

CHAPTER 5

The State of Mountain Agriculture in Nepal

Introduction

Nepal is a mountainous country. About 1.7 million hectares or 65% of the total cultivated land is used for 'rainfed' (non-irrigated) agriculture, and 62% of this rainfed agricultural land is found in the mid-mountain region. There is a considerable diversity in environmental conditions, from sub-tropical climates at low elevations (<500m) to cold temperate climates at high elevations (<2500m). Agricultural activities in the hill areas are extremely complex with multiple cropping seasons within a year. The mid-mountains are dominated by upland farming systems characterised by a predominance of maize-based cropping systems, intensive cultivation, a high degree of subsistence, a high labour input, and close integration between crops, livestock, and forest. Agricultural activity in the higher mountain areas is dominated by production on steep hill slopes, large areas of which have been extensively terraced. Soil erosion is a continuing problem, particularly where land has been deforested and disturbed. An even more widespread problem in the region is loss of soil fertility and the lack of sustainability of the existing cropping systems.

In general, the number of holdings has increased in the last decade, resulting in a decreased size in the average holding per household. Holdings are also highly fragmented, the average parcel size in the hills is 0.2 ha with a holding of 3.9 parcels, or 0.78 ha, per household (Yadhav and Sharma 1996). Table 5.1 shows the average size of landholdings in the high and mid-mountain regions. The majority of households are classified as 'marginal farmers' with holdings of less than 0.05 ha. Less than a quarter of farmers in both areas are classified as 'small farmers' with landholdings of between 0.051 and 1 ha. About 20 per cent of households have landholdings of more than one hectare.

Table 5.1
Landholding size in the high and mid mountains, Nepal

Farm Size Class (ha)	High Mountain		Mid Mountain	
	% of HHs	HH Size	% of HHs	HH Size
0.025 to 0.051	67.5	5.0	53.6	5.4
0.051 to 1.02	20.6	6.1	24.9	6.6
1.02 +	19.9	7.8	19.9	8.2

Source: Munankarmi (1996)

Cropping Systems

The typical cropping patterns found in the low hills (below 1,000m), mid mountains (1000-2000m), and high mountain areas are summarised in Table 5.2. The most common main crops are paddy, wheat, maize, and potatoes in the low hills; paddy, wheat, maize, and millet in the mid-mountain region; and barley, maize, wheat, and potatoes in the high mountain region.

Table 5.2
Cropping patterns in the low hills and mid and high mountains of Nepal

Low Hills (below 1000m)	Mid-Mountains (1000-2000m)	High Mountains (2000-4000m)
paddy-wheat	maize/millet-fallow	maize/finger millet-fallow
paddy-wheat-maize	maize-potato	maize-wheat or barley
paddy-potato	Upland paddy-wheat	potato-fallow
	Upland paddy-potato	buckwheat-fallow

Food Grain Crops

The data on crop yields for the ten years from 1985/86 to 1995/96 were averaged to facilitate a comparative analysis of crop productivity in the different regions (Table 5.3). The crop yields of the major food grain crops paddy, maize, wheat, and millet, were lower than the national average in both the hills and the mountains, with the exception of millet, which had a slightly better yield in the hills and a lower yield in the mountains than in the hills.

Table 5:3
Average yield of food grain crops (kg/ha) in Nepal (1985-95)

	Paddy	Maize	Millet	Barley	Wheat
Mountains	1,875	1,476	1,032	902	1,045
Hills	2,122	1,491	1,068	896	1,221
Average for Nepal	2,179	1,547	1,050	911	1,358

Source: MOA, HMG (1985/86 to 1995/1996)

The growth rates in the area, total production, and average yield of the major food grain crops between 1985/86 and 1994/95 are shown in Table 5.4. There was minimal growth (stagnation) in the area, production, and yield of paddy, but significant growth rates were observed for maize, wheat, and millet. Maize production increased at annual rates of 1.5 and 2.2% in the high mountain and hill areas respectively, wheat production by 2.6 and 1.6%, millet production by 2.5 and 3.5%, and barley production by 1 and 3%. In the mountains, the increase in maize production resulted mainly from an increase in the area planted, that of wheat from both an increase in area and an increase in productivity.

Although the total production of the major food grain crops in both the high mountain and mid-hill areas outpaced the annual growth in population (1% in the high mountains, 1.6% in the hills between 1981 and 1991), the annual growth rates in crop yields were still well below these rates.

Table 5.4

Average annual growth rates in the area, production and yield of major cereal food grain crops in the mountains and hills of Nepal (%) (1985/86-1994/95)

Area	Paddy	Wheat	Maize	Millet	Barley
Mountains					
Area	0.74	0.85	1.11	1.67	0.18
Production	0.92	2.62	1.52	2.51	1.02
Yield	0.19	1.77	0.41	0.86	0.62
Hills					
Area	0.36	0.55	1.06	2.15	2.17
Production	0.97	1.58	2.17	3.51	3.03
Yield	0.68	1.03	1.12	1.34	0.83

Horticultural and Cash Crops

Production of fruit, vegetables, and other special horticultural crops is gaining commercial importance in Nepal. Horticultural enterprise has increased the possibility of generating employment by over two per cent in addition to self-employment in the hills. Farm household level studies in the Rapti mountains showed that the cost/benefit ratios of horticultural crops are much better than those of food grains. This economic benefit has considerably increased the social acceptability of horticultural crops (Tulachan 1997). There was an estimated growth of about 12% in the total production of citrus fruit and 6% in that of non-citrus fruit between 1974/75 and 1992/93 as well as an impressive increase in the production of vegetable crops. The horticultural sector has a strong export potential. Horticultural crops contributed 13% to the agricultural gross domestic product in 1991-92.

Land is the key farm resource. Over the last ten years, there has been a considerable expansion in the area under horticultural crops as a result of both bringing idle land under cultivation and changing the use of fields previously used to grow food grains. Table 5.5 shows the increased allocation of land resources to horticultural crops over the different plan periods (1987-1997). Sizeable portions of land under these crops are from newly cultivated upland (waste, forest, and grass land) and some has been shifted from cereal crops (maize, millet, wheat) to horticultural cash crops. From the end of the fifth five-year plan (1986) to the end of the sixth five-year plan (1991), the percentage increase in area and production was greater than 20 and 40% for fruit and vegetables respectively. Similarly, from the end of the sixth five-year plan (1991), to the end of the

Table 5.5

Land allocation for high-value cash crops (horticulture) at the national level

Particular	End of 5 th Five Year Plan	End of 6 th Five Year Plan	Percentage Increase	End of 7 th Five Year Plan	Percentage Increase
Fruits					
Area (ha.)	42,077	51,176	21.6	63,126	23.35
Production (mt)	275,000	343,204	24.8	461,746	34.54
Vegetables					
Area (ha)	96,000	138,000	43.75	140,500	1.8
Production (mt)	5,280,000	743,000	40.7	970,200	30.5

Source: NPC documents (1995)

end of the seventh five-year plan (1997), a significant increase in area and production has been observed.

Table 5.6 shows the average annual growth rates in the area, total production, and average yield of various fruit crops between 1993/4 and 1997/8. The area under the major crops, apple and citrus, increased significantly. There was little increase in yield for any of the crops.

Table 5.6
Average annual growth rates in the area, production and yield of various fruit crops in the mountains and hills of Nepal (%) (1993/94-1997/98)

Crop	Area	Prod	Yield
Apple	2.83	3.24	0.45
Citrus	2.39	2.83	0.31
Pear	0.19	0.65	-0.05
Walnut	1.83	2.10	0.33
Peach	2.09	1.94	1.00

Livestock

Livestock contributed about 32% of the national agricultural gross domestic product in 1991/92. The livestock population in Nepal in relation to the arable land per person is one of the highest in Asia (LRMP 1986). There are an estimated 6.2 million cattle, 3.1 million buffaloes, 5.4 million goats, 0.9 million sheep, and 0.6 million pigs in the country (DFAMS 1997). In the subsistence agricultural system practised by 90% of the population, livestock rearing is an important sector of the farm economy.

In the mountains and hills of Nepal, the livestock production system is integrated with the production of staple crops like paddy, maize, millet, wheat, and pulses as well as fruit and vegetables. The livestock supply draught power, manure, milk, and meat and the crops supply food and fodder. The most common livestock species found in mixed crop farming are cattle, buffalo, and goats. Nearly half of the animal feed comes from crop residues. There is an acute shortage of animal feed during winter and the dry season (Tulachan 1985) and livestock are generally underfed to the extent of one third of the required amount. Nepal as a whole has a feed shortage of 20 to 36% (Sherchand and Pradhan 1997), the problem being more acute in the hills and mountains.

On average, a mountain/hill household has six to ten head of large and small ruminants (Shrestha and Sherchand 1988). The number of standard livestock units (SLUs) per household is about 7.5 in the high mountain areas compared to 5.7 in the mid-mountains and 4.3 in the plains (the *Terai*). The overall number of livestock per capita is also higher in the mountains as is the contribution to the average household income. Livestock contribute close to 50% of household cash income in the mountains, 36% in the hills, and 20% in the plains (Table 5.7).

Table 5.8 shows the trends over time in the number of animals of different species and their proportion of the total between 1988/89 and 1996/97. In the hills, there was a significant increase in the populations of cattle, buffalo, and goats and an increase in the percentage share of

Table 5:7

Average annual livestock contribution to household economies by eco-region (NRs)

Ecological Region	Crops	Livestock	Agriculture Total
Mountain	3549 (52.7)	3190 (47.3)	6739 (100)
Hill	4495 (64.3)	2495 (35.7)	6990 (100)
Terai	8224 (80.0)	2057 (20.0)	10281 (100)
All Nepal	6007 (71.7)	2371 (28.3)	8378 (100)

Figures in parentheses indicate per cent of total
Source: Shrestha N.P. and Sherchand, L. (1988)

Table 5.8

Livestock population and composition in the mountains and hills of Nepal
(1988/89 to 1996/97)

Livestock species	Mountain		Hills	
	% increase in population	% change in composition	% increase in population	% change in composition
Cattle	+3.17	+0.89	+5.77	-0.51
Buffalo	+0.58	0	+8.30	+0.21
Sheep	-9.59	-1.70	-2.53	-9.59
Goat	+2.87	+0.80	+9.37	+2.87

Sources: HMG-MOA1990;HMG-MOA1996/97

buffaloes and goats in the total population. In the mountains there was an increase in the number of both cattle and goats and a slight increase in the number of buffaloes. There was a significant decline in the sheep population in both regions.