

Mountain areas are characterised by inaccessibility, fragility, marginality, diversity, niche and human adaptation mechanisms, which are sometimes called mountain specificities. They distinguish these areas from the plains. These features have both biophysical as well as sociocultural and economic dimensions. They affect mountain agriculture's capacity to withstand shocks and its resilience to support an ever-increasing population pressure. Consequently, widespread poverty and environmental degradation are ubiquitous features.

The knowledge reviews and empirical work carried out by the Mountain Farming Systems' Division of ICIMOD in different parts of the Hindu Kush-Himalayan region have shown that sustainability of mountain agriculture faces a serious threat which may worsen unless remedial measures are immediately undertaken. This is reflected in the degradation of the natural resource base in terms of increases in the intensity and frequency of landslides, gully formation, soil erosion, reduced per capita availability and fragmentation of land, and so on. This has, *inter alia*, contributed, to a varying degree, to negative trends in the yields of crops and livestock; an increase in drudgery, especially for women in terms of collection of water, fuelwood, and fodder; and low availability of capital for re-investment in agriculture.

While the above-mentioned indicators of unsustainability pervade the whole of the HKH region, some areas have also undergone rapid transformation, thanks to the adoption and implementation of mountain-sensitive development strategies encompassing the mountain perspective. The State of Himachal Pradesh, located in the heart of the western Himalayas, represents one such example with positive features. This is clear from the fact that the state's net domestic product increased two hundred times and net per capita income twenty-six times during the last two decades, when the State attained full statehood in 1971. The quality of life has improved dramatically. The incidence of poverty has declined from one person in every three in 1971 to one in every seven in 1991. Two-thirds of the population are now literate, compared to one-third in 1971, which is higher than the national average of one-half. All villages have been provided with electricity, and more than 95 per cent have access to safe drinking water. These accomplishments have drawn the attention of both scholars and policy-makers to Himachal Pradesh as a model of development in hill areas.

Concerned quarters are keen to understand the factors and processes behind such rapid changes in the State at a time when mountain areas, in general, are witnessing worsening conditions of environmental degradation and a diminishment in the quantity and quality of livelihood options available to mountain people. Against this background, efforts have been made: first, to document the livelihood options of the households and assess their sustainability implications in

terms of the natural resource base, quality of life, and equity aspects and, second, to understand the factors and processes that contributed to the transformation in order to draw policy implications for development interventions elsewhere in the HKH region.

To accomplish these objectives, an empirical study was carried out in the Kullu District of Himachal Pradesh. Two blocks, namely, Naggar and Banjar, were selected to represent the transformed and non-transformed areas, respectively. From the selected blocks, two *panchayat*(s) were selected, again to capture the contrasts in levels of development. Finally, a sample of 125 households was selected at random, 62 from the transformed areas and 63 from the non-transformed areas. The selected households were classified into small, marginal, and large on the basis of their land ownership status; those who owned less than one hectare were designated small farmers, between one to two hectares medium; and those who owned more than two hectares were categorised as large farmers. To capture temporal changes in the natural resource base, 35 key informants were also interviewed, 20 from the transformed areas and 15 from the non-transformed areas.

The conceptual framework developed by the MFS Division of ICIMOD was employed in carrying out the study. Accordingly, while analysing the livelihood options, their implications for quality of life, equity aspects, and the natural resource base were examined. These three conditions, viz., improved quality of life, equity, and natural resource base, are sometimes known as the dimensions of sustainability and constitute an option-screening framework.

The empirical evidence given by the field data indicate no significant differences in the range of livelihood options adopted by the households in the transformed and non-transformed areas. For example, nearly four-fifths of the households in both types of area adopted three to four activities. The evidence, however, did indicate a higher percentage of households (17.46%) adopting a larger number of livelihood options (in the range of five to six) in the non-transformed areas, than in the transformed areas. No household adopted more than six options. There was, however, no relationship between the range of livelihood options and average household and per capita income in the transformed areas. For example, those adopting two options had a higher level of income than their counterparts adopting three to four options; the average household and per capita incomes of those practising five to six livelihood options were again higher. On the other hand, in the non-transformed areas, a direct and positive relationship was observed between the average and per capita income of the households and the range of livelihood options. It is, however, important to note that the average household and per capita incomes for all categories of household in the transformed areas were more than double those of their counterparts in the non-transformed areas. Regarding different livelihood options, two-thirds of the total household income in the transformed areas comes from agriculture-related activities, whereas the share of such activities in the non-transformed areas was less than fifty per cent. Fruit production (mainly apples) alone accounted for more than two-fifths of the total income followed by services and pensions (26%) and livestock and dairy

(nearly 18%). The respective contributions of these activities in the non-transformed areas were 20 per cent, 28 per cent, and 13 per cent.

Among the various indicators of the quality of livelihood options, per day, per worker earnings were a better measure, insofar as they take into account both the amounts of employment and income. Therefore, considering this as a yardstick, livelihood options, namely, fruit production, vegetable production, businesses, and shops, were of very high quality. It should be mentioned that vegetable production, though contributing little towards the total household income and employment, is a very high quality production option and offers considerable scope for diversification in future. The high quality of production options in the transformed areas is also evident from the number of forward and backward linkages generated by them. The quality of livelihood options, measured by per worker, per day earnings, was very low in the non-transformed areas. Some of the options, such as livestock activities and dairy farming, agriculture, weaving, and agricultural labour, were distress driven and undertaken primarily with a survival motive. At the household level, factors such as the availability of land, labour, amount of assets, and number of educated members in the family, were significant in determining the number of livelihood options adopted by a household.

A variety of factors, such as the low quality of livestock, low use of modern inputs, low level of education, and so on, contributes to the low quality of livelihood options in the non-transformed areas. The most important factor is, however, the inaccessibility constraint, which is a ubiquitous constraint in all mountainous regions. This is demonstrated by the fact that, in the non-transformed areas, whereas there is not much difference between different cost components of the total production and marketing costs, for instance of a 20kg box of apples, the cost of transportation up to the roadhead alone accounts for 23.48 per cent compared to a low three per cent in the transformed areas.

To reiterate, the different livelihood options were screened for their sustainability implications by following the framework developed by ICIMOD. The evidence in this case shows that the quality of life of the people, by all reckoning, has improved dramatically in the transformed areas. For example, households in these areas spend nearly 50 per cent more on superior grains and clothes than those in the non-transformed areas. The most notable differences are discernible in the consumption of milk and dairy products (300%), meat products (150%), and fruit and vegetables (240%), which are all high income elasticity products. Similarly, expenditure on health in the transformed areas is much lower than in the non-transformed areas. The improved level of welfare in the former areas is also evident from the increased level of literacy in general and female literacy in particular, disappearance of poverty, and a decreased level of land and water disputes. Equity, one of the important prerequisites for sustainable development, is also taken into account. For instance, the Gini coefficient of the distribution of per capita household income is 0.37 in the transformed areas compared to 0.40 in the non-transformed areas.

Evidence regarding impact on the natural resource base, the most important aspect of sustainability, is also positive. The process of transformation has not led to deterioration in the natural resource base. On the contrary, because of better management of demand factors, processes have been generated that have lessened the burden on natural resources. An increasing shift to other energy sources, hundred per cent electrification, growing substitution of wooden boxes for packing with corrugated fibre cartons, import of timber from the neighbouring states and recycling of wooden boxes, reduction in the number of livestock per household, and switching over to stall feeding from grazing are some of the important examples of better demand management. On the supply side, the livelihood options are in complete conformity with the development imperatives of mountain specificities, namely, inaccessibility, marginality, fragility, diversity, and niche. Fruit crops are, for example, perennial in nature and help to reduce cropping intensity and check soil erosion. Livestock farming based on stall feeding helps to maintain the forests and pastures.

It, however, should be stressed that sustainability is a dynamic phenomenon and a process of change. And any activity which is sustainable today may not remain sustainable for all times to come, because of a variety of factors, e.g., unrelenting population pressure, changes in the people's needs and perceptions, market integration from local to national and then to international, and changes in technology and market conditions. What is essential therefore is the promotion of option enhancement by building up basic infrastructure! — physical, institutional, and social — facilities, providing the latest technical knowhow through a sound R&D network, and strengthening human capital. In the transformed areas, because of the easy availability of the above noted infrastructural facilities, households are actively exploring alternatives to diversify their economic activities to floriculture, vegetables, dairy production, and also to non-farm activities in order to reduce their dependence on apple crops, because the production has become very unstable due to the spread of diseases.

The adoption of development strategies in conformity with mountain specificities has been the single most important factor in introducing the process of sustainable development; a development strategy, *inter alia*, focussed on the provision of sound physical and institutional infrastructure. The provision of huge subsidies, setting up of a separate directorate of horticulture in 1961 and later HPMC in 1972, and a training school to train fruit growers were some of the important landmarks in the development strategy which facilitated the spread of high-value cash crops. In the process, self-help institutions have emerged to promote the process of sustainable development.

To sum up, the whole debate on sustainable mountain agriculture centres around promoting farming systems that are consistent with mountain specificities, both constraints, such as inaccessibility, marginality, and fragility, and opportunities, such as niche, diversity, and human adaptation mechanisms, and which are also high yielding and eco-friendly. In this context, the micro-level evidence emanating from the study areas reveals that the introduction of high-value cash crops appears to be sustainable, both economically and ecologically. It further needs to

be underlined that sustainability is a dynamic and continuous process. And an activity which is sustainable today may not remain so for all times to come because of developments, e.g., change in technology, prices, integration of the local market with the national and international markets, and so on. It, however, comes out very clearly, as emphasised by the WCED definition of sustainable development, that once the basic needs of the people, e.g., food, clothing, and shelter, are satisfied, they tend to take care of their natural resources and environment to ensure that the needs of future generations are met. In other words, this helps to break the so-called 'poverty-environmental degradation-resource scarcity-poverty cycle' and put the system further on the path of sustainable development. It also needs to be underlined that the State has to play a very vital role in overcoming the constraints, e.g., providing basic infrastructural facilities to initiate the process of development. The indicators by which we have measured the process of sustainability, particularly relating to the quality of life, are comparative. For example, to an outsider, the amount of household expenditure on grains, clothing, housing, and so on may not qualify as sustainable but, compared to the non-transformed areas, these certainly indicate a qualitative improvement.