THE HILL FARMER'S PROBLEM

The problems of each country in the Hindu Kush-Himalaya Region are generally similar and are related to economic under-development. In most countries of the Region the economy, as already indicated, is dominated by the rural sector and is based almost exclusively on agriculture which itself is heavily dependent on forestry for its sustenance. Whether forestry can continue to contribute to the economic and social good of the people needs serious consideration. This is particularly relevant because of deforestation, which is an aspect of environmental deterioration, and which has become a topic of widespread concern in recent decades.

In the past, the integration and balance developed by the hill farmer between crop production, livestock husbandry and forestry allowed the needed levels of agricultural productivity. There are numerous examples of hill farmers' adaptability to the pressure of population growth, fragile environments and parasitic rulers, through changes in technology, crops, migration and colonization of frontier lands (Banskota, 1985).

More recently, however, rapid population growth throughout the Region has resulted in increased competition for scarce resources, fragmentation of land holdings and the gradual but inevitable breakdown of the fragile but previously sustainable upland farming system. Forests in particular are increasingly mined to meet the requirements of fodder, fuelwood, leaf-litter for animal bedding and compost, thatching materials, timber and other products. As a consequence of the declining availability of forest products, farming systems dependent on free goods from the forest cease to be sustainable, farm productivity stagnates or declines (Blaikie et al., 1980). This high level of dependence on the forest is closely related to the ratio of land available per person. The declining farm productivity resulting from the declining land:man ratio is the root cause of the hill farmer's problem.

The declining land:man ratio, therefore, is perhaps the most fundamental problem of development in the HK-H Region. Arable land per capita is generally very low and crop yields are declining. For instance, in the Himalaya-Hengduan Mountain Region of China, according to Li Wenhua and Zhang Mingtao (1985), the average land holding per capita is extremely low, ranging from 0.1 to 0.16 ha. 90% of all crops produced are cereals. Crop yields per unit area of agricultural land are generally low, averaging 0.75 tons/ha, and grain production is insufficient to meet the demand in most areas. In Nepal, with only 16% of the land resource under cultivation, the average land holding in the hills for a family of 5-6 persons is 0.4 ha. The World Bank (1979) estimated that the ratio of persons per ha of arable land varied from 15.76 in the Middle Hills to 3.79 in the Terai. Although the total agricultural production increased during the 1960s and 1970s, largely due to the extension of agricultural land to the previously forested areas of the Terai, in fact crop yields per ha generally remained stagnant or declined (Blaikie et al. 1980). Similarly, in the Central Indian Himalaya Region, the population density averages 61.25 persons per sq. km. The number of persons per ha of cultivated land is 4.78. The available forest area per capita is on average less than 0.80 ha.

Generally speaking, the land:man ratio is low and crop yields are declining throughout the Hindu Kush-Himalaya Mountain Region. Most hill people, as a result, are being pushed to live further below the poverty line. Agricultural production does not last for the whole year. To make ends meet, the hill people seek additional income.

ENHANCING THE HILL FARMER'S INCOME

Although the hill farmers in the HK-H Region still produce many of the goods needed by the household, none are self-sufficient. The farmers, therefore, need cash to buy goods and services at the market. In addition, cash is needed for paying rent and interest, taxes and

fees, capital investment and improvements; and to cover the cost of children's education, many religious and social ceremonies, marriages and other expenses. Moreover, declining farm productivity in the hills exerts further pressure on the farmer to make up production deficits through additional income and higher investments.

The widening gap between the hill peasant's farm income and the needed cash for various purposes is resulting in growing tension within the hill farming economy. Enhancing the hill farmer's income, therefore, becomes the most important consideration.

The problem of enhancing the hill farmer's income is to a great extent, related to the dwindling of the local resource base. The main problem linked to the deteriorating forest resource base is related to population increase and demand for resources, the fall in the level of forestry contribution, and breakdown in system interrelationships and its effects. These problems are visualized as follows:

Problem of forest resource depletion

For hill farming systems to be sustainable primarily requires a net transfer of fertility from the forest through fodder and leaf-litter to stall-fed animals. The dung produced is mixed with leaf-litter to obtain the compost manure which is transferred to the fields and generally comprises the only means available for maintaining an already low level of soil fertility. The declining availability of forest-produced fodder and leaf-litter means that nutrient levels and soil structure cannot be maintained, thus resulting in a decline of per ha production. In the hills the picture is one of more frequent and widespread food shortages and declining per ha production and hence income.

Forests are also over-exploited for fuel-biomass, timber, poles, etc. In the Himalaya-Hengduan Region of China demand for fuelwood continues to be the main cause of deforestation along with fodder collection and grazing pressure. Up to 90% of the total wood harvest is consumed for domestic purposes such as cooking and heating (Li Wenhua and Zhang Mingtao, 1985).

In India, forests represent the most important land use in the Himalaya region and have a vital role to play in supporting agriculture, animal husbandry and horticulture. As a result they are increasingly subjected to severe livestock and human pressures. The current annual fuelwood demand stands at 140 million metric tons, whereas the annual supply from existing forests is only 20 million metric tons. Timber demand is 50 million cubic metres per annum with supplies currently at a level of about 30 million cubic metres. The annual fuelwood demand in the Indian Himalaya region was found to be 0.60 to 1.64 tons per capita and that 51.83 to 74.04% of total fuelwood requirements are obtained from the forests, with the deficit provided by crop residues, animal dung and trees on private land (Singh and Swarup, 1980). Thus, growing human and livestock populations continue to exert heavy pressure on available resources; forests are cleared for agriculture, horticulture and settlements.

In Nepal, with per capita fuelwood consumption at 1 cubic metre per annum and the population standing at over 16 million, the net annual increment, estimated at 8 million cubic metres from the existing forest resource, can no longer meet the demand so deforestation continues. In addition to fuelwood demands, the forest is used for providing fodder for a growing livestock population (approximately 1 large livestock unit per capita in addition to small livestock units). Forests also supply leaf-litter for compost and animal bedding and a number of other products.

Similarly, some of the major social and environmental problems faced in Bhutan are directly related to the conservation of existing forest resources. The annual per capita fuelwood consumption in Bhutan is estimated at 2.6 m^3, a substantially higher demand than in India or Nepal, and this again is a potential threat to the resource base if scientific management is not implemented (Dorji, 1984).

The northern Himalayan region of Pakistan occupies an area of 15,500 km^2 Within this area, crop production, livestock husbandry and forestry are the major land uses, with cultivated land occupying 19% of the total land area. Over 92% of the total population of the region is rural, a large majority of whom live below the poverty line. Population density is very high, 125-150 persons/km^2 Fragmentation of land holdings has made farming uneconomical. Crop cultivation and grazing on steep slopes has led to soil erosion (Chima, 1978; Qureshi, 1981 and 1985; Mian, 1983; Noor, 1985).

Problem of ecosystem degradation

Degradation of the Himalayan ecosystem is seen to be essentially caused by increasing pressure on vegetative cover by the large and ever increasing livestock numbers accompanying the high human population. Such biotic pressure manifests itself in over grazing and browsing and other associated problems in the form of soil compaction, excessive run-off, direct trampling of regeneration, fire, excessive lopping, etc. Grazing and crop cultivation on steep slopes has led to soil erosion. This results in the loss of productive topsoil in the hills, with decreasing productivity due to deposition of eroded soil, widening the river and stream beds in downstream areas. This means more hardship for the hill farmer and problems for plains dwellers also. However, there are powerful natural forces at work that contribute to environmental degradation in the Region, and in many cases mass-wasting of soil is unavoidable (Carson, 1985).

In the Himalaya Mountain region of Pakistan, a recent survey showed 33% of the region's total agricultural area as being subject to 'moderate' or 'severe' soil erosion (Khattak, 1985). Moreover, with human and livestock populations growing at a rate of 3% per annum, a man to cultivated land ratio of 4 to 17.2 persons per ha, and a livestock ratio ranging from 1.5 to 3.1 animal units per ha, pressure on available crop, grazing and forest lands is increasing at an alarming rate (Chima, 1978; Qureshi,1981 and 1985; Mian, 1983; Noor, 1985). Similarly, the hilly regions in India are severely threatened by the accelerated pace of development and the subsequent increased pressure on land, forest, permanent pasture, grazing land, etc. The problems include: limited availability of land resulting in the extension of agriculture on to previously forested steep slopes, soil erosion and landslides; lack of irrigation facilities and dwindling water resources; poor transportation and communication networks.

In China, population increase has led to the extension of cultivation onto marginal, easily eroded land and to growing grazing pressure on the fragile upland pastures. As in other countries of the Hindu Kush-Himalaya Region, forests are rapidly being depleted to meet fuelwood, fodder, timber and grazing requirements. This removal of forest cover has accelerated topsoil erosion, lowered soil fertility and consequently decreased crop yields (Li Wenhua and Zhang Mingtao, 1985).

The problem of a deteriorating eco-system is thus common to all the mountain areas and is the primary cause of rural poverty in the Hindu Kush-Himalaya Region. Given the precarious ecology of these mountain areas the question of human welfare cannot be isolated from that of ecological conservation.

THE HILL FARMER'S RESPONSE

In response to the pressure of population growth, a fragile environment and most importantly the declining crop yields, a number of options including changes in technology, crops, migration, agricultural colonization of new and marginal lands, off-farm (casual, seasonal or permanent) employment, etc., are tried by the hill farmer. He may adopt one or more of the following strategies:

Agricultural land extension

From historical times agricultural land extension by clearing of forest has been the first response to meet additional needs of food production. Much of the clearing in the beginning must have been to meet the local subsistence needs. Government legislation also fostered conversion at times to generate agriculture surpluses for the state through maximization of land taxes and timber revenues (Mahat et al. 1984).

How much forest land is still cleared for agriculture extension is a controversial question. Undoubtedly, at least in the case of Nepal, large areas of lowland Terai forest have been cleared for agricultural colonization and resettlement and timber revenue. The situation in the Hills, however, could have been different.

Many authors have claimed that the principal means of increasing agricultural production in Nepal has been the extension of agricultural area. According to Pant & Jain (1972), the yearly growth in food production between 1962 - 1970 was 2.09% as compared to an annual increase of 3.06% in the area of cultivated land. Shrestha & Jain (1978) ascribe an increase in food grain production of 5.5% between 1965 - 1970 and 9.5 % during 1970 - 1975 during which period the area under cultivation was extended by 6.3% and 8.3% respectively. It is clear that during this period the overall production of food crops declined. Bajracharya (1983) suggests that agricultural land extension

(through forest clearance) and not an increase in yield, was responsible for the increase in food production.

It is shown by Rana & Thapa (1975) that in 1951, 3.5% of the Terai population consisted of hill migrants, 5.95% in 1961 and 9% in 1971. This increased out-migration was principally due to declining farm productivity in the Hills. Malaria eradication, improved infrastructure and government sponsored settlement schemes in the Terai acted as 'pull' factors and encouraged the hill farmers to migrate to the Terai for planned or unplanned settlements there and extension of agriculture to forest lands.

Mahat et al. (1984) argue that the situation has been different in the hills, at least in Nepal. They assert that deforestation due to the clearing of forests for agricultural extension in the Nepalese Middle Hills region is largely due to historical government pressure in order to maximize land taxes. It is argued that most existing land use boundaries were fixed in the distant past and remain largely unchanged in the present century. Hence, although population pressure has been responsible for the declining productivity of remnant forest, further clearing of forest land for crop production has been greatly limited in the hills. This contention is also supported by data generated by others like HMG (Water & Energy Commission), 1983, the Land Resource Mapping Project (1985), Remote Sensing Centre (Malla, 1985), Tinau Watershed Project (Strebel, 1985), and other authors.

The presence of abandoned terraces in the higher hills region indicates past efforts of agricultural land extension in response to the additional needs of food production which failed however, due to the declining productivity of land. More recently, despite the overall gain in crop production mainly due to extension of agriculture in forest land in the Nepal Terai, crop yield per unit of cultivated area has been declining. A further decline in crop yields will force the farmer to look for other options. Thus new areas are cut and cleared from the forest so long as it remains feasible.

Agriculture intensification

Intensification of agriculture by increasing cropping intensity is another way by which the hill farmer responds to declining crop yields. The necessity every year to produce the maximum food supply from their small holdings motivates small farmers to raise the crop intensity on available land. An excess of labour over land resource permits them to do so. A higher cropping intensity, generally speaking, is more possible where irrigation is available because it permits one additional crop. Crop production activities are almost entirely carried out within the framework of traditional practices. Human labour, animal draught power, farm yard manure and compost, and monsoon rain water are the main inputs. Labour is used lavishly in making full and intensive use of the available land. The adoption of new technologies and inputs to maximize food productivity, however, has been constrained mainly by the hill farmers' inability to buy them, lack of irrigation facilities and 'know how' about their use.

Off-farm employment opportunity

Very high percentages of population in the countries of the Region are still dependent on agriculture and other rural occupations. Abundance of labour against a scarcity of skills is the characteristic feature related to rural employment and income structure in these hill areas. In the hills, there has been little development of the non-agricultural sector. Both economic and socio-cultural influences have not favoured a shift from agriculture. Economically, the non-agricultural sector has not been able so far to provide attractive employment and income opportunities for the increasing rural population. Traditionally, land is closely associated with wealth and status. Land is also almost the only asset owned by the farmer. These links discourage the farmer from a shift in occupation. Moreover, employment opportunities have not kept pace with population increase. Therefore, crop production remains the main source of income for all farms. Small farms obtain a relatively larger share of their income via the labour market, medium-sized holdings through livestock husbandry and large-land holdings through crop-production (Pachico, 1980). But income from the agricultural sector alone is not enough to maintain the farm household. Farm production is supplemented by selling spare household labour within or outside the agricultural sector. However, local employment opportunities are minimal and opportunities for temporary outside employment are decreasing. The HK-H Region as a whole is characterized by low level industrial development, limited employment and income opportunities. Local artisans and contract labourers, generally with little or no

land, provide their services for fixed annual payments in kind and rarely in cash. The major employer outside agriculture is the state. Thus, military pensions and salaries support a considerable number of households in the rural hill areas of Nepal and India. For instance, recruitment of Gurkha soldiers from Nepal into the British Army is highly selective, based exclusively on ethnicity and region, and is limited to Gurungs, Magars, Rais and Limbus. In Pakistan some money is sent back home to their families by people who work in foreign countries (Sheikh, 1985). But such opportunities are limited and provide a solution only for the few. Thus the tension within the farming economy grows further.

Out-migration

A widespread method of supplementing income in the hills has been out-migration: casual, seasonal or permanent. There is evidence to suggest that the average size of the poorest groups' land holdings is being eroded, with a subsequent increase in the number of landless (in Nepal currently 10% of the population). Blaikie et al., (1979) noted that a growing differentiation within the peasantry, both in terms of control over resources and income distribution, has led to an increase in the level of 'impoverished emigration'. According to Rana and Thapa (1974), 'push' and 'pull' factors are responsible for migration. The 'push' factors include declining economic conditions due to population pressure and environmental decline. Opening of off- farm employment opportunities and opening up of the lowlands for agriculture are among the 'pull' factors. In summary, migration is primarily a result of the need for cash to purchase consumer goods, reflecting a rise in the standard of living of many people in the hills.

SUMMARY

The declining land:man ratio is the most fundamental problem of development in the HK-H Region and declining farm productivity resulting from it is the root cause of the hill farmer's problem. To make up for production deficits, to face the growing economic pressure and in order to maintain a minimum standard of living, the hill people are adopting strategies which take into account some or all of the above factors. These, however, fail to deal with the basic problem. One of the most basic requirements, therefore, seems to be the opportunity to earn a cash income through off-farm employment and income generating activities. The most important and relevant consideration includes the involvement of hill people in re-establishing the local natural resource base, e.g. in improved management and utilization of forests and trees.