ROLE OF FORESTS IN THE MIDDLE HILLS' ECONOMY

The pattern of occurrence and utilization of forests in the Middle Hills is intricately interwoven with the pattern of settlement and farming practices. Table 1 indicates that the Middle Hills of Nepal have a relatively large amount of forest cover at 40 per cent, but this is misleading as the land categorised as forest land in Table 1 includes all land which is at least 10 per cent covered by trees. Much of this forest land has only a scattering of trees due to heavy utilization.

His Majesty's Government of Nepal, through the Forest Department, exercises control over all forest land (which may include grassland and shrubland).

Permanent human habitation is largely confined to areas below about 2000 m due to the short growing season at higher altitudes. The forests up to 2300 m are generally under heavy pressure to provide a range of products necessary for subsistence agriculture.

The forest products in demand include firewood (Plate 3), fodder (Plate 4), leaf litter and grass for animal bedding and compost, construction timber, thatching material, edible fruits, vegetables, medicinal plants, and material for religious ceremonies. While many of these products are available from private lands they are rarely available in sufficient quantity to satisfy demand because of the generally small size of individual holdings. Consequently, off-farm sources of forest products are necessary to satisfy the demands of most hill farmers.

Almost all of Nepal's energy needs are derived from biomass fuel, which includes fuelwood and a range of woody weeds and agricultural residues. Of all wood utilized from the forests, 95 per cent is used in the form of fuelwood (Manandhar 1980). Campbell and Bhattarai (1984) estimated that the average annual consumption of fuelwood in the hill regions was 640 kg per person, although large regional variations have been reported (Donovan 1981; Mahat, Griffin, and Shepherd, 1987a,b).

Table 1. Land Use in the Middle Hills of Nepal

Land Distribution	Area	Percent
Forest land*	1,794,100	40.4
Cultivated land	1,222,500	27.5
Non-cultivated inclusions	665,400	14.9
Grass land	292,600	6.6
Shrub land	409,300	9.2
Other land (ice, rock, water, and urban)	60,600	1.4
TOTAL	4,444,500	100.0

* Land which is at least 10 per cent covered by trees.

Source: Land Resources Mapping Project (Nield 1985).

Plate 3.
The forests provide fuelwood for cooking and heating. Pruned branches from young chir pine plantations provide substantial amounts of fuelwood for the local people.

Plate 4 The agricultural system is heavily dependent on the forest for foliage collected for fodder and bedding material for stall-fed livestock.

As previously noted, the number of livestock kept per household is quite high. Arnold and Campbell (1985) report that in some areas the numbers of livestock are decreasing, but there remains a great demand for foliage, grass and litter for livestock production. The annual fodder consumption is as high as 16 tonnes f.w. per family in some communities (Brewbaker 1983), while the quantity of foliage litter used for bedding material amounts to 6.4 tonnes per family. Brewbaker (1983) estimated that 35 per cent of animal feed is derived from trees and that throughout Nepal, a staggering total of seven million tonnes of dry feed is required from trees each year.

Farm-Forest Dependency

There is a one-way flow of products from the forest to the farm (Figure 2), and the extent of this flow and the ability of the forests to sustain themselves in the long term is a subject of considerable concern. An indication of the dependence of the hill farming system on forests is gained by determining the amount of forest required to provide the essential inputs of fodder, fuelwood, and construction timber to the farms.

Wyatt- Smith (1982), in a study in west-central Nepal, estimated that an area of 2.8 ha of productive but unmanaged forest was required to sustain 1 ha of agricultural land for fodder. The equivalent ratios for fuelwood and timber were 0.36:1 and 0.32:1 respectively.

However, if forest land is taken to include forest, shrubland and grassland (i.e. all uncultivated vegetated land not in private ownership), the ratio for fodder is reduced to 0.97:1 (calculated by Mahat et al 1987a).

A similar study carried out in parts of Sindhupalchok and Kabhre Palanchok was undertaken to determine the amount of land needed to support the agricultural system. This study, reported by Mahat et al 1987a, indicated that the total leafy biomass taken from the forest requires 1.33 ha of forest land (forest shrub and grass) for 1 ha of agricultural land (cultivated and non-cultivated inclusions). This figure is reasonably similar to that developed from Wyatt - Smith's data.

When the situation is considered on a panchayat basis even the minimal ratio of 1.33:1 is found in only 22 out of 79 panchayats in Sindhupalchok and 27 out of 96 in Kabhre Palanchok. Thus in both districts, current use of forests, shrubland, and grassland for fodder and bedding probably exceeds sustained yield in about two-thirds of the panchayats (Mahat et al 1987a). In such areas degradation of the remaining forests must be proceeding rapidly. However, it must be stressed that a considerable degree of uncertainty still exists with regard to most of the data and the interpretations made from them.

In the past some confusion has surrounded the precise definitions of terms such as forest land and agricultural land. The recently completed land use survey conducted by the Land Resources Mapping Project (the results of which were summarised by Nield 1985), has clarified the situation to some extent. In this survey estimates were made of the area of non-cultivated land normally mapped within the agricultural boundaries. These non-cultivated inclusions amount to a substantial total area and while many of them already carry some forest cover, there may well be possibilities for improving their productivity. At this stage, uncertainty exists about the ownership of these small patches of land. No doubt many are under private ownership, but some may be considered as communal resources.

Table 2. Family Size and Large Animal Numbers Estimated From Surveys in Various Parts of Sindhupalchok District in the Middle Hills of Nepal

	Units	New Era	Shrestha	Mahat Griffin,& Shepherd
Family size	Persons	6.1	6.2	8.1
Large animals household	no.per	4.62	3.69	9.4

Source: (New Era 1980; Shrestha 1982; Mahat, Griffin, and Shepherd 1987b).

Table 3. Composition of Various Land Use Categories in Two Districts (Sindhupalchok and Kabhre Palanchok) Northeast of Kathmandu. (The High Himal physiographic region is excluded as it is generally inaccessible to most farmers.)

	Sindhupalchok		Kabhre Palanchok	
	Area (ha)	%	Area (ha)	%
Cultivated land	41,588	20.0	36,444	25.9
Non-cultivated inclusions	22,313	10.8	25,155	17.9
Forest land*	87,577	42.2	39,565	28.2
Shrubland	33,771	16.3	34,236	24.4
Grassland	11,756	5.7	3,746	2.7
Other (water, sand, rock)	10,485	5.0	1,339	0.9
Total	207,490	100.0	140,485	100.0

* Land which is at least 10 per cent covered by trees

Source: Land Resources Mapping Project (R. Nield 1985)

Forest areas above the zone of permanent human settlement (i.e. above the extent of heavy influence from Middle Hills farmers -- about 2300 m) are in much better condition than those of lower areas because of decreased utilization pressures.

However, different patterns of utilization occur in these higher forests. Many of the communities living in the higher elevation areas are heavily dependent on grazing animals for a major part of their livelihood (Alirol 1979). Herds of animals (mostly sheep and various types of yak-cow crosses) are taken through the high forests at the end of each winter to graze in the alpine pastures up to an elevation of about 5000 m. The animals and their attendant families return to lower elevations at the onset of the following winter. This annual migration of stock has probably been in progress for many centuries.