

Reports

Forestry and forest management in Bhutan

Bhutan is the only country in the Indian subcontinent which has been able to retain nearly three-quarters of its land under forests; this situation contrasts favourably with that in neighbouring countries where the Himalayan forests have been savagely degraded. The government of Bhutan is concerned to develop policies to preserve this valuable natural asset.

Bhutan, a small and mountainous country located towards the eastern end of the southerly face of the Himalaya mountains, covers an area of 40 250 km². While the present official estimate of total population is 1.2 million, all other estimates indicate it to be significantly less. The country is predominantly rural and is considered to be one of the least developed countries. The diversity of the physical environment, the limited knowledge available regarding some of its essential characteristics and the lack of trained manpower are some of the major constraints to formulating and implementing appropriate resource development policies.

Vegetation

As might be expected in a mountainous country with rapidly changing altitudes, ranging from about 200 m to significantly above 4 000 m, and climatic conditions varying from the moist tropical around the foothills of the Himalayas to the alpine conditions in the High Himalayas, the floristic characteristics of Bhutan change rapidly with local climatic conditions, which are primarily influenced by altitudes. On the basis of satellite imagery six ecofloristic zones can be identified correlating closely with altitude.¹ These zones are shown in Table 1. The distribution of these zones within the country is shown in Figure 1.

Although large tracts of Bhutan, particularly the more inaccessible forest areas, retain the natural climax flora, significant modifications to the

vegetation patterns have resulted from settlement and the practice of agriculture. Apart from the development of continuously cropped farms, extensive changes in vegetative cover have been caused by firewood gathering, shifting cultivation, livestock grazing and the defoliation of fodder trees. Generally, this has led to the reduction or elimination of the tree stands, and their replacement by scrub or patchy grass

swards. A notable exception, however, has been the purposive planting of deciduous oaks, the shed leaves of which are a preferred material for stock litter and composting.

Overall, native tree forests dominate the vegetative cover of Bhutan, accounting for an estimated 64% of the total land surface. Alpine and subalpine grasslands and scrubs account for about 7%; 20% of the land is either under perpetual snow, covered by water, or is barren and rocky. The balance of 9% is made up of the actively cultivated areas – about 4% – and ecologically degraded land between farms and adjacent to settlements.

Forestry resource and extraction

Forests are a major natural resource base of Bhutan. In terms of foreign exchange earning potential, they are probably second only to water. Forestry is also a significant public revenue

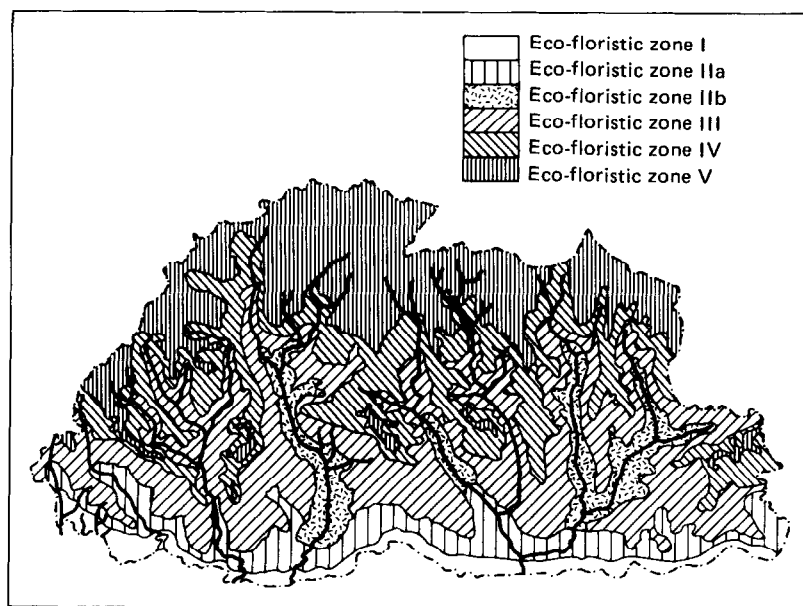


Figure 1. Bhutan vegetation map.

Table 1. Ecofloristic zones of Bhutan.

Zone	Designation (altitude)	Typical flora
I	Moist tropical (200–1 000 m)	Dense evergreens and semievergreens
II(a)	Moist subtropical (1 000–2 000 m)	Mostly evergreens, some deciduous trees
II(b)	Subtropical pine (1 000–2 000 m)	Open woodland, chir pine
III	Montane (2 000–3 000 m)	Evergreen oaks, blue pine
IV	Subalpine (3 000–4 000 m)	Firs, bamboo
V	Alpine (4 000 + m)	Juniper, birch, grassland

Source: G.S. Negi, *Forestry Development in Bhutan*, FAO, Rome, 1983.

source; royalties and taxes collected in 1980–81 were Nu 9.5 million,² accounting for 9.3% of the total government receipts. Both of these figures are significantly lower than the corresponding statistics of 1978–79, before restrictions were imposed on commercial logging. Forestry extraction volumes and values for the period 1976–77 to 1981–82 are shown in Table 2. Though the importance of forest royalties in total government receipts has declined, in 1984–85 they were still around three times land tax revenues.

Data are available on the forest resources from a comprehensive Pre-investment Survey of Forest Resources carried out between 1974 and 1979 with the assistance of the government of India and, more recently, a study of land use and vegetative cover based on remote sensing data. For the former study, aerial surveys were undertaken for about 63% of the country (the area excluded was the largely uninhabited north and north-west region) to obtain a low density forest profile. Forest cover distribution of Bhutan is shown in Table 3.

Bhutan is the only country in the Indian subcontinent which has been able to retain as much as 70% of its land under forests. The situation in Bhutan is significantly better than in neighbouring countries where the Himalayan forests have been much degraded. However, the pattern of forest exploitations in the country has been uneven. The forests in the south, especially those near the Indian border, and those near roads and centres of population, have been exploited, but the rest are relatively inaccessible and are virtually intact.

Forestry Act and policies

One of the first government directorates to be established in Bhutan was for forestry, in 1959. The Bhutan Forest Act became effective from November 1969 and for its implementation a National Forest Service was created as a department of the Ministry of Trade, Industry and Forests. The Act defined government reserved forests as 'any land under forests for which no person has ac-

quired a permanent, heritable and transferable right of use and occupancy'. This means that practically all the present dense conifer and broadleaved forests as well as the great majority of the bare or poorly stocked grassland on the lower valley slopes come under this category. Furthermore, the government is empowered to take over any private land used for cultivation, pasture and homestead and bring it under the purview of the Act if necessary for prevention of landslides affecting highways or for maintenance of water supply in catchment areas. The Act, however, safeguards certain rights such as grazing and collection of fuelwood and minor forest products for domestic consumption. The Act also established national parks and wildlife sanctuaries with defined boundaries within which timber exploitation, grazing, fishing and hunting are prohibited.

Local people, however, can obtain permits for timber for *bona fide* house construction on payment of a royalty which is fixed from time to time. The royalty at present is Nu 5 per tree, and people are entitled to a permit once

every 25 years. Nearly half of the 705 915 m³ of timber (306 374 trees) estimated as having been extracted during the Fourth Plan was used for house construction. The normal royalty for commercial timber at present is Nu 105 per m³.

A National Forest Policy was officially promulgated in 1974 covering: forest conservation; afforestation; resources survey; utilization programme; wildlife management and programme; forest administration and training; investment; revenue; research and publicity; forest law.

The policy on forest conservation included banning of the practice of shifting cultivation, known locally as *tsheri*.

Significant changes were made in 1979 respecting forest exploitation. All forest felling by private contractors was stopped and the export of timber was nationalized. Extractions fell from 134 100 m³ in 1978–79 to only 17 200 m³ in 1981–82, as shown in Table 2, reflecting the limited departmental extraction capability.

The Fifth Plan projected a total outlay of Nu 282.7 million for the

Table 2. Forestry extraction volumes and values (1976–77 to 1981–82).

	Cubic metres (thousands)			Nu (millions)		
	Commercial	Departmental	Total	Commercial	Departmental	Total
1976–77	143.3	–	143.3	2.99	–	2.99
1977–78	115.0	–	115.0	7.11	–	7.11
1978–79	134.1	–	134.1	11.02	–	11.02
1979–80	101.1	1.4	102.5	2.61	0.28	2.89
1980–81	25.1	3.2	28.3	0.52	0.23	0.75
1981–82	–	17.2	17.2	–	2.61	2.61

Source: Department of Forestry, *Information on Forests and Forest Development*, Ministry of Trade, Industry and forests, Thimphu, Bhutan, no date.

Table 3. Forest cover distribution in Bhutan.

Land use and vegetation types	Area	% of
	km ²	total land area
Alpine pasture/meadows	747.70	1.9
Alpine scrub (rhododendron, juniper scrubs)	1 918.05	4.7
Fir	2 956.17	7.3
Mixed conifer	4 854.34	12.1
Blue pine	755.28	1.9
Chir pine	1 291.62	3.2
Hardwood mixed with conifers	2 193.06	5.5
Upland hardwood (temperate)	8 726.27	21.7
Lowland hardwood (tropical and subtropical)	3 513.63	8.7
Degraded forest	1 415.90	3.5
Plantations	27.38	0.1
Total forested	28 399.40	70.6
Total land – Bhutan	40 250.00	100.00

Source: G.S. Negi, *Forestry Development in Bhutan*, FAO, Rome, 1983.

Table 4. Proposed outlays for the forestry sector for the Fifth Plan (million Nu).

	Total	Development	Maintenance
Regular programmes			
Survey, demarcation and management plans	9.438	9.300	0.108
Afforestation	7.643	5.624	2.019
Wildlife management	2.587	0.100	2.487
Fire conservancy	0.631	—	0.631
Logging roads and paths	17.076	16.000	1.076
Tashila ropeway	4.258	4.258	—
Training/study tours	5.933	5.933	—
Establishment expenses	49.474	10.943	38.531
Total regular programmes	97.040	52.188	44.852
Investments			
Gedu veneer project (integrated wood industry)	108.093	108.093	—
Graded particles board	56.301	56.301	—
Logging (wood harvesting)	21.134	21.134	—
Feasibility study	0.132	0.132	—
Total investment	185.660	185.660	—
Grand total	282.700	237.848	44.852

Source: Planning Commission, *Fifth Plan, 1981–1987: Main Document*, Planning Commission, Thimphu, Bhutan, no date.

forestry sector, which was 6.5% of the total proposed outlays. Of this amount, Nu 97 million was for the regular programmes, and Nu 185.7 million for commercial and industrial activities as indicated in Table 4. So far as the investment plans were concerned, only Nu 37 million (about 20%) was available from internal budgetary sources: the balance of Nu 149 million was to be met from external sources.

The forest cover is reasonably well distributed across the country, ranging from a low of 63.2% of the land surveyed in the north-west to a high of 80.6% in the south for a national average of 74%. North-west Bhutan accounts for about 51% of all coniferous forests of the country; 54% of the broadleaved forests are to be found in the south.

On the basis of the official 1985 population estimates, per capita forest area in rural Bhutan varies from a high of 11.02 ha in Gasa to a low of 0.56 ha in Chirang with a national average of 3.6 ha per capita.

It has been estimated by UNDP that the total growing stock volume of both coniferous and non-coniferous forests is about 480 million m³. The same report, however, estimated the per capita consumption of wood at about 2.2 m³ per year, most of it in the form of fuelwood (although it is more likely to be around 3 m³ per year). The amount of timber generally scheduled

for future extraction is well below the potential yield because of inadequate infrastructure and the lack of institutional capability to handle large volumes of timber.

Social forestry

A modest beginning in social forestry was made in 1976–77, with programmes to encourage the growing of trees in settlements so as to increase the supply of fuelwood and timber for domestic consumption, and to educate the farmers in scientific forestry practices.

According to a recent government directive, each rural household is required to plant 10 to 100 trees in its own land under the social forestry programme. The Department will distribute 400 000 seedlings to farmers free of cost during the Fifth Plan in order to support the planting programme. Nu 300 000 has been budgeted for improving and expanding the nurseries for growing the seedlings. Royalties cannot be levied by the Forest Department on the trees planted under the social forestry programme, provided they have been registered with the Department.

To date, social forestry has not made any noticeable progress in Bhutan. For instance, only about 2.5 ha of land has been used for social forestry plantations in the districts of Samchi and Pema Gatshel.

One constraint could be that under the Bhutan Forest Act of 1969 there is no provision for the Department to lease forest land to rural communities for communal forestry. Also, under the 1974 National Forest Policy, people are entitled to harvest 120 forest trees, irrespective of size, for house and other construction; this reduces the incentive to plant their own trees.

Deforestation and obstacles to forestry development

One estimate is that the rate of annual deforestation in Bhutan is about 2 000 ha per year, mainly as a result of shifting cultivation and illegal encroachment on forest lands.³ The deforestation problem is most serious in the Phuntsholing and Gaylepphug areas, where it has contributed to some environmental problems. Areas under forest in the early 1970s were cleared for settlement. Protective belts of vegetation were left on both sides of the rivers and in catchment areas, but these were soon encroached upon. First, fuelwood for cooking was taken. Then timber for construction and trade was extracted. Additional land was cleared by the settlers. Livestock introduced by the settlers used the forest for grazing. These factors over a decade contributed to forest degradation, which in turn has increased surface run-off. Soil erosion in these areas has been a serious problem.

Degradation of these forest lands continues through unregulated cattle grazing, which damages the soil and retards the natural regeneration of trees. The problem is further aggravated by forest fires.

The Bhutan government, which is aware of the environmental problems created by forest degradation, is following two reforestation approaches:

- Enclosure of heavily depleted forests to induce and protect natural regeneration; and
- new plantations where natural regeneration is not feasible.

These measures are supported by regulations on logging and grazing, by the settlement of people practising shifting cultivation and by commutation of

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private rights where judged necessary.

The Fifth Plan envisaged 9 330 ha of new plantations including 7 500 ha specifically to provide raw materials for industrial purposes.

Constraints to forestry development

Some of the principal obstacles to a more rapid and effective forestry development programme are indicated in the subsequent paragraphs.

Lack of trained manpower and equipment. There are severe shortages of trained manpower in several aspects of forest management, mountain logging, industrial processing of wood, management of wood-based industry and equipment maintenance and repair. Currently a forest school exists at Taba, Thimphu, which strengthens the cadre of foresters and forest guards. So far 75 foresters and 300 forest guards have been trained at Taba, so that in manpower terms the forestry sector may have some advantages over other sectors; but even so the technical expertise available is seriously limited.

Poor transport. Adequate access to forests and networks of roads for harvesting operations and reforestation purposes do not exist at present. The limited transport and communication systems of the country make transport of forest products difficult and costly.

Terrain characteristics. Because of the topographical characteristics of the country, harvesting and reforestation (site preparation, tree planting and maintaining of established stands) have to be carried out in slopes ranging from 20% to over 60%. Construction and maintenance of access roads to such sites is an expensive and difficult task. Adequate precautions need to be taken to prevent landslides and erosion. It is also not easy to find enough level land where large nurseries can be established.

Illegal use. Illegal occupancy of forest lands and unauthorized grazing of cattle in degraded forest areas con-

tinues to be a widespread problem. Eviction of squatters and their resettlement elsewhere has not been an easy task.

Lack of information. Accurate contour maps and supporting aerial photography are essential for good forest management. Unfortunately they are still not available. Information on types of soil and their productivity is lacking. The paucity of data and research information makes selection of species for reforestation difficult.

Forestry extension. The forestry extension service presently concentrates on seedling distribution. More attention could be given to other aspects of extension, for example explaining the value of social forestry and increasing public awareness of the costs of deforestation.

The emphasis given to forestry in policy formulation, legislation and training provisions demonstrates the recognition by government of the critical importance of forests both as a factor in the environment and a commercial asset. The development of an appropriate institutional framework and adequate infrastructure to utilize

the forests efficiently is, however, still at its early stages.

It should also be noted that whereas there is considerable concern in neighbouring countries like India, Nepal and Pakistan on the extent of deforestation in the Himalayan region and its overall long-term impacts on the environment, the Royal Government of Bhutan is acutely aware of the necessity of maintaining the country's natural resource base. The present policies and the proposed development plans clearly reflect this concern.

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¹G.S. Negi, *Forestry Development in Bhutan*, FAO, Rome, 1983.

²The currency of Bhutan is Ngultrum (Nu), and 1 Nu is equivalent to 1 Indian rupee. One dollar is now approximately equivalent to 12 Nu.

³Department of Forestry, *Reforestation/Afforestation Project in the Phuntsoling and Gaylephug Areas*, Ministry of Trade, Industry and Forests, Thimphu, Bhutan, no date.

The analysis is based on data collected when the author was on a Special Programming Mission to Bhutan on behalf of the International Fund for Agricultural Development. The opinions expressed are those of the author.