

2 Background

Bhutan is a small landlocked country covering about 40,077 sq. km. in the eastern Himalayas. It is located between 91° 41' and 91° 25' east and 27° 13' and 27° 25' north. It is bordered on the west, south, and east by India and in the north by the Tibetan Autonomous Region of China. Most of the Bhutanese landscape is mountainous with elevations ranging from 160 to 7,600 masl. Bhutan contains three physiographic zones. The northern zone lies at an altitude above 4000 masl and contains areas of perpetual snow, glaciers, barren land, and alpine grasslands; the central zone lies at 1,000 to 4,000 masl and contains both the important inhabited areas of the country and the major forested areas; the southern zone lies at 160 to 2,000 masl and comprises the Himalayan foothills. The natural ecological and climatic conditions of Bhutan favour forest as the dominant form of vegetation. It is estimated that forests cover approximately 72 per cent of the land area of the country (LUPP 1995). The overall land-use pattern in Bhutan is shown in Table 1.

The largest part of Bhutan's population resides in the steep valleys of the central belt and along the southern border region with India. The total population is estimated at 600,000 with an annual growth rate of three per cent. More than 85 per cent of the population is rural and 54 per cent is literate.

Bhutan has a predominantly subsistence rural economy with over 71 per cent of households classified as rural farms. Most fuelwood, grazing, and fodder are derived from the forest areas adjacent to settlements under customary use rights.

2.1 Extent of Forest Resources

Bhutan's forests are found in the central and southern zones of the country. The central zone contains the major forested areas. Forest lying in humid areas at altitudes from 1,000 to 2,000 masl contains a mixture of evergreen and deciduous broadleaved tree species and is classified as warm broadleaf forest. Chir pine

Land Use	Area in sq. km.
Agriculture	3,088
Forests	29,045
Pasture	1,564
Horticulture	58
Settlement	31
Other uses	6,289
Total	40,077

Source: Landuse Planning Project, RGOB (1997)

(*Pinus roxburghii*) forest is more common in drier areas at this altitude. Cool broadleaf forests are found on moist exposed slopes above the warm broadleaf forests, and evergreen oak forests on drier sites at the same elevation. Forests above an altitude of 2,500 masl contain mainly temperate conifers with some hardwoods. These conifer forests of blue pine and spruce are the main forest types of commercial significance. The southern zone has a subtropical climate and contains dense forests. The forests found along the southern foothills at altitudes of from 200 to 1,000 masl are classified as subtropical.

Agricultural lands lie close to, and in many cases within, the forested lands. Degraded forest areas are mostly located close to villages and agricultural lands, reflecting the traditional use of forests for fuelwood, fodder, and timber for rural house construction.

2.2 The Role of Forests in the Country's Economy and the Livelihood of the Mountain People

In Bhutan, forests play an important role in the conservation of environmental quality, the welfare of the rural population, and the productivity of agricultural land. The forestry sector directly contributes about 11 per cent of the gross domestic product (GDP) and generates about three per cent of government revenues through royalties and sales by various

agencies. Furthermore, protection of watersheds by forest has facilitated the development of hydropower plants.

The forest sector is estimated to provide employment to more than 25,000 people, mostly in collection of fuelwood for use rather than sale. Forestry is of strategic importance because the young and expanding wood-based industrial sector is largely dependent on forest resources. The wood industry in Bhutan is still in its infancy, and it consists mainly of small sawmills. There are a few medium-sized units including an integrated sawmill, plywood mill and joinery, and a particle board mill. Many sawmills operate sporadically depending on the availability of raw materials. The mechanisation level is very low and the operations are labour intensive. Many of the permanently operating sawmills work on a contract basis for the Forestry Development Corporation. Table 2 lists the major wood-based industries in Bhutan.

The amount of wood used by these industries is about 100-200,000 cubic metres per year. The capacity utilisation rate of the industrial units is thought to be very low (estimated to be 30-40%), mainly as a result of constraints resulting from the availability of raw material. The poor quality of machinery, low degree of mechanisation, and low utilisation rate appear to hamper the efficiency and economy of the sawmills seriously.

Type of Wood-Based Industry	Total
Sawmills	49
Sawmills and Crates/Boxes	5
Particle Board Factories	1
Blackboard Factories	2
Plywood Factories	1
Joineries/Woodworks	4
Broom Handle Factories	3
Furniture Factories	33
Tea Chest/Crate Factories	4
Wooden Handicrafts	1
Total	103

Source: Master Plan for Forestry Development (DANIDA/ADB 1991)

Forests are a major source of leaf litter, forage and fodder, edible fruits, essential oils, and medicinal plants. Although subject to government rules and regulations, the use of forests by households has been sanctioned traditionally as part of use-rights. For centuries, the people of Bhutan have depended on the forests to supply their needs for fuelwood, home construction, and inputs for farming systems. Wood demands from monasteries and government offices, and more recently from urban centres, schools, and other institutions have added significantly to the total demand for wood in the country. More than 98 per cent of domestic household energy demand and 83 per cent of the national energy balance for all users are met from fuelwood. The total consumption of fuelwood in the household

sector in 1988 was estimated to be 1.1 million cubic metres, and in all sectors together about 1.3 million cubic metres (Master Plan for Forestry Development, DANIDA/ADB 1991). Villagers also depend on the forest for grazing their cattle and for collection of fodder and litter for livestock. All individuals have the right to use government forest land to graze their cattle.

Evidence suggests that the pressures on forest are highly localised and mostly in and around the demand centres. This has led to visible forest degradation in certain densely-populated areas. This degradation has probably contributed to the low productivity of agricultural lands. Forest degradation is unlikely to have affected hydrological regimes in Bhutan since the major part of the land still has intact forest cover.