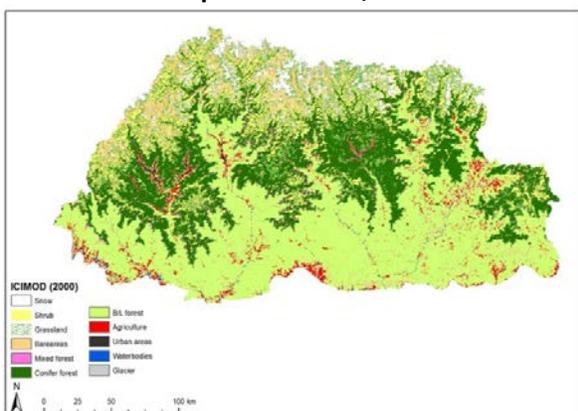
**While forest loss has been occurring more prominently on the southern border and in valleys, the northern mountains have benefited from forest gains.** The results of the deforestation and forest degradation analysis between 2000 and 2015 indicate that 392,683 hectares of forests were gained in a 15-year period, while around 74,445 hectares were lost, resulting in a net change or increase of 12 percent at an annual rate of 0.8 percent (MoAF 2017b). However, 667,680 hectares of forests experienced degradation.<sup>13</sup> Maps 2 and 3 present the spatial distribution of forest loss and gain in 2000 and 2015. The drivers of deforestation and forest degradation were analyzed as part of Bhutan's engagement in REDD+. The drivers are presented below.

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<sup>12</sup> It was established as a Logging Division under the Forest Department in 1979, upgraded to the Bhutan Logging Corporation (BLC) in 1984, again upgraded to the Forestry Development Corporation Limited (FDCL) in 1996, and finally restructured as the Natural Resources Development Corporation Limited (NRDCL) in 2007.

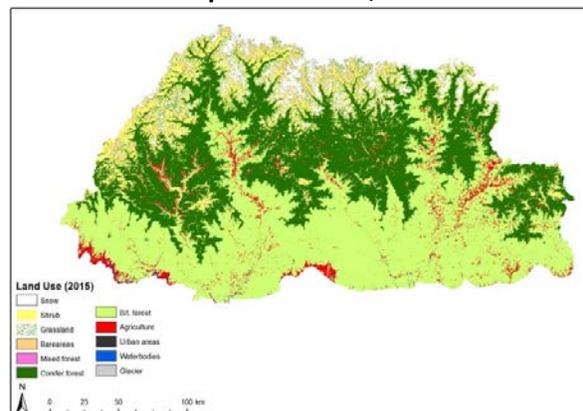
<sup>13</sup> These figures are currently being updated and validated as part of the Forest Reference Emission Level/Forest Reference Level.

**Map 2. Land Use, 2000**



Source: Yangchen, Thinley, and Wallentin 2015.

**Map 3. Land Use, 2015**



Source: FRMD 2016.

### *Drivers of Deforestation*

The Ministry of Agriculture and Forests (2017b) has identified following six major drivers of deforestation and ranked them in the order of severity (Table 3). In total, the annual rate of deforestation equals 6,714 hectares, or 0.2 percent of the total forest cover. This loss in forest cover is overcompensated by gains in forest cover elsewhere. Given the low prevalence of deforestation in Bhutan, only the top two main drivers of deforestation are discussed below.

**Table 3. Drivers of Deforestation**

Driver	Area affected annually (ha)	Annual greenhouse gas emissions because of forest area loss (tCO <sub>2</sub> e)
State reserved forest land allotment for various purposes	1,923	604,852
Hydropower projects	1,880	591,327
Agriculture	916	288,114
Roads	820	257,919
Mines and quarries	633	199,101
Electricity transmission lines	542	170,478
<b>TOTAL</b>	<b>6,714</b>	<b>2,111,791</b>

Source: MoAF 2017b.

**Allotment of SRF land for various purposes and construction of hydropower projects are the two main drivers of deforestation in Bhutan.** Together, these two drivers account for 57 percent of total deforestation. The government allocates SRF land for various purposes, including (a) leasing to large projects such as hydropower, private commercial farming, mining, quarrying; (b) compensation for private registered land acquired for developmental purpose; (c) government agencies and religious institutions; and (d) land exchange for special situations, such as to compensate land destroyed by natural disasters. Hydropower investments require large areas to build various components, including access roads, transmission lines, storage, and tunnels to divert river flows (World Bank 2016). Area deforested for transmission lines and access roads is included under the SRF land allotment. On average, about 2 hectares

of forest are lost for every megawatt of generation capacity. Currently, there are many plans for hydropower investments in Bhutan. Extrapolating the known development plans, it is estimated that 18,380 megawatts may impact about 39,760 hectares of forest (1.5 percent of forest area), or an annual average of 1,880 hectares (MoAF 2017b).

#### *Drivers of Forest Degradation*

**The MoAF has identified four major drivers of forest degradation (MoAF 2017b).** Table 4 provides annual degradation data and resulting annual greenhouse gas (GHG) emissions.

**Table 4. Drivers of Forest Degradation**

Driver	Annual degradation (m <sup>3</sup> /ha)	Annual GHG emissions because of forest degradation (tCO <sub>2</sub> e/ha)
Timber harvesting	163,009	117,394
Firewood	84,936	61,168
Forest fires	111,969	88,560
Livestock	9,694	6,981
<b>Total</b>	<b>369,608</b>	<b>274,103</b>

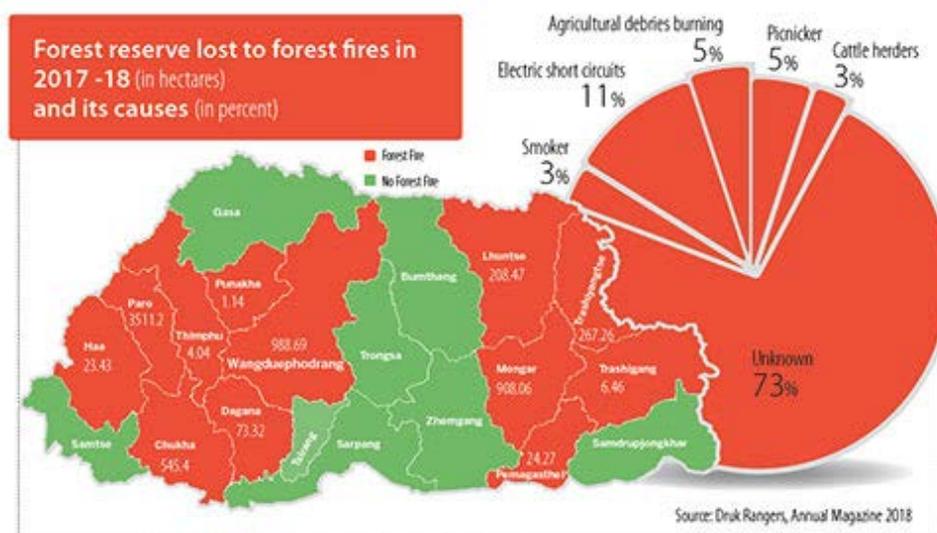
Source: MoAF 2017b.

**Timber and fuelwood harvesting are the most important drivers of forest degradation in Bhutan, accounting for 67 percent of total degraded forests.**<sup>14</sup> The applied method relies on the assumption that the total timber harvested, according to national statistics, is associated with forest degradation. In the Forest Reference Emission Level, harvesting is identified as a driver of degradation but is part of sustainable forest management. Using the timber harvest data from national statistics (~248,000 cubic meters), the study uses a lower bound of actual extracted forest biomass (~1,155,000 cubic meters). The national statistics do not fully include the fuelwood consumption by rural households, which is estimated at around 765,000 cubic meters in 2012 (Figure 3), using data from the Bhutan Living Standard Survey. Implicitly, the study assumes that about 21.5 percent of timber harvest results in forest degradation. The study explicitly points out that forest degradation due to illegal and unauthorized timber extraction is not included.

**Forest fires are one of the prominent causes of forest degradation, and they can be caused by natural or man-made activities.** The number of forest fires have fluctuated over time, from 34 in 2012–2013 to 72 incidences in 2016 and 37 in 2017–2018 (MoAF 2017b). Fires are more prevalent in the eastern and central regions (Figure 4), where pine and oak forests are more susceptible to fire incidences. Data suggest that the area burned has been increasing. Because of climate change, fire incidences are projected to increase.

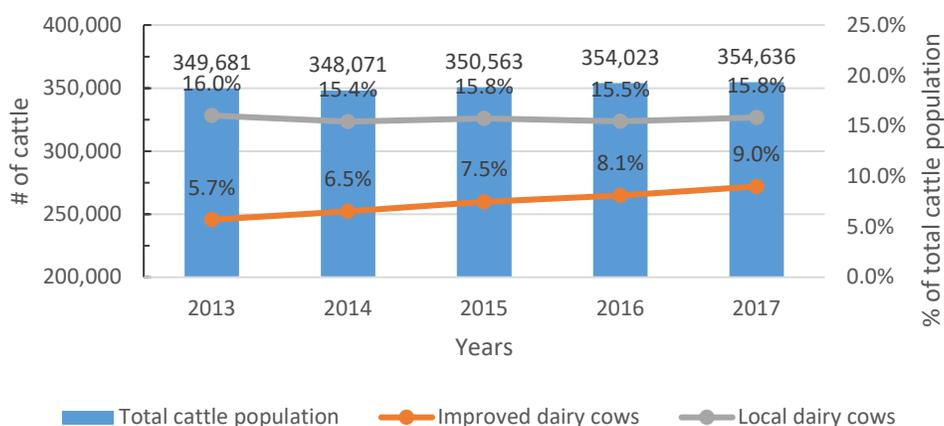
<sup>14</sup> If timber and fuelwood are harvested sustainably based on SFM principles, this activity should not be identified as a driver of forest degradation.

**Figure 4. Forest Fires and Causes, 2017–2018**



**Livestock is a substantial but largely understudied driver of forest degradation.** Grazing by livestock negatively affects regeneration of managed forests, for example, recently harvested forest management units. Livestock also compact soil through trampling, leading to reduced seed germination potential. Pressure from livestock grazing in the forest was addressed by the government’s initiatives to improve livestock management through cross-breeding, enhancing pasture, and feed and fodder development programs (MoAF 2017b). However, the magnitude of impacts of the intervention remains unclear. The almost doubling in the number of improved dairy cattle has hardly had any impact on the local cattle population. As a result, the total cattle population did not decline, but instead it experienced a slight increase over the last five years (Figure 5). Hence, the level of pressure from cattle on forests may persist as before. The forest degradation by cattle as presented in Table 4 is estimated as the residual from total forest degradation after subtracting the other drivers. The forest degradation study argues that the impact of livestock grazing on forests is largely local and thus difficult to assess systematically (MoAF 2017b).

**Figure 5. Population of Total Cattle and Dairy Cows, 2013–2017**



Source: MoAF 2017a.

## Vulnerability to Climate Change and Natural Disasters

**Bhutan’s NDC identifies “[s]ustainable forest management and conservation of biodiversity to ensure sustained environmental services” as one of the priority actions related to climate change adaptation and resilience.** The 2012 version of the National Adaptation Programme of Action lists, in addition to glacier lake outburst floods, new climatic hazards such as windstorms, fire, and cyclones.

**It is expected that forests and trees will be increasingly affected by new diseases, pests, and parasites and by shifting phenological and seasonal changes induced by climatic changes.** As a result, vulnerability at a community level, particularly among subsistence farmers, is high (Lhendup, Wikramanayake, and Freeman 2011). A survey in 2010 indicated that forest productivity suffered setbacks due to periodic diebacks and insect attacks. There were outbreaks of bark beetle in spruce forests, increased incidence of mistletoe infestation, and moisture-stress–related problems in blue pine forests. Between 1992 and 2008, five incidences of pine dieback were observed along the Paachu-Wangchu Valley, which were strongly correlated with higher temperature and lower rainfall (UNDP 2016).

**Bhutan’s 2011 Climate Change Vulnerability Assessment predicts a warming trend in annual temperature and high levels of variability and uncertainty in annual precipitation.** This will lead to shifts in seasonal stream flow, ecosystems, and distributions of species depending on habitat shifts. The 2016 UNDP study identified forest conditions as the most sensitive indicator to be affected by climate change. Forest condition measurements include, in the order of severity, forest fire incidents, decrease in fodder availability, decrease in availability of water in streams/lakes, availability of timber/firewood, decrease in wildlife diversity, decrease in availability of NTFPs, and plant diversity.

**The development of alternative income sources is a crucial measure to increase the resilience of rural communities.** In 2013, an analysis of Bhutan’s forest policy framework to mainstream climate change adaptation was conducted (Wangdi, Lhendup, and Wangdi 2013). To enhance resilience, the study proposes the promotion of small-scale cottage industries for generating off-farm income opportunities to supplement communities’ livelihoods in the event of climate disasters. These small-scale industries could include forest-based enterprises such as furniture making, handicrafts, wood turning, and lacquering to produce different types of wood products that can be sold to tourists, urban consumers, and other communities.

## Underdeveloped Private Sector

**Bhutan does not have a long history of private enterprise.** Private sector activities were mainly limited to small trade of small agricultural surpluses and a few handcrafted products. There is no vibrant commercial culture and strong traditions of entrepreneurship and professional management, all of which have been identified as weaknesses of Bhutan’s private sector.

**Recently, there has been a shift in government policy to create an enabling and business-friendly environment.** Many relevant legal instruments have been enacted and appropriate trade and industrial policies adopted, including a public-private partnership policy in 2016 and rules and regulations in 2017. These efforts are directed toward the long-term objective of the government to strengthen the domestic industry and provide job opportunities to meet the mid- to long-term needs of Bhutan’s population without negatively impacting the environment and linked international reputation.

**Access to capital has been identified as a major constraint for the private sector (World Bank 2017).** To reduce this constraint, the financial sector should introduce several reforms to promote and support the

growth of enterprises. Important suggestions coming from the private sector include the reduction of high banking transaction charges; the promotion of competitive interest rates based on client credit rating systems; the scale-down of high collateral requirements for loans; an assessment of the valuation of collateral assets based on true market value; an increase of the limit of consortium funding; and the provision of adequate foreign exchange for the import of raw materials. Another need expressed by the private sector is for financial institutions to introduce innovative financing mechanisms and to strengthen local expertise.

**Despite Bhutan's wealth in natural capital, especially forests, trade data suggest that Bhutan has a substantial trade deficit in wood and wood products, with imports volumes that are six times higher than exports.** The type of imported and exported wood and non-wood products is an indicator of which industries are underdeveloped in Bhutan. Data also show that Bhutan exports raw materials such as mushrooms and plant materials.

**Bhutan's forest and wood-based industry lacks competitiveness.** A 2017 study on productivity enhancement in Bhutan by the Ministry of Economic Affairs (MoEA 2017) lists several factors affecting Bhutan's forest and wood-based industry, including the lack of available quality raw materials within the country, constant increase of the raw material prices, high transportation costs, coupled with policy restrictions on employment of foreign workers. The same study presents that 76 percent of the interviewed forest-based firms feel that their business is threatened by the supply of wood-based products from China and neighboring countries, and construction materials substituted by iron, steel or concrete. In addition, there is only a limited supply of skilled labor which constrains the development of high value-added products (World Bank 2017).

**The number of forest-based industries compared with other industries is small and declining.** In December 2011, there were 27,982 licensed cottage and small-scale enterprises in Bhutan, of which more than 90 percent were in the service and contract industry and 7 percent were in production and manufacturing. Of the production and manufacturing industries, 45 percent were forest-based with timber as the main raw material. In 2016, *Kuensel* reported that the Greenwood Manufacturing Corporation's plywood production significantly dropped over the past years because Indian plywood and furniture were 50 percent cheaper than Bhutanese products.<sup>15</sup>

**Bhutan also faces challenges related to NTFPs, such as lack of technology, management skills, markets and capital for value addition, market information, and quantity and quality requirements.** In addition, small and dispersed volumes, irregular supply and demand, poor infrastructure, and high transportation costs impact business development opportunities (Cheki 2017). Bhutanese products cannot compete with Indian or Chinese markets because there are no established small and medium community-based enterprises and quality control is missing. Grading and value addition are lacking, the basis for getting better prices. NTFP resources are also threatened by the impacts of climate change.

## Challenging Policy and Institutional Environment

**Guided by Article 5 of the Constitution of the Kingdom of Bhutan 2008, Bhutan has established an extensive legal and regulatory framework aimed at the conservation of the environment and the mitigation of adverse environmental impacts.** In contrast, the effective implementation is commonly lacking. Shortage of law enforcement personnel, ambiguity in institutional mechanisms, and lack of technical and financial resources to implement environment-friendly technology are some of the key

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<sup>15</sup> *Kuensel* is the national newspaper of Bhutan.

reasons for weak law enforcement. At the same time, there is also the acknowledgment that there is some degree of public and professional apathy toward existing laws (RGoB 2012). Effective environmental law enforcement will also depend on the awareness and education of the public of their environmental rights and responsibilities. For example, during the National Adaptation Programme of Action preparation, local community consultations revealed that a majority of the local people were not aware of various environmental laws and regulations (UNDP 2017).

**The 12th Five-Year Plan is ambitious and demonstrates the commitment of the government to make better use of its forest resources.** The plan has 16 National Key Result Areas, with four directly relevant to the forest agenda: (a) economic diversity and productivity enhanced, (b) poverty eradicated and inequality reduced, (c) carbon-neutral and climate- and disaster-resilient development enhanced, and (d) productive and gainful employment enhanced. The MoAF has defined four agency key results areas: (i) management of natural resources for sustainable utilization of ecosystem goods and services enhanced, (ii) renewable natural resources research strengthened, (iii) enhanced efficiency and effectiveness of renewable natural resources service delivery, and (iv) increased renewable natural resources sector contribution to national economy. To achieve the ambitious targets associated with the NKRAAs, including for the forestry sector, the government needs to significantly increase its investment in the sector, including for capacity and skills development, new technology and infrastructure, and in value addition for timber and NTFPs. Since these investments are focusing on increasing productivity in a sustainable manner, they will have a positive rate of return. Productivity improvements, investments, and positive rates of return are known forces for generating economic growth.

**Bhutan's policy for access to and pricing of extracted wood negatively affects the development of wood-based industries.** As noted earlier, substantial quantities of firewood are provided with subsidies. Firewood is regulated by the Forest and Nature Conservation Rules of Bhutan 2006 (RGoB 2006). The rules specify that households are allowed 16 cubic meters of fuelwood per year if they lack electricity or 8 cubic meters per year if they have electricity, irrespective of household size, need, forest type, and availability. Households also have entitlements to certain amount of timber for construction. The subsidized provision of wood to individuals impairs the development of specialized enterprises to become an economically viable source of timber and forest products, such as building materials (Narain, Toman, and Jiang 2014).

**The current regulatory framework is also characterized by overregulation, leading to inefficiencies within the wood industry.** Timber used for urban purposes needs to be bought through the government-owned NRDC (MoAF 2012). The NRDC sells timber for commercial purpose through a lottery to sawmillers, which clearly indicates the market scarcity of timber. Sawmillers again may only sell to those customers that have obtained an official timber allotment order.<sup>16</sup> The orders have been introduced to prevent the sale of illegal timber; however, the regulatory framework leads to inefficient allocation of resources and unnecessary curtailment of the wood industry through overregulation. Further, timber production is not adjusted to demand levels, leading to shortages and oversupply of timber depending on business cycles and other macroeconomic conditions. This has led to the paradoxical situation whereby to meet shortages of timber, the NRDC sometimes has had to import timber at almost tenfold the price of domestically sold timber (Wangmo 2012).

**The government regards import substitution important for economic growth and employment generation.** However, the current regulation of the forestry sector impedes market mechanisms that could provide incentives for efficient resource allocation, training of skilled labor, and investments in state-of-the-art technology and equipment. In addition, since Bhutan produces timber almost exclusively

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<sup>16</sup> Also reported in *Kuensei*, "Forestry Red Tape Stymies Sawmill Sales," May 8, 2013.

for the domestic market, the NRDCL and sawmills are heavily dependent on national policy decisions. For example, the housing loan restrictions in 2012 badly affected sawmill owners' business and sale of timber and building components slumped by about 50 percent. The NRDCL was also affected and had to deal with a huge unsold timber stock, which it was able to empty only in 2014 (Wangdi 2015). Moreover, the red tape of allocating timber harvested by the quasi-monopoly of the NRDCL through a complicated lottery system prohibits planning security and rather incentivizes industries to rely on timber substitutes. Bhutan's 2016 Economic Development Policy (RGoB 2016a) makes provisions for subsidies and other fiscal stimulants for forest-based industries. However, lack of implementation and other factors such as high timber prices, outdated technology and methods, and lack of skilled labor make the forestry sector uncompetitive.

## Opportunities for Bhutan's Forestry Sector

**Bhutan's forestry sector can be more productive without jeopardizing the goal to maintain at least 60 percent of Bhutan's land under forested cover in perpetuity and to remain a global leader in environmental conservation.** Transforming the forestry sector by improving forest management has the potential to increase employment opportunities, invest in forest-based enterprises, and move to a market-based approach for trading timber and NTFPs.<sup>17</sup> Being a global champion for environmental conservation does not preclude Bhutan from developing a modernized and resource-efficient forestry sector.

**Bhutan's rich forest resources can contribute more to the country's objective of remaining a carbon-neutral and socio-equitable economy.** Forests provide timber and NTFPs that are already a key element for Bhutan's carbon-neutral development path. Investing in SFM will allow Bhutan to increase its carbon sequestration potential as forests are managed dynamically, creating opportunities for advance regeneration. More investments in wood-substitution technology will allow Bhutan to replace GHG emission-intense materials like steel and cement with wood (for example, using cross-laminated timber technology), which stores carbon for the lifetime of the product.

### Box 1. Climate Benefits of Wood

To produce 1 kilogram of timber, a tree consumes 1.47 kilograms of CO<sub>2</sub> and returns just over a kilogram of oxygen into the atmosphere. When trees are harvested and used to make wood products, the carbon remains stored in the wood for the life of the product. About 50 percent of the dry weight of wood is carbon. Using wood to build long-lasting, efficient, and durable homes and other buildings will help reduce the amount of carbon dioxide in the atmosphere.

*Source:* <https://makeitwood.org/benefits/carbon-harvest>.

**To identify potential action areas to modernize and improve Bhutan's forestry sector, the PRIME framework was applied.**<sup>18</sup> The PRIME framework is used to assess the most relevant drivers and principles

<sup>17</sup> Annexes 1 and 2 present the World Bank engagement in the natural resources sector in Bhutan.

<sup>18</sup> PRIME: Productivity, Rights, Investments, Markets, Ecosystems.

related to the nexus between forests, economic development, and pathways out of poverty. The analysis yielded a multitude of potential interventions (analytic work, capacity development, and investments). This section will describe the interventions that may have a transforming impact on Bhutan’s forestry sector and could be implemented in the short to medium term; long-term opportunities are identified as well. The implementation of the proposed actions would improve the productivity of Bhutan’s forestry sector through SFM, increase investments in forest-based small and medium enterprises, and build local capacity for forest-based industries while sustaining the environmental benefits forests provide.

**The proposed interventions would support the implementation of Bhutan’s 12th Five-Year Plan, specifically the objectives for the renewable natural resources sector and MoAF’s Sustainable Natural Resources Management and Biodiversity Utilization Program (MOAF/03) (Box 2) (MoAF 2019).**

**Box 2. MOAF/03 Program Summary**

**Program title:**

Sustainable Natural Resources Management and Biodiversity Utilization Program

**Link to National Key Result Areas (NKRAs):**

- **NKRA 2** [Economic Diversity and Productivity Enhanced]
- **NKRA 5** [Healthy Eco-system Maintained]
- **NKRA 6** [Carbon Neutral, Climate and Disaster Resilient Development Improved]
- **NKRA 8** [Food and Nutrition Security Ensured]
- **NKRA 17** [Sustainable Water Ensured]

**Link to Agency Key Result Areas:**

Management of natural resources for sustainable utilization of ecosystem goods and services enhanced, air quality monitoring system strengthened, land use planning and management improved.

## Opportunity Areas and Activities

### *Short- and Medium-Term Opportunities*

Based on the PRIME assessment, five opportunity areas were selected based on their high potential to transform Bhutan’s forestry sector into a modern and effective economic sector consistent with Bhutan’s GNH approach and its Constitution:

- (i) Supporting SFM in FMUs and community forests
- (ii) Investing in modern forest technology and infrastructure in FMUs and CFs
- (iii) Exploring a market-based approach for timber and NTFP sales
- (iv) Establishing SMEs for timber and NTFPs and value addition
- (v) Supporting the development of a curriculum for wood engineering and wood architecture

Table 5 presents an illustrative list of activities for each opportunity area.

**Table 5. Focus Engagement Areas**

<b>Opportunity area</b>	<b>Illustrative list of activities</b>
<b>Supporting SFM in FMUs and CFs</b>	<ul style="list-style-type: none"> <li>- Training on SFM</li> <li>- Development/update of SFM plans for FMUs and community forests</li> <li>- Expansion of the area under SFM in existing FMUs and CFs</li> <li>- Increase of number of FMUs and CFs</li> <li>- Increase of harvesting volume</li> <li>- On-site training on silvicultural practices and monitoring</li> <li>- Establishment of tree nurseries</li> <li>- Purchase of field equipment for monitoring</li> <li>- Improvements to forest division offices</li> </ul>
<b>Investing in modern forest technology and infrastructure in FMUs and CFs</b>	<ul style="list-style-type: none"> <li>- Technology/equipment needs assessment</li> <li>- Capacity needs assessment</li> <li>- Purchase of modern technology and equipment</li> <li>- Training for operators and maintenance personnel</li> <li>- FMU business planning and monitoring</li> </ul>
<b>Exploring a market-based approach for timber and NTFP sales</b>	<ul style="list-style-type: none"> <li>- Market study for timber and NTFP (national, regional, beyond)</li> <li>- Development of an auction system for timber and NTFP (i.e., moving toward online auctioning system)</li> </ul>
<b>Establishment of SMEs for timber and NTFPs and value addition</b>	<ul style="list-style-type: none"> <li>- Review existing policies and regulations and identify challenges for the establishment of forest-based SMEs</li> <li>- Develop credit line in financial institutions for forest-based activities</li> <li>- Develop capacity development program for lending institutions and potential clients on SFM</li> <li>- Support access to technology and equipment</li> </ul>
<b>Support the development of a curriculum for wood engineering and wood architecture</b>	<ul style="list-style-type: none"> <li>- Organize educational visits to countries that offer wood engineering and wood architecture as an educational opportunity</li> <li>- Identify educational institutions that could provide new curriculum (universities and vocational schools) for wood engineering and wood architecture</li> <li>- Pilot 2–3 projects where wood technology is showcased (e.g., renovation of historic wood buildings, new office buildings, highly visible buildings/constructions)</li> <li>- Organize awareness creation events on the role of wood in engineering and architecture</li> </ul>

**It is expected that implementing these activities would lead to the following results:**

- Production forest quality is improved while forest cover is sustained.
- People, particularly in rural areas, have secure employment and benefit from forest-dependant jobs.

- Institutional and human capacity for SFM is increased.
- Improved technologies and equipment for timber harvesting and processing.
- Increased roundwood production.
- Reduction of wood-based imports.
- Production of high-value forest products capitalizing on the “Brand Bhutan” and its sustainable managed forests (organic NTFPs, high-value furniture products).
- Increased number of forest-based SMEs.
- Piloted use of new wood-based technologies in building structures.
- Carbon sequestration potential and carbon stock increased.
- Improved resilience of forest ecosystems against impacts of climate change and other natural disasters.

### *Long-Term Opportunities*

The PRIME assessment also suggests opportunities the government may want to explore in the long term, as they could yield additional benefits to Bhutan’s economy and people’s well-being. Analytical work to further explore the feasibility of these opportunities in the context of Bhutan would help the government to consider the implementation in the long term.

Long-term opportunities include developing the following:

- Domestic charcoal production
- High-value furniture industry
- Online timber and NTFP auctioning system
- Regional partnership for combating forest fires

### *Role of the World Bank*

**The World Bank has recently prepared a draft of the Bhutan Systematic Country Diagnostic, *Fostering Competitiveness, Diversification and Inclusion*, which when finalized will be the basis for the future Bhutan Country Partnership Framework (CPF) FY20–24 to guide the future Bank Group investment portfolio.** The SCD presents five priority areas to achieve this realignment together with the goal of long-term sustainable poverty reduction and shared prosperity: (1) reducing macroeconomic volatility and vulnerability, (2) meeting the job creation challenge by boosting private sector development, (3) investing further in human capital and improving service delivery to expand opportunities to people living in remote areas, (4) promoting sustainability and mitigating the impact of climate change, and (5) addressing implementation gaps. Implementing the opportunities for the forestry sector identified in this note would support these priority areas.

**The CPF will build on the achievements in the past and define new areas for World Bank investments for the coming four years in support of the implementation of Bhutan’s 12th Five-Year Plan and overall sustainable development goals.** The CPF consultations will also provide the opportunity to further consult with other development partners and identify action areas that have the potential to strengthen or create new partnerships. Annexes 1 and 2 summarize ongoing forest-related activities supported by the World Bank and other development partners. Building on these activities, a strong collaboration to support Bhutan’s forestry sector has great potential for concerted actions leading to transformative results.

## Annex A. Current World Bank and Partner Engagement in Forests

### Current World Bank Engagement in Forests

Although there is no current lending portfolio focused exclusively on the forestry sector, several trust fund initiatives, implemented by the World Bank, are providing up-front finance for activities related to combating the illegal wildlife trade (Global Environment Facility [GEF]), REDD + (Forest Carbon Partnership Facility [FCPF]), and integrated catchment area management (Korea Green Growth Trust Fund [KGGTF]).

Under GEF, a US\$4.08 million project supported the improvement of the operational effectiveness and institutional sustainability of the Bhutan Trust Fund for Environmental Conservation (BT FEC). The project had three components: (a) enhancing the operational effectiveness and sustainability of BT FEC, (b) improving conservation management of high altitudes of northern areas (HANAS) landscape in Bhutan (including protected areas and associated methods, forests, and agricultural systems), and (c) capacity building for mainstreaming of conservation and sustainable forest and natural resources management approaches in national policies, strategies, and plans.

Through the FCPF, the World Bank has been supporting the Bhutanese government in its efforts to reduce emissions from deforestation and forest degradation, foster the conservation and sustainable management of forests, and enhance forest carbon stocks (REDD+). The government expressed interest in receiving support from the FCPF by presenting a Readiness Preparation Proposal (R-PP). The FCPF Participants Committee selected the R-PP in December 2013 and allocated a US\$3.8 million grant. The project was approved by the World Bank's Bhutan Country Director in February 2015, became effective in March 2015, and started implementation in July 2015. It is scheduled to close in June 2020.

The objective of the project is to build national capacity of the country to engage in REDD+ efforts at the national and international levels, through strengthened policies, increased knowledge on REDD+, and enhanced data on forests and forest management. The project is executed by the Watershed Management Division and Forest Resources Management Division of the Department of Forest and Park Services in the Ministry of Agriculture and Forests. The project has four components: (1) Readiness Organization and Consultation; (2) REDD+ Strategy Preparation; (3) Reference Emission Level/ Reference Level; and (4) Monitoring Systems for Forests and Safeguards.

#### **Box A.1. World Bank's Past Engagement with Bhutan on Forests**

The first IDA-assisted Forestry Development (Afforestation) Project (IDA Credit 1460-BHU of US\$5.5 million) became effective in 1984. It supported the Bhutanese government's efforts to develop the Forest Department's capacity to plan and operate an integrated logging, reforestation program to continue to maintain forest reserves, supply to wood-based industries, and export on a sustained basis. In 1985, a serious pest outbreak in the extensive coniferous forests in western Bhutan led the government to seek assistance from IDA to combat the problem. The IDA-assisted Second Forestry Development Project (SDR 0.8 million; US\$1.06 million equivalent) was administered by the Bhutan Logging Corporation (BLC) and the Forest Department over a six-year period and supported (a) Forest Department activities in pest and forest management, and (b) BLC activities, including road construction, logging, workshop development, marketing, nursery development, and reforestation in the project area, and improvement of the financial management system.

The government submitted a midterm report of the project to the FCPF Participants Committee in January 2017, with a request for additional resources to complete the readiness activities and transition to REDD+ implementation. In March 2017, the FCPF Participants Committee approved the government's request for additional funding of US\$4.8 million. The World Bank signed the Grant Agreement in February 2018. The additional funding finances the costs associated with consolidating and expanding REDD+ readiness activities in Bhutan to firmly anchor REDD+ features and good practices in work plans and government policies and procedures, particularly at the local level. It emphasizes exploring models for sustainable forest management with a focus on production forests, including private sector development, and land use planning to provide the bases for planning resources use consistent with the national development agenda of Bhutan. It further contributes to strengthen the capacity of the REDD+ Secretariat, support a national approach to integrated land use planning, conduct further baseline collection activities, implement safeguards, and strengthen the monitoring system for the benefit of Bhutan's forests. The involvement of the National Land Commission and support to a national land use policy provide excellent opportunities for improved inter-agency coordination and collaboration at all levels, which is a central pillar of the upcoming 12th Five-Year Plan.

Under the KGGTF, the Bank supports client countries' need for technical capacity development and better data for prefeasibility analysis in Bhutan, Nepal, and Pakistan to promote smart hydropower development through integrated catchment area management in support of countries' green growth strategies. This Bank-executed project includes four main activities: (1) creating awareness and influence among policy makers across energy, water resources, and forestry ministries on the role of catchment area management and PES schemes in promoting sustainable hydropower and as a source of green inclusive growth; (2) generating know-how on how integrated catchment area management can promote smart hydropower development through (a) the application of ecosystem services-based modelling tools to develop cost-effective catchment area management plans in selected catchments and (b) institutional and technical capacity needs assessment for the design and implementation of PES schemes and guidance for investing/sharing hydropower royalty in upstream watersheds for sustainability of hydropower plants; (3) strengthening capacity of technical officers to apply catchment area management tools and implement payment for ecosystem services (PES) schemes; and (4) supporting knowledge sharing within the region and with other key countries on integrated catchment area management practices to promote sustainable hydropower.

### Development Partners Engagement in Forests and Forest Relevant Sectors

In October 2015, the European Union Commissioner for Climate Action and Energy and Agriculture and the Forest Minister of Bhutan signed a joint declaration on cooperation on climate policies.<sup>19</sup> In the declaration,<sup>20</sup> the EU and Bhutan recognized their important role in combating global climate change and agreed to consider specific needs of the least developed countries to increase their resilience to climate change. The EU committed to triple its assistance from €14 million (2007–2013) to €42 million (2014–2020), focusing on civil society/local authorities and sustainable agriculture/forestry. More specifically, the EU intended to support Bhutan in enhancing the resilience of rural households to the effects of climate change as well as the sustainability of renewable natural resources through the Global Climate Change Alliance (GCCA).

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<sup>19</sup> [https://ec.europa.eu/clima/news/articles/news\\_2015121001\\_en](https://ec.europa.eu/clima/news/articles/news_2015121001_en).

<sup>20</sup> See the declaration at: [https://ec.europa.eu/clima/sites/clima/files/docs/2015121001\\_declaration\\_en.pdf](https://ec.europa.eu/clima/sites/clima/files/docs/2015121001_declaration_en.pdf).

The United States Forest Service provides capacity building and technical assistance to the Bhutanese counterpart,<sup>21</sup> mainly on the following:

- Forest and carbon inventory
- Exposure to different approaches to address climate change through sustainable forest management

Helvetas<sup>22</sup> has been supporting Bhutan—for much of that time on mandates of the Swiss Agency for Development and Cooperation (SDC)—in the participatory management of its forests and in drafting its forestry law. Now it's focus has been shifted to new challenges, which are summed up in three C's: consolidate, capitalize, communicate.

SNV Netherlands had the project “Integrating PES and REDD+ in Bhutan,” which is a collaborative project between SNV Bhutan and the Watershed Management Division funded by Blue Moon Fund USA and Bhutan Trust Fund for Environmental Conservation.<sup>23</sup> With technical assistance from SNV Bhutan, Watershed Management Division and Dzongkhag Forestry Office of Paro have facilitated the third PES agreement in Bhutan, between the Namey Nichu Watershed Management Group (provider of environmental services) of Paro Dzongkhag and the drinking water users (environmental service users) consisting of five hotels and Satsham Water Association. The agreement was signed in October 2015 for five years (2016–2020).

The Royal Government of Bhutan and the World Wildlife Fund announced, in November 2017,<sup>24</sup> their commitment to create a US\$43 million fund to permanently protect Bhutan's network of protected areas. This would be combined with US\$75 million from the Bhutanese government, to be contributed over a 14-year period, to support a new program called Bhutan for Life (BFL). The program is supported in part by a US\$26.6 million grant from the Green Climate Fund. Funding generated through this initiative would be used to maintain and manage the country's parks and wildlife corridors in perpetuity, where sustainable economic development, such as ecotourism and organic farming, would be allowed in the protected areas. The BFL is based on an innovative funding approach—called Project Finance for Permanence (PFP)—that ensures the long-term financial stability for funding protected areas or their networks.

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<sup>21</sup> <https://in.usembassy.gov/our-relationship/bhutan-affairs/forest-conservation-cooperation-projects/bhutan-forestry-engagement/>.

<sup>22</sup> See: <https://www.helvetas.org/en/bhutan/what-we-do/how-we-work/our-projects/bhutan-forest-management>.

<sup>23</sup> <http://www.snv.org/update/third-pes-agreement-bhutan>.

<sup>24</sup> <https://www.worldwildlife.org/press-releases/bhutan-wwf-and-partners-announce-deal-to-permanently-secure-bhutan-s-extensive-network-of-protected-areas>.

## Annex B. World Bank Project Portfolio

Project ID	Project name	Lead Global Practice/ global themes	Appr. FY	Len. inst. type	Closing date	Commitment (US\$, millions)
P090157	Bhutan Second Urban Development Project	Social, Urban, Rural and Resilience	2010	IPF	30-Jun-2019	29.41
P155513	Food Security and Agriculture Productivity Project	Agriculture	2017	IPF	30-Dec-2022	8.00
P164290	Strengthening Fiscal Management & Private Sector Employment	Macroeconomics, Trade and Investment	2018	DPF	28-Feb-2019	30.00
P150177	Bhutan REDD Readiness Project (AF)	Environment and Natural Resources	2015	Carbon Finance	30-June-2020	8.6

## World Bank Bhutan Project Lending Pipeline

Project ID	Project name	Lead Global Practice/ global themes	FY	Len. inst. type	Commitments (US\$, millions)	Bank approval
P168166	Strengthening Fiscal Management and Private Sector Employment Opportunities	Macroeconomics, Trade and Investment	2019	DPF	30.00	28-Mar-2019

## Annex C. PRIME Analysis

### **Productivity**

**Despite the high forest endowment, forest productivity in Bhutan is low.** The degree of forest productivity is a key factor determining the contribution of a country's forests toward economic development and poverty eradication. Current productivity levels are low as FMUs are currently producing below the set AAC. The reported low net-operation ratios of current forest management units and the challenge of free roaming cattle browsing in reforested broadleaved forests indicate a low level of efficiency. Incidences of illegal logging and fuelwood collection are also undermining forest productivity, but data to determine the magnitude of losses are currently not available. Additional drivers affecting productivity are forest fires, land use conflicts with agriculture, and deforestation owing to infrastructure development.

**Degradation of forests has affected forest productivity, but the drivers are not sufficiently well understood.** The assessment of forest degradation drivers is a challenge, especially if based on changes in forest cover classes determined only by remote sensing methods. According to the recent report on drivers of deforestation and degradation in Bhutan, a disproportionate share of forest degradation is observed in broadleaved forests. This could hint at an interplay of forest utilization and inadequate forest regeneration owing to overgrazing of livestock. Especially in larger openings (for example, in FMU forests) and in broadleaved forests there is empirical evidence that cattle browsing seriously aggravates forest degradation (Buffum, Gratzner, and Tenzin 2008; Moktan 2014). Where community forests apply selection cutting, moderate grazing of livestock seems to have low impacts on forest regeneration (Buffum, Gratzner, and Tenzin 2008, 2009). Grazing constitutes a nutrient transfer from forests to agricultural lands, which increases the complexity of finding adequate responses toward forest grazing (Roder, Gratzner, and Wangdi 2002). Generally, more data and research are needed for a better understanding of the interaction and interdependence of degradation drivers. The current assessment of drivers of degradation in Bhutan is based on a simplified approach in which forest utilization, including harvesting, is inevitably equated with forest degradation.

**There is considerable scope to sustainably increase forest productivity in Bhutan.** Productivity can be enhanced by increasing the technical efficiency of timber harvesting and forest regeneration within the sustainable AAC per forest area (Schindele 2004). According to spatial assessments of forest resources, the productivity of Bhutan's forests could be considerably increased (Schindele 2004; MoAF 2014). Before the forest area for utilization is increased, the efficiency and effectiveness of the existing FMUs need to be improved to harvest timber and NTFPs at potential within the currently established AAC. In parallel, a study on potential harvesting levels using the SFM approach in the existing FMUs should be conducted. In the mid to long term, the current utilization of about 15 percent of forest area (including commercial forestry, community forestry, and forests for local use) could be increased to at least 20 percent, increasing the area of existing FMUs or creating new ones that would apply lessons learned from existing FMUs. A further avenue to increase forest productivity are the use and promotion of private forests. However, bureaucratic hurdles discourage rural households to register private forests. Action is required to tap the potential of private forest land, given that about 20 percent of agricultural land is left fallow (MoAF 2013).

## Possible interventions and engagement related to *Productivity*

Intervention	Threats and gaps	Specifics and opportunities
<b>Analytical work</b>		
<b>Analysis of the current state of harvest technologies used in FMUs and needs assessment</b>	Lack of skilled labor; lack of new technologies and equipment; country specific challenges (e.g., geography)	Transfer of state-of-the-art technologies and equipment for mountainous forest operations for more efficient and lower impact logging, improved biodiversity; reassessment of the AAC
<b>Review of commercialization of community forestry schemes</b>	Lack of capacity; unsustainable timber harvesting practices; fixed timber prices can be a disincentive	Analysis of the general guidelines for CF management plans and the area designated to CF to increase supply of commercial timber from community forests
<b>Assessment of potential for increasing the production of NTFPs</b>	Lack of investment in NTFP processing facilities and value addition; lack of access to finance for establishing SMEs	Needs assessment for implementation of NTFP management plans, including harvesting, value-addition and commercialization
<b>Capacity development</b>		
<b>Building capacity for sustainable forest management</b>	Timber harvesting is identified as a driver of forest degradation; SFM that includes timber harvesting should be promoted as an approach that is consistent with the GNH concept and Bhutan's Constitution	Training for FMUs and NRDL on SFM, including silvicultural practices to control the growth, composition, health, and quality of forests to meet Bhutan's timber and NTFP needs in a sustainable manner
<b>Investments</b>		
<b>Increase productivity of existing FMUs</b>	High cost for forest road infrastructure; costs for technology and equipment could be very high; lack of capacity to repair/maintain new equipment	Increase the area under sustainable forest management in existing FMUs; modernization of harvesting technology and equipment

## Rights

**Improving the governance of forest management in Bhutan is pivotal to ensure sustainability of forest use, to lay a foundation for enhanced productivity, and to counter issues of illegality.** The government has a powerful lever over the management of forest resources, since virtually all forest areas are designated as state reserved forests. This can be used to increase efforts countering forest offences (that is, illegal logging and wildlife poaching) and to tune forest policies with market mechanisms for improving the efficiency of resource use and allocation. Innovative governance structures coupled with systems of checks and balances may extend the commercial use of forests accompanied with strict monitoring and enforcement.

**Bhutan is on a good track to increase the participation of local communities in the management of forest resources, but the economic benefits remain unclear.** By law, virtually all forest tenure is with the government, including forests within protected areas. Under Bhutan's community forest policy, use and management rights over forest resources can be transferred to local people in rural areas. However, the government has the right to withdraw these rights at any time without giving due compensation (Helvetas 2011). Recent policies and laws strengthened the social capital (rights, responsibilities, and capacities) of local communities to access and use forest resources within the proximity of rural settlements. While

currently only 3 percent of forest land is under community management, the government intends to allocate a minimum of 4 percent of forest lands to communities by the end of 2020 (ibid). The 12th Five-Year Plan envisages an increase of the number of community forest management plans from 750 to 1,183, including revisions to existing plans.

**Benefits of community-managed forests must contribute to shared prosperity in rural communities.**

Recent empirical evidence suggests that the current setup of community forests in Bhutan are prone to elite capture within village communities (Rahut, Behera, and Ali 2016). In particular, the rights of local communities to participate in commercial timber trade is still a controversial topic because of the fear of unsustainable harvesting practices. Research is needed to identify structures and institutional arrangements that improve the inclusiveness of community forestry, increase the linkage with markets, and ensure that they are managed sustainably. This analytical work can help find forest governance arrangements that are more beneficial to the communities and have appropriate benefit-sharing mechanisms.

**The capacity of forest law enforcement requires strengthening against the background of increasing forest offences.**

Countering illegal logging and poaching of wildlife in Bhutan is challenging because of the country’s low population density, rugged terrain, and high forest cover. Measures such as the registration and licensing of chainsaws and increasing road checks have been put in place (Pokhrel 2017), but their effectiveness remains doubtful (Sears et al. 2017). The number of reported forest offences increased in 2009, the same year a policy was put in place that rewards government employees and informers reporting forest crimes. This underlines the importance of mechanisms that rely on incentives and monitoring of forest resources by people on the ground (that is, forest officers and the rural population). Increased de facto ownership of local communities over their forest resources could increase options to curb illegal logging. Additionally, the government may use satellite imagery technology and other modern technologies—for example, using drones (Global Conservation 2018)—to remotely monitor forest activities and detect illegal logging. Countering wildlife poaching is highly challenging and more specialized capabilities are required.

**Possible interventions and engagement related to *Rights***

Intervention	Threats and gaps	Specifics and opportunities
<b>Analytical work</b>		
<b>Identify innovative options for governance of rural forest resources</b>	Scaling up, monitoring challenges; risks of unsustainable harvesting; access to alternative fuel options and affordability; enforcement of new quotas	Assess policy options that improve efficiency of resource use and incentives to switch to cleaner fuels; examples include the modification of the current quota system of subsidized fuelwood and timber allocation to rural households, improving efficiency of resource use and incentives of switching to cleaner fuels, reviewing the timber allotment procedure to sawmills
<b>Review of current forest resource governance to expand production forest area</b>	Biophysical limitations to expand production forest area	Review and assess the compatibility of legal and regulatory frameworks relevant to forests by examining the various rules, regulations, and procedures that constitute barriers for increasing the production forest area under sustainable management

Capacity development		
<b>Build capacity for SFM in community forests</b>	Could trigger overharvesting; lack of access to finance to invest in value-addition activities	Training for community-based forest user groups on SFM, including planning, harvesting, management, and monitoring; training in value addition of timber and NTFPs
Investments		
<b>Strengthening of community forestry</b>	Forest degradation due to unsustainable timber harvesting practices; elite capture within community forest groups; adequate resource planning	Continue the transfer of publicly administered forests to community-based forest user groups and support SFM; strengthening of rural livelihoods; provision of income sources beyond lumber; creating ownership of forest and its sustainable management
<b>Employ latest technology to enforce forest laws</b>	Reliability of technology in remote areas; training of forest staff and community-based forest user groups; lack of information on forest crime hot spots; low population density	Invest in modern technologies (aerial surveillance, cell phone apps) to improve forest resource monitoring and enforcement of forest laws, and to counter illegal logging and wildlife poaching

## Investments

**Investments in Bhutan’s forestry sector could contribute to higher productivity of forest use and to the development of wood-based industries.** Transfer of state-of-the-art timber harvesting technology and know-how may unlock substantial gains for the commercial management of forests. These areas require cost-benefit analyses and, if feasible, should be tested in pilot interventions. For example, within the broader wood-product value chain, a detailed cost-benefit analysis was conducted to assess the potentials of charcoal production in Bhutan (Feuerbacher et al. 2016). More in-depth assessments—for example, an opportunity analysis—could build on these findings, potentially involving the private sector through joint ventures and public-private-partnerships. The economic potential of other forest-relevant sectors, such as furniture industries, requires more in-depth studies, for example, on benefits from the underutilization of hardwood tree species in Bhutan, which so far can hardly be processed owing to a lack in processing technology. Generally, the success of any private investment in Bhutan’s wood industries will be dependent on a conducive and enabling environment, the reliable supply of raw materials and technology, and skilled labor.

**The contribution of fiscal revenues from Bhutan’s forestry sector is low and potential tax reforms require careful analysis.** The government levies royalties on the commercial sale of timber and NTFPs. In fiscal year 2012/13, total royalties from forestry were about US\$1 million (55.5 million ngultrums), accounting for 0.3 percent of the government’s total revenue (MoF 2013). Concessional royalty rates are granted to timber harvested for subsistence use in rural areas, which is referred to as subsidized timber. Given the prevalence of rural poverty, any potential reform of the royalty regime must account for its implications on rural livelihoods. A flat discount on commercial royalties is easy to administer but drives a price wedge between the rural (subsidized) and commercial use of timber. Furthermore, it creates incentives of smuggling and inefficiency of timber use. Besides marginally changing the royalty system (for example, by reviewing the level and applicability of rates), the maintenance of collecting forest royalties could also be put up for debate. Currently, forestry is almost exclusively a rural economic activity benefiting rural households and is well aligned with the government’s objective of strengthening rural

livelihoods. Instead, taxes on wood-based products could be collected farther down the value chain (for example, production tax on charcoal or furniture production).

### Possible interventions and engagement related to *Investments*

Intervention	Threats and gaps	Specifics and opportunities
<b>Analytical work</b>		
<b>Opportunity analysis for domestic charcoal production</b>	Environmental pollution; increase in GHG emissions; quality control, access to finance and technology	Conduct an opportunity analysis for developing a domestic charcoal production industry, including PPPs based on strict environmental and international standards such as ISO/TS 17225-8:2016
<b>Review of royalty tariffs</b>	Prohibitively high cost for collection of royalties	Review the royalty tariff schedule to increase government revenue from commercial forestry and forest-based industries and to strengthen rural livelihoods
<b>Capacity development</b>		
<b>Develop wood engineering and architecture curriculum in universities</b>	High up-front costs and need for international experts; universities not equipped for new curriculum; lack of job opportunities	Offering a wood engineering and architecture education stream in universities would allow Bhutan to produce an educated labor force for the construction market; it would increase the demand for wood-based constructions
<b>Investments</b>		
<b>Technologies for low-impact logging</b>	High cost; access to finance; highly challenging terrain	Modernize timber harvest technologies to improve low-impact logging
<b>Pilot charcoal production unit</b>	Access to finance and technology; lack of private sector involvement; industrial emissions; unsustainable supply of fuelwood inputs, achieving critical scope	Pilot the domestic charcoal production using modern carbonization technology. Provides opportunity for use of low-value fuelwood in a high-value addition activity; opportunity to provide incentives for efficient use of fuelwood and generate rural employment; larger independence on imports of charcoal from India
<b>Invest in modern wood-based industry</b>	Access to finance; lack of skilled labor; stigma for using timber instead of steel and cement	Invest in SMEs using modern technologies (e.g., for producing cross-laminated timber, wood pellets, bio-briquette)
<b>Invest in high-value furniture industry</b>	Access to export markets, availability of skilled labor; access to quality roundwood	Invest in a high-value furniture industry—e.g., blending the traditional Bhutanese handicraft skills (“Brand Bhutan”) with modern furniture design and targeting high-income segments in Asia

## Markets

**The markets for forest products in Bhutan are highly regulated and separated into commercial and subsistence timber markets.** Figure C.1 illustrates the value chain of forest products for the year 2012 in Bhutan. Most of the harvested timber (~938,700 cubic meters, or 79 percent) is for fuelwood use (including wood chips), of which the majority (65 percent) is consumed by rural households (Feuerbacher et al. 2019). An estimated 253,100 cubic meters of timber is used for wood processing and construction industries. The supply of commercial timber from rural households and community forestry is estimated to be about 24,000 cubic meters, based on reported income from rural households' wood sale in the Bhutan Living Standard Survey 2012.

**The national timber market is not competitive because timber prices are fixed.** The prices (log and sawn) for broadleaf and conifer timber are set for each *dzongkhag* by the Natural Resource Pricing Committee (NRPC), comprising members from the Ministry of Economic Affairs, MoAF, Ministry of Finance, the Bhutan Chamber of Commerce and Industry and Druk Holding and Investments. The purpose of having the NRPC regulate the price of the timber is to make it affordable, accessible, and available to the people of Bhutan. The produced timber is bought by the NRDC and further distributed to licensed wood-based industries registered with the Association of Wood-Based Industries through a lucky-dip system. There is no auctioning system for timber.

**Bhutan has banned timber exports; thus, any wood product not produced in Bhutan needs to be imported.** Timber imports consist mainly of logs used in the wood processing construction industry, which comprise only 3 percent of Bhutan's total timber demand. There are no records of timber leaving the country illegally. Currently, the only forest products to be exported are NTFPs—about 61 percent of total NWFP value is currently exported (Feuerbacher et al. 2017). The high share is due to the exports of Cordyceps, a parasitic caterpillar-fungus facing high demand by consumers in China. Not shown in the forest product value chain is the high figure of charcoal imports due to the high demand of Bhutan's metallurgical industry, which makes up 60 percent of all wood-product imports. In 2012, about 55,000 tons of charcoal were imported, equivalent to about 390,000 cubic meters of timber (using a conversion ratio of 7.1 cubic meters/ton).

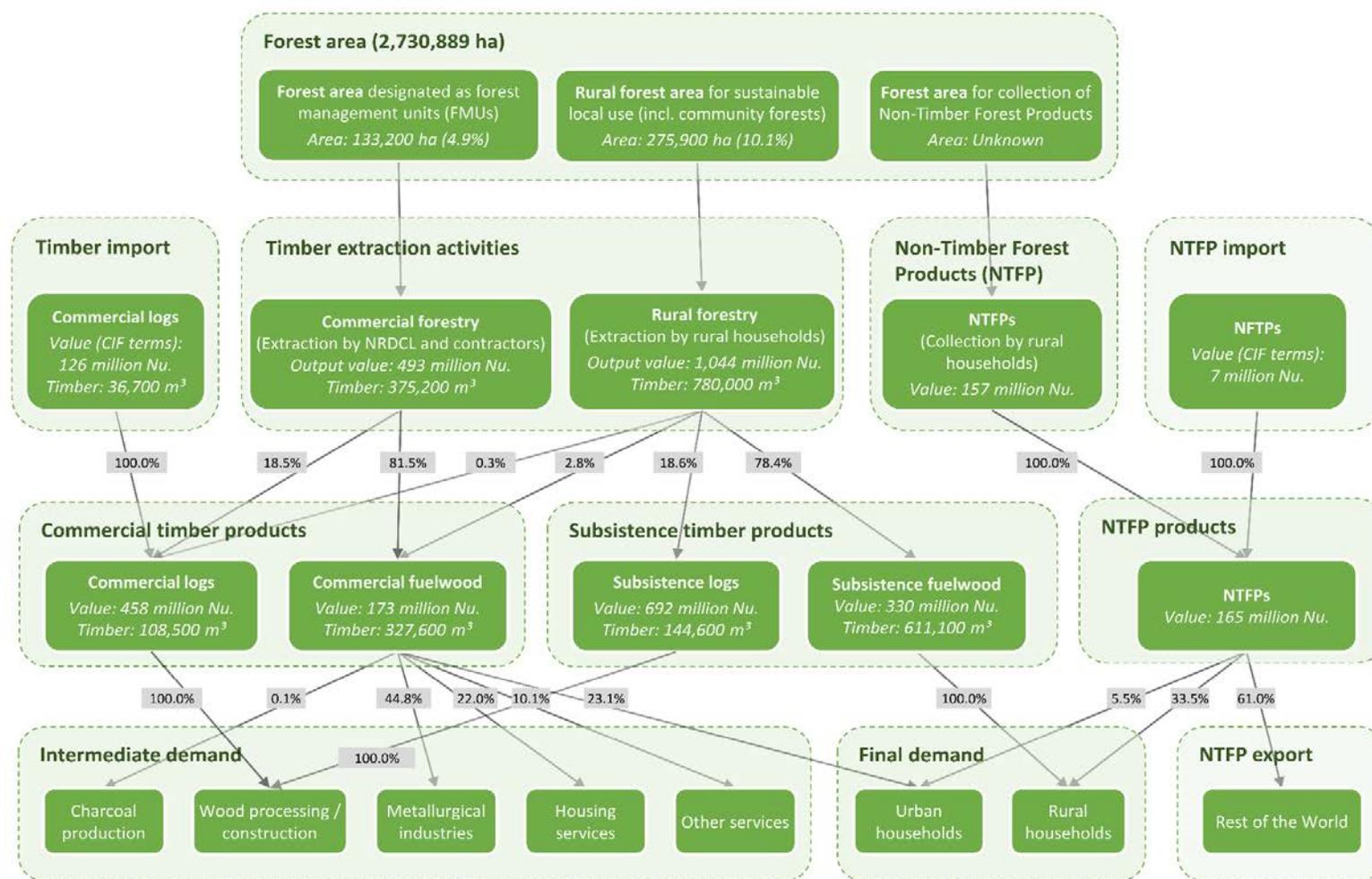
**Export markets can play an important role when sustainable forest management is scaled up and forest-based SMEs are supported.** Forest-based products from Bhutan could capitalize on the "Brand Bhutan" and other characteristics, such as being sustainably sourced and produced in compliance with a strict forest-conservation regime. Exports of high-value wood products (for example, furniture) and diversifying the exports of NTFPs away from Cordyceps only can provide attractive options for SME development. In addition to export markets, the increasing domestic base of high-income consumers and visiting international tourists provide further opportunities for marketing.

### **Possible interventions and engagement related to *Markets***

<b>Intervention</b>	<b>Threats and gaps</b>	<b>Specifics and opportunities</b>
<b>Analytical work</b>		
<b>Value chain analysis for underdeveloped NTFPs</b>	Data availability	Prepare value chain analysis for underdeveloped, high-value, and export-oriented NTFPs (e.g., for mushrooms with a focus on the domestic hotel and restaurant industry and export markets)

<b>Feasibility study for high-value furniture products</b>	Identification of suitable niches; data availability	Prepare a feasibility study for high-value furniture products and potential export markets
<b>Development of a timber auctioning system for Bhutan</b>	NRPC not equipped for auctions; needs political willingness to open parts of the timber sales to auctions	Develop a market-based approach to timber sales; price differentiation for high-value and lower-value species; promotes SFM; not all produced timber needs to be auctioned – provisions can be made for affordable timber to eligible parts of society
<b>Capacity development</b>		
<b>Regional capacity exchange</b>	Application of knowledge to Bhutan context; lack of access to finance to create SMEs	Increase participation in knowledge exchanges, e.g., on processing and marketing of forest products, timber sales mechanisms
<b>Investments</b>		
<b>Support high-value NTFPs</b>	Lack of private sector involvement, access to markets, private sector capacity, and skilled labor	Encourage investments in high-value NTFPs (e.g., medicinal plants, essential oils) for their value addition and processing; commercial income sources for rural households, leveraging the “Brand Bhutan”; organic certification possible; low entry barriers in terms of volume
<b>Promotion of forest-based SMEs</b>	Access to markets; banks to offer line of credit for forest activities; scale of operations	Improve access to finance for forest-based SME and promote cooperative arrangements such as JVs and PPPs, e.g., through the Druk Holding Investments.
<b>Wood-based construction materials</b>	Excessive demand for timber construction materials	Invest in a more efficient linkage between timber markets and the urban construction sector to increase the use of timber as part of a strategy for low-carbon development
<b>Timber treatment facilities</b>	Access to resources and technology, skilled labor	Enable the establishment of timber treatment facilities to lengthen life span of construction timber, thereby reducing domestic timber demand in the long term

Figure C.1. Bhutan's Forest Product Value Chain



Source: Based on Feuerbacher et al. (2019).

Note: For timber, the percentages show the relative distribution of physical quantities. For non-timber forest products (NTFPs), the percentages are based on values.

## Ecosystems

### **Forests provide multiple ecosystem services, which are particularly vital in mountainous geographies.**

Thanks to Bhutan's GNH philosophy, forest ecosystem services are well recognized and considered at the overall administration and policy levels. A recent report (Sears et al. 2017) has analyzed the relationship between the different categories of forest ecosystem services (provisioning, regulating, cultural, and supporting services) and the four pillars of GNH.<sup>25</sup> This report also provides an overview over published evidence on scientific assessments of forest ecosystem services in Bhutan. Beyond, there is a large body of literature documenting the importance of maintaining productive and intact forest ecosystems.

### **Despite the increase in forestry cover, there are concerning drivers jeopardizing the maintenance of forest ecosystem services.**

The replacement of traditional forest management practices by scientific ones is partially viewed as “detrimental to the forest ecosystem and to rural livelihoods” (Sears et al. 2017). However, the impacts of modern silvicultural practices on forest ecosystem services are understudied in the context of Bhutan. However, forest management can also have benefits for biodiversity—for instance, tigers prefer thinner forest cover to hunt their prey (Siebert and Belsky 2015). Beyond the skepticism against productive (and sustainable) forest management, the growing incidences of forest fires are recognized as the most pressing threat to forests ecosystem services in Bhutan (Sears et al. 2017). Furthermore, construction of infrastructure (for example, roads, hydropower) in locations vulnerable to soil erosion and landslides pose a risk of forest degradation.

### **The conversion of forests into other land uses is increasing and a concern for the government.**

Between 2008 and 2014, 9,426 hectares of government reserved forest land was lost to the construction of transmission lines, 5,462 hectares to farm roads, and 5,208 hectares to long-term land lease (NEC 2016). Moreover, between 2011 and 2012, 153 hectares of government land was allocated from protected areas and 2,561 hectares of land from other state land for developmental purposes leading to habitat fragmentation (MoAF 2019).

### **A critical ecosystem service is the conservation and protection of watersheds by effective vegetative cover, which regulates and reduces water flows.**

However, there is only anecdotal and hardly any empirical evidence on how disturbance of forest land in Bhutan, for example, due to timber harvesting, has affected downstream environments (Sears et al. 2017). Generally, Bhutan's growing hydropower sector is exposed to the risk of increasing siltation in reservoirs and the corrosion of turbine components due to sediments, resulting in increased maintenance cost and potentially reducing the operational lifetime of hydropower infrastructure (Nkonya et al. 2014). The crucial nexus between upstream watershed conservation and downstream users (for example, hydropower) is recognized within the National Forest Policy, which also addresses the rationale for the establishment of PES schemes. While some PES schemes have been initiated in Bhutan, Sears et al. (2017) argue to expand the evidence base “for causal pathways between upstream forest condition and downstream security, particularly for services such as water regulation,” before preparing large-scale initiatives for forest-related PES programs. In this context, more biophysical research is required to allow for evidence-based policies.

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<sup>25</sup> The four pillars of GNH are sustainable socioeconomic development, cultural preservation and promotion, environmental conservation, and good governance.

## Possible interventions and engagement related to *Ecosystems*

Intervention	Threats and gaps	Specifics and opportunities
<b>Analytical work</b>		
<b>Analysis of synergies between sustainable forest management and Bhutan's environmental objectives</b>	Complexity of ecosystems and their interaction with forest management, lack of biophysical data, uncertainty on valuation of ecosystem services	Study on the potential of synergies between sustainable forest management, biodiversity, and carbon sequestration
<b>Strategy for forest fire control in remote mountainous terrain</b>	Adequate prioritization of fire control methods; high costs; applicability; uptake of strategies that require behavioral changes	Analyze strategies to mitigate risks of forest fires, including assessing possibly measures like controlled burning and upgrading equipment and infrastructure
<b>Feasibility study for a national PES schemes</b>	Identification of critical watersheds; assessment of benefits	Analyze the potential of implementing a national PES scheme to protect critical watersheds in Bhutan
<b>Capacity Development</b>		
<b>Building capacity for scaling up of PES scheme</b>	Training of staff; adequate adaptation of tools to the context of Bhutan	Capacity building at federal and provincial levels to strengthen institutions to scale up PES schemes at the national and subnational levels.
<b>Investments</b>		
<b>Large-scale implementation of PES</b>	Requires suitability analysis; implementation risks; monitoring of effectiveness of PES	Scaling up of PES in critical areas providing watershed and slope stabilization areas to mitigate the risk of sedimentation of rivers and adverse impacts on other infrastructure

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