CHAPTER 7

Trends of Mountain Agriculture in the Hindu Kush-Himalayas

In the mountain areas of the HKH region, over 80% (full or part-time basis) of the population depend on farming for their livelihoods. Thus sustainable development and growth of the farming sector provide the only viable means to reduce poverty in mountain farming communities. In order to initiate this effectively it is first necessary to have a good systematic understanding of the present state of mountain agriculture. In this chapter the patterns and trends over the past ten to fifteen years across the HKH region of three integral components of mountain farming systems—food grain crops, horticultural and cash crops, and livestock—are summarised. The analysis makes use of the time series' data published by national governments. The patterns and trends are examined in terms of shifts in the allocation of land resources (reflecting land-use changes), changes in crop productivity and total production, and transitions in livestock population. Selected provinces, states, and regions in five Hindu-Kush Himalayan (HKH) countries—Bhutan, China, India, Nepal, and Pakistan—are used as examples. The trends identified could have considerable implications for the long-term sustainability of mountain agriculture as practised now.

General Trends and Patterns

The trends identified were not all uniform across the HKH countries, rather they varied somewhat from region to region.

Overall in the region neither the area under food grain crops nor the crop yields changed to a significant extent—small increases in one area were balanced out by decreases in another. Although the yields of food grains changed little, overall the yields in the mountain areas are lower than the national averages. The amount of land allocated to horticultural crops (fruit and vegetables) increased significantly across the region, but the yields of these crops stagnated or declined. These results suggest that at farm household level mountain farmers are maintaining a relatively stable production of food grain for food security reasons but have rapidly expanded the area under horticultural cash crops because of the opportunity to earn cash income and in response to the increased accessibility and demand.

The trends in livestock population and composition were very similar across the HKH. Overall the populations of cattle and sheep have declined, while those of buffalo and goats have increased. This has resulted in an increased share of buffaloes and goats in the total livestock composition, and a rise in their importance in the livestock economy of the HKH.

The trends (average annual growth rates in per cent) in cultivated area under and yields of food grain crops are summarised in Table 7.1 and shown graphically in Figures 7.1 and 7.2. Overall in the region the area under food grains has changed little. The crop yields have also changed little, with minimal or small increases in the yield of paddy in all areas except Tibet, and of wheat in all areas except Meghalaya. Yields of maize increased or decreased slightly in all areas. The overall production is increasing slightly.

There were some differences between areas, for example, both the area growing and the yield of food grains increased more in Balochistan than in the NWFP, possibly indicating more favourable production policy strategies in the former. The area under all food grain crops increased in

Table 7.1
Trends* in land resource allocation and productivity of food grains in the Hindu Kush-Himalayan Region

Province/ State/Region	Area under Food grain Crops			Productivity			Year
	Paddy	Wheat	Maize	Paddy	Wheat	Maize	
China							
- Sichuan	-0.1	0.3	0.1	1.5	0.0	1.5	1983-97
- Tibet	0.4	0.5	1.6	-1.9	0.2	-1.3	1983-97
- Yunnan	-0.6	1.4	0.0	1.9	2.4	1.8	1983-97
India							
- Himachal P.	-0.4	0.2	0.2	0.5	2.1	1.3	1981-91
- U.P. Hills	-0.1	0.0	-0.9	1.5	2.4	-0.3	1980-93
Nepal							
- Hills	0.4	0.6	1.1	0.7	1.0	1.1	1985-94
- Mountains	0.7	0.9	1.1	0.2	1.8	0.4	1985-94
Pakistan							
- Balochistan	0.6	2.1	0.6	0.5	2.0	1.0	1975-93
- NWFP	0.1	0.4	1.4	0.1	0.8	0.5	1975-93

*Annual Growth Rates (%)

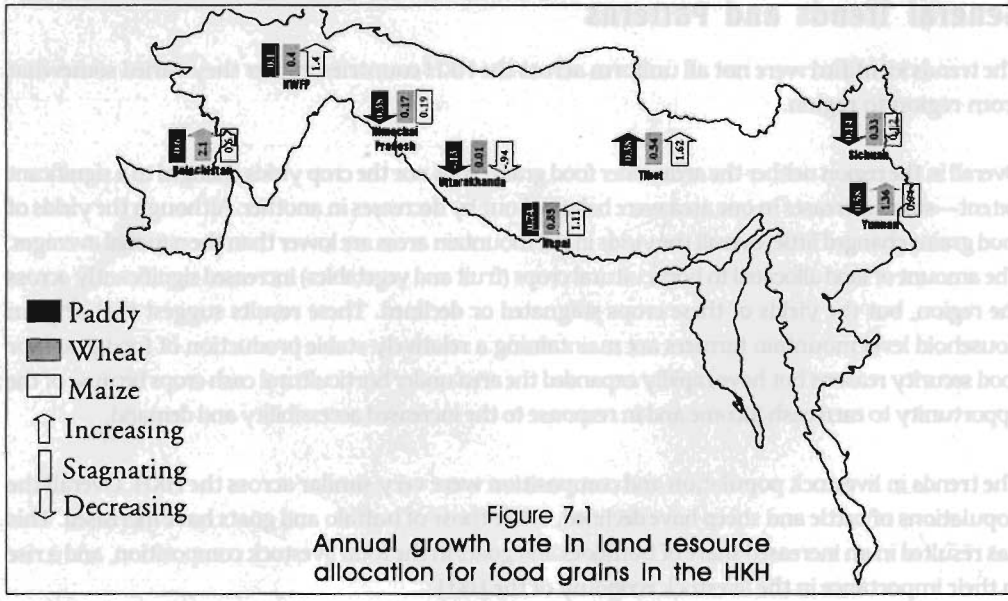

Figure 7.1
Annual growth rate in land resource allocation for food grains in the HKH

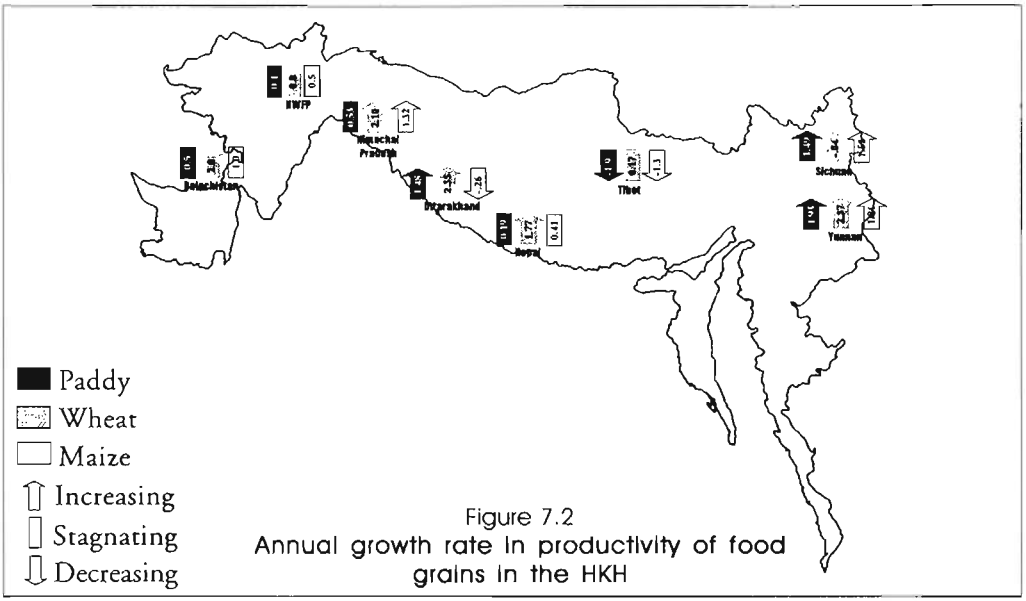

Figure 7.2
Annual growth rate in productivity of food grains in the HKH

Balochistan, NWFP, Nepal, and Tibet, but remained stagnant or decreased in Himachal Pradesh and Uttarakhand. Both Sichuan and Yunnan showed a decrease in the area under paddy in favour of an increase in the area growing wheat. The total production of paddy in these areas increased, however, as a result of the marked increase in yields. Although yields increased for most crops in most areas the increases were more marked in Balochistan than in NWFP, and in Yunnan compared to Sichuan. Yields decreased for both paddy and maize in Tibet and wheat and maize in Meghalaya, although the area under these crops in both places increased markedly, possibly indicating inappropriate choice of land to grow these crops in some parts.

Horticultural and cash crops

The average annual growth rates in per cent (trends) in land resources allocated to various fruits, vegetables, and other cash crops are shown in Tables 7.2 and Figure 7.3. The trends for land resources allocated to, and yields of, apple, citrus fruit, and tomatoes are illustrated

Table 7.2
Trends * in land resource allocation and productivity of fruits and vegetables in selected areas of the Hindu Kush-Himalayan Region

Province/ State/Region	Area under Horticultural Crops				Productivity				Period
	Apple	Citrus	Tomato	Veg.	Apple	Citrus	Tomato	Veg	
China									
- Sichuan	1.4	1.3	-	-	1.2	2.5			1985-97
- Tibet	1.1	-	-	-	-2.0	-			1984-97
- Yunnan	4.9	4.4	-	-	-0.6	0.9			1983-97
India (Himachal Pradesh)	1.6	3.4	-	2.5	0.4	-2.3		-	1981-92
Nepal (Hills & Mountains)	2.8	2.4		-	0.5	0.3	-	-	1993-97
Pakistan									
- Balochistan	4.9	4.5	3.6	3.0	0.9	2.6	0.6	0.2	1981-94
- NWFP	2.4	0.8	3.2	1.9	-0.2	0.1	-0.3	0.5	1981-94

*Annual Growth Rates (%)

diagrammatically in Figure 7.3 and 7.4. There have been significant increases in the land allocated to the production of horticultural crops, particularly fruit, across the HKH region, indicating an increasing diversification towards cash crops. In many cases the overall yields of the horticultural crops either stagnated or declined, however. Even so, the total production of apples, citrus fruit, vegetables, potatoes, sugar cane, tobacco, and silk increased slightly to markedly in all areas for which figures were available with the exception of sugar cane and tobacco in Sichuan. The most significant increases in total production in percentage terms were observed in apple and/or citrus fruit in Balochistan, Sichuan, and Yunnan; potatoes in Balochistan, the UP hills, and Tibet; sugar

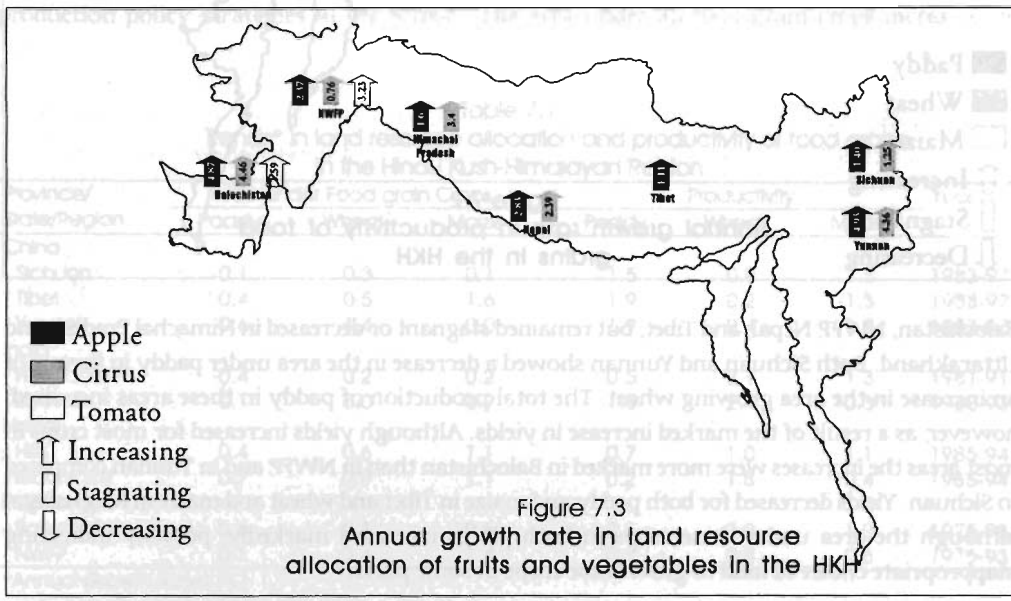

Figure 7.3
Annual growth rate in land resource allocation of fruits and vegetables in the HKH

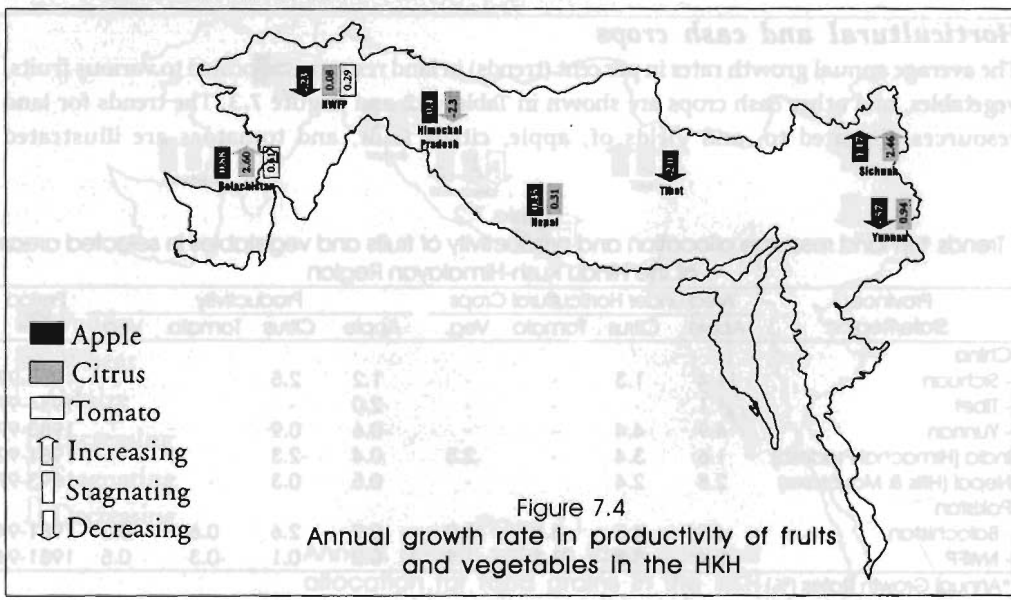

Figure 7.4
Annual growth rate in productivity of fruits and vegetables in the HKH

cane in Balochistan and Yunnan; tobacco in Yunnan; and oil crops in Tibet (the production of which decreased in most other areas).

Livestock

The percentage change in the population of different types of livestock and their percentage share in the total livestock population in selected areas of the HKH over the given time periods are shown in Table 7.4 and illustrated diagrammatically in Figure 7.5. Overall the share of buffaloes and goats in the total livestock population has grown across the region, whereas that of cattle and sheep has decreased. The exceptions were an increase in the proportion of cattle as well as buffalo in the NWFP at the expense of both sheep and goats; a decrease in the proportion of buffalo as well

Table 7.3
Trends* in livestock population and composition in the Hindu Kush-Himalayan Region

Province/ State/Region	Population				Period
	Cattle	Buffaloes	Sheep	Goats	
Bhutan	-23.0	-	21.3	108.8	1986-96
China					
Sichuan	20.6	4.4	7.0	81.0	1986-97
Tibet	2.2	-	2.3	8.0	1986-97
Yunnan	9.6	17.3	-25.6	13.8	1986-97
India					
Himachal Pradesh	-1.1	13.6	-8.2	5.3	1982-92
UP Hills	-5.2	15.1	-9.1	7.1	1978-88
Nepal					
Hills	3.2	0.6	-9.6	2.9	1988-96
Mountains	5.8	8.3	-2.5	9.4	1988-96
Pakistan					
Balochistan	81.0	133.0	185.0	87.0	1984-94
NWFP	9.5	68.0	-39.0	-10.0	1976-86

* Percentage change during the period indicated in the last column.

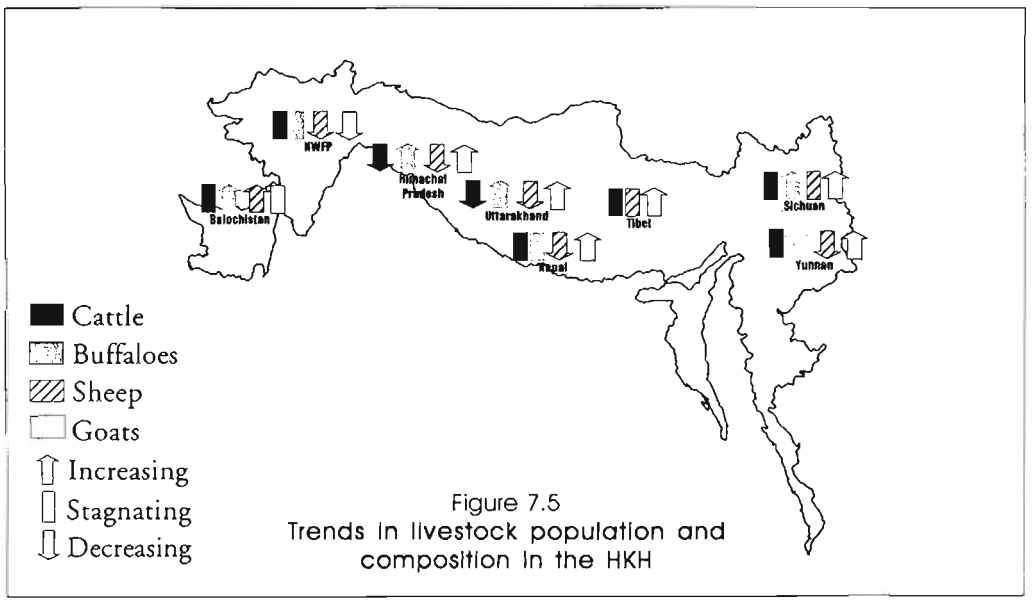

Figure 7.5
Trends in livestock population and composition in the HKH

as cattle and sheep in Sichuan to the advantage of goats; and an increase in the proportion of sheep in Balochistan at the expense of both goats and cattle. Overall the total population of cattle, buffaloes, and goats increased in most areas (with the exception of Uttarakhand and HP where the cattle population decreased and NWFP where the goat population decreased), whereas the population of sheep only increased in Balochistan, Sichuan, and Tibet

Possible Reasons for the Present Trends and Patterns of Mountain Agriculture

Although the area under food grains has not increased, the yields in many cases have—in contrast to horticultural crops. This could be because of the introduction of favourable government policies for food grains in the effort to ensure food security; for example, subsidies for fertilisers which are common across the HKH region. Secondly, most of the fertile valley lands where irrigation is available are under cereals. Thirdly, the development of roads could be contributing to the timely supply of modern inputs such as fertilisers, improved seeds, and pesticides.

The area under horticultural crops (fruit and vegetables) has increased significantly over the past years. The main reason for this rapid expansion is that these crops provide mountain households with a cash income. With increasing accessibility and a growing road and transport network, farmers have easier access to major centres of consumption in both the mountains and lowlands, including cities. As a result of the increasing income of urban dwellers the demand for fruit and vegetables has also increased. The significant growth in horticultural crops suggests that fruit and vegetables are more profitable than cereals, and that the importance of horticultural crops in the farming systems and household economies of the HKH region has increased.

In most areas the actual yields of horticultural crops have either stagnated or declined, however; the increase in production has resulted from increased acreage. This could be linked to the increased use of marginal lands. For example, in Himachal Pradesh, more than 80% of fruit farming is on marginal and sloping lands (Verma and Partap 1992). Cultivation of low-yielding heterogeneous varieties and, particularly for fruit, problems associated with the variable climatic conditions during fruit setting and maturation, also restrict improvements in yields (John Mellor Associates 1995; Jindal 1996).

The overall growth in the number of cattle has not been large and in the Indian Himalayas there is a general decline. The number of buffalo has increased more. This could be the result of decreasing feed resources and a decline in areas for open grazing for cattle. Equally there is a trend towards keeping stall-fed buffaloes because of their multiple uses and cash income generation through the sale of milk and live animals On the whole the sheep population has gone down across the region (except in Balochistan where the population has grown significantly) and the goat population has increased. The decline in the sheep population could be the result of a reduction in open grazing lands and restrictions imposed by communities on open grazing. For example, a case study carried out in the mountainous areas of China (Yanhua et al. 1992) discovered that in livestock dominated farming systems (LDFS) (at county level), the grassland available per sheep decreased from approximately nine mu (0.6 ha) in 1976 to approximately six mu (0.4 ha) in 1986. The

grassland available per capita (at village level) decreased from 458 mu (30 ha) in 1982 to 376 mu (25 ha) in 1988. In horticulture dominated farming systems (HDFS) (at village level), the cultivated land per capita decreased from 1.84 mu (1.84 ha) in 1982 to 1.25 mu (0.08 ha) in 1988. In crop-dominated farming systems (CDFS) (at county level), the crop land available per capita decreased from 1.7 mu(0.11ha) in 1978 to 1.3 mu (0.09ha) in 1986. In contrast to sheep, goats can be stall-fed and do not need grazing land, especially in the high-pressure Himalayan areas of mixed crop-livestock farming systems.

Constraints to the Sustainable Development of Mountain Agriculture: Implications of the Present Trends

Constraints to Mountain Agriculture