

LIVELIHOOD OPTIONS — RANGE AND QUALITY

The range of livelihood options is the number of activities undertaken by a household, while their quality refers to the amount of income and employment generated by them. Given the agroclimatic conditions of a region, the number of livelihood options practised by a household depends on several factors; for instance the availability of infrastructural facilities, skills, assets, education, attitude towards risk, technical knowhow, and so on. In mountainous regions which are steeped in poverty, households engage in a variety of livelihood options to meet their basic needs for food, clothing, and shelter and to ensure survival. Many of these options are of a distress nature and yield an extremely low level of income and employment. Again, in these regions, the risk averse attitude of poor peasant households and their conservative attitudes in the choice of asset holding, which is a direct result of their poverty, hinders the adoption of land augmenting and land conserving innovations and leads to environmental degradation (Bifani 1992, pp 99 -120). The households in the above-mentioned situations do not readily switch over to high quality production options because of the high risk associated with these options; for example, they would not bring their entire land under high-value cash crops because of the very high risks associated with them. On the other hand, in mountainous regions that have undergone some degree of transformation, households adopt superior production options insofar as they are favourably endowed with resources, viz., skills and assets, to bear imponderable risks. The present chapter presents a historical perspective on how households have substituted, replaced, and added to their livelihood options in the process of economic transformation. It examines the effect of economic transformation on the number of livelihood options adopted by households and their quality in terms of income, employment, and intersectoral linkages.

Process of Option Enhancement in the Transformed Areas: A Historical Perspective

Prior to the Year 1930

Initially, crop production and livestock were the main livelihood options of the people. Cropping patterns were dominated by millet, such as foxtail millet, proso millet, finger millet, amaranth, grain chenopod, barley, wheat, paddy, corn, and black gram. Besides cows, large herds of sheep and goats were maintained. While millet, amaranth, and grain chenopod were the staple foods of the people, wheat, corn, and paddy were the cash crops. People also used to sell livestock products to meet their cash needs. They used to store surplus millet and other grains to meet emergencies (e.g., famine). The dependency on forests for fuelwood and fodder, particularly for grazing sheep and goats, was very high. Though apples

were introduced into the area by a British Captain, A.A. Lee, in 1870, at Bandrol, they were kept a closely-guarded secret and the local people and those working in the orchards as labourers were not allowed to take saplings away. Granny Smith, Winter, Macintosh, and Boldvin were the main varieties. The production technology was primitive. Since population pressure was low, mainly because of the high death rate, the pressure on land and other natural resources was marginal. Community participation in the management of natural resources, such as forests and water sources, was a common practice, and social sanctions were imposed on the use of these resources. Transportation was by mule and porters. The Kullu-Mandi road was built in the year 1925-26, and this facilitated the transportation of surplus production. There was endemic poverty in the area, and nearly 80 per cent of the families were food deficient; these families used to procure foodgrains from local landlords by pledging their services.

The Period from the Year 1930 to 1950

Cropping patterns continued to be dominated by foxtail millet, proso millet, finger millet, amaranth, barley, wheat, paddy, and corn. People also kept cows, bullocks, and large herds of sheep and goats. The introduction of potatoes in the year 1941-42 was the most important change. Potatoes became the main source of income besides wheat, paddy, corn, and animal products. The marketing of potatoes was facilitated by the opening of the road between Mandi and Kullu. Pathankot and Amritsar were the main marketing centres. The emergence of potatoes as a cash crop improved the local population's access to food. It shortened the hunger gap period and made a considerable contribution to poverty amelioration. Natural resource management continued to be community based. The pressure on land and other natural resources was low due to the low population. Land was still abundant, and this encouraged land-extensive cultivation.

Apple cultivation started to spread with large land holdings and through other leading farmers planting apple orchards. Nurseries were raised locally and apple saplings were supplied to the local people. During this period, people from the neighbouring district, Lahaul and Spiti, started migrating to the area. They purchased land and set up apple orchards. In 1945-46, the formation of small farmers' societies also encouraged apple cultivation.

The Period from the Year 1950 to 1965

The predominance of traditional crops (millet) in the cropping patterns began to decline; the area under these crops declined by almost 50 per cent towards the closing years of this period. These crops were being replaced by potatoes, wheat, corn, and paddy. Wheat, corn, and paddy began to lose their importance as cash crops. People also began to realise the limitations to the economic viability of livestock rearing, particularly in regard to sheep and goats. As a consequence of marginal and fallow lands also being brought under apple cultivation, the land for grazing was insufficient. Potatoes became the most important cash crop. While productivity was around 15 metric tonnes per hectare, net returns varied between IRs 1,500 to 2,000. The produce was transported by railways from Jogindernagar

to the distant markets of Madras, Bombay, and Calcutta. Nevertheless, potatoes lost importance as a cash crop towards the closing years of this period because of two reasons. First, the productivity of potatoes declined because of disease; second, the production of potatoes of a superior quality increased in the neighbouring district, Lahaul and Spiti. When these reached the market, it affected the demand for local potatoes.

The cultivation of apples received a big boost. New varieties like Red Royal and Royal Delicious, procured from Kashmir, were introduced. Cheap and subsidised foodgrains were provided to the people to encourage them to switch over to apple cultivation. The then Chief Minister, Sardar Partap Singh Kairon, visited the area and exhorted the people to produce apples because of their comparative advantages in the area and then to exchange them for foodgrains produced in the plains. The government took several measures to encourage apple cultivation such as the provision of massive subsidies on nursery plants, digging pits, preparing beds, and buying implements. In some cases, apple orchards were planted by forest officials on private land to motivate the local people to plant apples. An institutional infrastructure was created to promote apple cultivation as a cash crop. A separate department of horticulture was opened in 1960-61 and a district horticultural officer was appointed to coordinate its activities. A horticultural training centre was also set up in the same year and training camps were organised to train people to prepare nurseries and plant apple orchards. In addition, the implementation of land ceiling and tenancy legislations, under the directives of the central government, also helped the spread of apple cultivation. Insofar as the ceiling on orchards was much higher than the ceiling on agricultural land (1.5ha), big landlords (22.5ha) transformed their marginal and less fertile lands to apple orchards and thus succeeded in circumventing the ceiling laws. Also, since apple cultivation does not require much labour in the initial years, it also helped them to tide over labour shortages. The migration of people from the neighbouring district continued; they purchased land and planted apple orchards. Thus, the local landlords and migrated orchardists acted as catalytic agents in promoting apple cultivation. A fruit growers' association was formed in 1950-51. An attempt was also made by leading orchardists to start a fruit processing factory in 1956, for which the government sanctioned a grant of IRs 500,000. It, however, did not succeed because of a dispute over shares. The spread of apple cultivation also led to a mushrooming of sawmills to manufacture wooden boxes, particularly towards the end of the period. This also had adverse effects on the forest resources which had been underused for the past several decades.

The peoples' initiatives in the management of community resources, such as irrigation channels, forests, and so on, started declining, mainly because of government intervention in terms of launching community development programmes. The population also started increasing because of the availability of better medical facilities and an increase in incomes. This led to the sub-division of holdings and farm sizes started to decline. Land-extensive cultivation started giving way to land-intensive cultivation.

There was a near replacement of traditional millet and other crops with wheat, corn, and paddy, which was also facilitated the availability of high-yielding varieties of these crops. Wheat, corn, and paddy ceased to be cash crops and became the staple diet of the people, replacing traditional crops like millet. Potatoes were no longer cultivated. Peas were the main cash crop from 1965 to 1975, with peak production in the mid-seventies. Thereafter, their production declined drastically because of the spread of disease. The quality of livestock also started to change. The first jersey cow was introduced into the area in the year 1970-71 and dairy farming started emerging as a commercial activity. People also began to reduce the number of sheep and goats because of the declining availability of grazing lands.

Apples emerged as a one of the main cash crops. Their cultivation also spread among marginal and small farmers. Cultivation of apples spread further as a result of the distribution of surplus land among landless households and the availability of subsidised foodgrains through the public distribution system. Again, since the apple orchards planted by big landlords in the fifties started yielding bumper crops, marginal and small farmers were convinced of their economic viability. In many cases, small and marginal households were also compelled to convert their land into orchards, because birds from the surrounding orchards were destroying their cereal crops. Some developments on the marketing front, for instance the opening up of a short route to Delhi via Bilaspur and issuing of permits to truck operators to transport apples to Delhi, also promoted apple cultivation. Infrastructural facilities were further strengthened. The Horticultural Produce Marketing and Processing Corporation (HPMC) was set up with World Bank assistance in 1970-71 to provide a post-harvest infrastructure. This led to the construction of link roads and provision of grading, packing, and storage facilities. The Fruit Growers' Association was formed in 1977 to help fruit growers, particularly the small and marginal, to market their produce; for example, by arranging transport and paying compensation in the event of any accident or loss of produce. In short, the 1970s was the golden period for apple production. Because of the low incidence of diseases, the use of chemicals, insecticides, and pesticides was also negligible; only one to two applications used to be carried out. There were plenty of fauna and flora which facilitated cross pollination. The spread of apple cultivation helped to improve the local economy. Employment opportunities to the tune of 1,000 to 2,000 person days in plucking, transporting, packing, and so on were created every year. House construction activities gained momentum, leading to a rising demand for masons, carpenters, and unskilled labour. People started diversifying their economic activities to shops and businesses, tourism-related activities, apple marketing, and so on. In total, incomes increased substantially, leading to a significant mitigation of poverty.

Again, realising that apples can be grown even on marginal lands, people vied with one another to encroach government-owned and common lands. This led to a decrease in access to common property resources for the poor and disadvan-

tagged sections of society. Social values also changed. For example, previously there had been a stigma against buying foodgrains from the market, now it became fashionable and prestigious. Similarly, concern for maintaining common property resources declined.

The Period from the Year 1980 to 1995

The cultivation of traditional crops such as millet completely disappeared, and these were replaced by wheat, corn, and paddy. Livestock raising as an economic activity underwent qualitative changes; local animals were being replaced with improved varieties, and there was a complete switch over to stall feeding. Towards the close of this period, practically every household had an improved variety of cow. Consequently, dairy farming was fast emerging as an important commercial activity and a source of income; nearly 50 per cent of the households were selling milk. Vegetable cultivation also started to pick up. Though the area under vegetables was small, farmers were actively considering diversifying to off-season vegetable production for which there was a huge demand.

Apples continued to be the most important cash crop. Their cultivation spread further, and small and marginal farmers brought more than 50 per cent of their land under apple orchards. Production was, however, affected by numerous diseases. An attack of scab in the early 1980s affected apple production adversely. Other diseases, e.g., canker, also appeared. To control diseases, growers resorted to excessive use of chemicals, insecticides, and pesticides; as many as six to seven applications were carried out in comparison to one to two in the seventies. The excessive use of chemicals destroyed honeybees and other useful insects that facilitate cross pollination. The spread of diseases, coupled with weather fluctuations, particularly at the time of fruit setting, caused a substantial reduction in apple production which, in turn, had an adverse effect on the local economy. As a result, the local people began to actively consider diversifying to other activities such as floriculture, mushroom farming, fisheries, off-season vegetables, and dairy farming in order to reduce their excessive dependency on apple cultivation.

During this period, the State government took certain initiatives. It announced support prices to protect growers from price fluctuations. Realising that the use of wooden boxes for packing apples, along with the policy of allotting timber to the sawmills, was causing damage to the forests, cardboard boxes were introduced as an alternative and the practice of supplying timber from the forest was stopped. This obliged fruit growers to look for alternatives. Consequently, in the mid-nineties, out of the total boxes used, 20 to 30 per cent were cardboard boxes, 20 to 25 per cent were recycled boxes from Delhi, and the rest were manufactured from Eucalyptus timber imported from the neighbouring states of Punjab and Haryana. More recently, realising the harmful effects from the excessive use of chemical fertilizers, people have started using more farmyard manure (FYM) and compost. There is also a visible, emerging shift to other alternative cash crops such as peas, flowers, and so on.

Range of Livelihood Options

The empirical evidence available from the study areas reveals no significant relationship between the range of livelihood options adopted by households in the transformed and non-transformed areas. As shown in Table 16, nearly four-fifths of the total households in both areas are engaged in three to four livelihood options. Nonetheless, the data indicate a significantly higher percentage of households (17.46%) adopting five to six livelihood options in the non-transformed areas compared to 4.84 per cent in transformed areas. No household, however, adopted more than five to six options. The patterns were almost similar with regard to different categories of household in both types of area, except that in the non-transformed areas more than one-third of the medium and more than one-fourth of the large households adopted five to six livelihood options compared to 4.26 per cent of the small farmers adopting options in the range of five to six (Tables 17 and 18). Furthermore, while there was no relationship between the range of livelihood options adopted by the households and the per capita and household income in the transformed areas, a positive relationship existed in the case of non-transformed areas, particularly regarding household income for all categories of household.

Table 16: Range of Livelihood Options: All Households

Range	Transformed Areas			Non-transformed Areas		
	% age of HH	HH income	Per capita income	% age of HH	HH income	Per capita income
Up to 2	9.68	82498	13026	3.17	8309	1846
3-4	85.48	67423	9684	79.37	33574	5134
5-6	4.84	88135	15553	17.46	48089	5750
All Households	100.00	69884	10219	100.00	35305	5197

Source: Field Survey, 1995

Note: Household and per capita incomes are net income figures in Indian Rupees (1 US\$ = IRs 35.00)

Table 17: Range of Livelihood Options by Categories of Household: Transformed Areas

Range	Small			Medium			Large		
	%age of HH	HH income	Per capita income	%age of HH	HH income	Per capita income	%age of HH	HH income	Per capita income
Up to 2	8.51	58842	8717	12.50	67599	16900	14.29	192021	27432
3-4	87.23	58186	9140	75.00	80803	8506	85.71	117161	13784
5-6	4.26	101093	18381	12.50	76830	10370	-	-	-
All Households	100.00	60068	9442	100.00	76831	9174	100.00	127855	15431

Source: Field Survey, 1995

Note: Household and per capita incomes are net income figures in Indian Rupees (1 US\$ = IRs 35.00)

Table 18: Range of Livelihood Options by Categories of Household: Non-transformed Areas

Range	Small			Medium			Large		
	%age of HH	HH income	Per capita income	%age of HH	HH income	Per capita income	%age of HH	HH income	Per capita income
Up to 2	2.50	9585	1917	6.25	7032	1758	-	-	-
3-4	90.00	23897	4136	56.25	46669	5316	71.43	69672	9959
5-6	7.50	24616	3692	37.50	51540	6443	28.57	71938	6078
All Households	100.00	23593	4050	100.00	46019	5629	100.00	77748	8504

Source: Field Survey, 1995

Note: Household and per capita incomes are net income figures in Indian Rupees (1 US\$ = IRs 35.00)

The configuration of livelihood options in different ranges and their contribution to total household income in the transformed and non-transformed areas have been shown in Tables 19 and 20 respectively. A few comments are in order. First, in the transformed areas, while households practising up to two options had adopted fruit crops, livestock, and service, more than two-thirds of their total income was contributed by fruit crops alone. The households practising three to four and five to six options had adopted practically all the options in varying combinations. Regarding the contribution of different options to income, fruit crops and services accounted for a large percentage of the household income. Second, in the non-transformed areas, the households practising two options had adopted crop production, livestock, and agricultural labour in varying combinations, whereas three-fourths of the household income came from crop production and agricultural labour. Among those adopting three to four and five to six options, all the important options were being adopted in varying combinations, but about half of the household income came from services and fruit crops. Third, among different categories of household in transformed areas, fruit crops accounted for more than fifty per cent of the total household income, particularly in the case of medium and large households (Tables 21 and 22). Fourth, in non-transformed areas, the small and medium households (Tables 23 and 24) which adopted two livelihood options were engaged in crop production, livestock, and agricultural labour, and a large part of their income was being contributed by agricultural labour in the case of small households and crop production in the case of medium households. Insofar as large households were concerned (Table 25), all households who adopted more than two options were engaged in all the options except collection of wild products and weaving. However, in the case of those who adopted three to four options, a large share of the income came from fruit crops and service, while, in the case of others, crop production followed by fruit crops and livestock provided most to the income.

A variety of factors, both at the household level and community level, determines the number of livelihood options adopted by a household. At the house-

Table 19: Range-wise Livelihood Options and Their Contribution to Total Household Income, All Households: Transformed Areas

S. No.	Livelihood Options/ Range	% of Households Involved			% share of Income		
		Up to 2	3-4	5-6	Up to 2	3-4	5-6
1.	Crop Production	-	94.34	100.00	-	6.92	3.70
2.	Vegetable Production	-	15.09	100.00	-	1.06	7.75
3.	Livestock	66.67	90.57	100.00	13.55	18.29	22.43
4.	Fruit Crops	100.00	100.00	100.00	63.74	43.23	22.43
5.	Weaving	-	7.75	33.33	-	0.61	0.38
6.	Agricultural Labour	-	11.32	-	-	1.80	-
7.	Service	33.33	28.30	66.67	22.71	25.40	46.90
8.	Business/Shop	-	3.77	-	-	2.69	-

Source: Field Survey, 1995

Note: Livestock include dairy animals, sheep, goat, and poultry

Table 20: Range-wise Livelihood Options and Their Contribution to Household Income, all Households: Non-transformed Areas

S. No	Livelihood Options/ Range	% of Households Involved			% share of Income		
		Up to 2	3 - 4	5 - 6	Up to 2	3 - 4	5 - 6
1.	Crop Production	100.00	100.00	100.00	45.60	15.09	19.55
2.	Livestock	50.00	90.00	100.00	16.49	12.85	14.05
3.	Fruit Crops	-	70.00	100.00	-	19.15	22.30
4.	Weaving	-	6.00	27.27	-	0.54	2.10
5.	Agricultural Labour	50.00	40.00	27.27	37.91	7.62	6.63
6.	Non-agricultural Labour	-	18.00	18.18	-	8.13	5.45
7.	Wild Products	-	10.00	36.36	-	0.54	1.04
8.	Services	-	30.00	63.64	-	30.09	23.03
9.	Business/Shop	-	12.00	36.36	-	5.99	4.76

Source: Field Survey, 1995

Table 21: Range-wise Livelihood Options and Their Contribution to Total Household Income, Small Households: Transformed Areas

S. No.	Livelihood Options/Range	% of Households Involved			% of Income		
		Up to 2	3 - 4	5 - 6	Up to 2	3 - 4	5 - 6
1.		-	-	-	-	-	-
2.	Crop Production	-	92.68	100.00	-	5.55	1.47
3.	Vegetable Production	-	12.20	100.00	-	0.50	6.50
4.	Livestock	50.00	87.80	100.00	6.51	18.12	20.85
5.	Fruit Crops	100.00	100.00	100.00	45.73	39.04	9.85
6.	Weaving	-	4.88	-	-	0.84	-
7.	Agricultural Labour	-	14.63	-	-	2.69	-
8.	Service	50.00	29.27	100.00	47.76	31.25	61.33
9.	Business /Shop	-	2.44	-	-	2.01	-

Source: Field Survey, 1995

Table 22: Range-wise Livelihood Options and Their Contribution to Total Household Income, Medium Households: Transformed Areas

S. No.	Livelihood Options/ Range	% of Households Involved			% of Income		
		Up to 2	3-4	5-6	Up to 2	3-4	5-6
1.	Crop Production	-	100.00	100.00	-	8.48	10.93
2.	Vegetables	-	33.33	100.00	-	3.45	11.81
3.	Livestock	100.00	100.00	100.00	19.84	18.06	12.32
4.	Fruit Crops	100.00	100.00	100.00	80.16	48.97	63.33
5.	Weaving	-	-	100.00	-	-	1.61
6.	Agricultural Labour	-	-	-	-	-	-
7.	Service	-	16.67	-	-	11.14	-
8.	Business /Shop	-	16.67	-	-	9.90	-

Source: Field Survey, 1995

Table 23: Range-wise Livelihood Options and Their Contribution to Total Household Income, Large Households: Transformed Areas

S. No	Livelihood Options/ Range	% of Households Involved			% of Income		
		Up to 2	3 - 4	5 - 6	Up to 2	3 - 4	5 - 6
1.	Crop Production	-	100.00	-	-	10.51	-
2.	Vegetable Production	-	16.67	-	-	1.31	-
3.	Livestock	100.00	100.00	-	19.96	19.03	-
4.	Fruit Crops	100.00	100.00	-	80.04	53.15	-
5.	Weaving	-	16.67	-	-	0.28	-
6.	Agricultural Labour	-	-	-	-	-	-
7.	Service	-	23.33	-	-	15.36	-
8.	Business/Shop	-	-	-	-	-	-

Source: Field Survey, 1995

Table 24: Range-wise Livelihood Options and Their Contribution to Total Household Income, Small Households: Non-transformed Areas

S. No	Livelihood Options/ Range	% of Households Involved			% of Income		
		Up to 2	3 - 4	5 - 6	Up to 2	3 - 4	5 - 6
1.	Crop Production	100.00	100.00	100.00	34.277	14.11	16.54
2.	Livestock	-	86.11	100.00	-	12.84	16.97
3.	Fruit Crops	-	63.89	100.00	-	10.69	22.00
4.	Weaving	-	-	-	-	-	-
5.	Agricultural Labour	100.00	50.00	66.67	65.73	13.56	9.14
6.	Non-agricultural Labour	-	16.67	33.33	-	10.28	17.06
7.	Wild Products	-	13.89	66.67	-	1.05	3.39
8.	Service	-	27.78	33.33	-	26.43	12.19
9.	Business/Shop	-	11.11	33.33	-	11.04	2.71

Source: Field Survey, 1995

Note: Livestock include dairy animals, sheep, goat, and poultry

Table 25: Range-wise Livelihood Options and Their Contribution to Total Household Income, Medium Households: Non-transformed Areas

S. No	Livelihood Options/Range	% of Households Involved			% of Income		
		Up to 2	3 - 4	5 - 6	Up to 2	3 - 4	5 - 6
1.	Crop Production	100.00	100.00	100.00	61.03	15.94	20.19
2.	Livestock	100.00	100.00	100.00	38.96	9.34	11.33
3.	Fruit Crops	-	77.78	100.00	-	20.89	18.94
4.	Weaving	-	11.11	16.67	-	1.07	0.65
5.	Agricultural Labour	-	22.22	16.67	-	2.71	10.86
6.	Non-agricultural Labour	-	33.33	16.67	-	11.43	5.24
7.	Wild Products	-	-	33.33	-	-	0.97
8.	Service	-	33.33	83.33	-	37.57	31.43
9.	Business/Shop	-	11.11	16.67	-	1.05	0.37

Source: Field Survey, 1995

Note: Livestock include dairy animals, sheep, goat, and poultry

hold level, factors such as availability of land, labour, assets, skills, availability of market facilities, and so on play an important role in determining the number of options. For the non-transformed areas, the zero order correlation matrix, presented in Table 26, shows a positive and significant relationship between the number of household options and factors such as total income, land owned, value of livestock, total assets, family size, and number of educated members in the family. On the other hand, in the transformed areas, (Table 27) there is a positive but insignificant relationship between the number of options and factors mentioned above. In these areas, factors such as the availability of markets for high-value cash crops, perhaps, play a more important role in motivating the households to undertake additional production options.

To conclude, micro data do not support the hypothesis that households in the non-transformed areas, that are poorer in terms of asset holdings and skills, adopt a higher number of livelihood options than their counterparts in the transformed areas. Regarding the relationship between the range of livelihood options in an average household and the per capita income, while there is no systematic relationship in the transformed areas, a positive relationship exists in the non-transformed areas.

Livelihood Options: Employment, Income and Linkages

The contribution of different livelihood options to employment for all categories of households, both in the transformed and non-transformed areas, has been shown in Table 28. Agriculture, defined to include crop production, fruit crops, and livestock, accounts for nearly 70 per cent of the total household employment in the transformed areas. Among the non-agricultural sources of employment, service is the most important. Whereas, in the non-transformed areas, the agricultural sector accounts for two-thirds of the total employment; service and non-

Table 26: Range-wise Livelihood Options and Their Contribution to Total Household Income, Large Households: Non-transformed Areas

S. No	Livelihood Options/ Range	% of Households Involved			% of Income		
		Up to 2	3 - 4	5 - 6	Up to 2	3 - 4	5 - 6
1.	Crop Production	-	100.00	100.00	-	16.28	29.60
2.	Livestock	-	100.00	100.00	-	16.60	18.34
3.	Fruit Crops	-	100.00	100.00	-	35.57	19.71
4.	Weaving	-	40.00	100.00	-	1.13	6.58
5.	Agricultural Labour	-	-	-	-	-	-
6.	Non-agricultural Labour	-	-	-	-	-	-
7.	Wild Products	-	-	-	-	-	-
8.	Service	-	40.00	50.00	-	30.12	10.69
9.	Business/Shop	-	20.00	100.00	-	0.30	15.08

Source: Field Survey, 1995

Note: Livestock include dairy animals, sheep, goat, and poultry

Table 27: Determinants of Livelihood Options, Non-transformed Areas: Zero Order Correlation Matrix

Variables	X ₁	X ₂	X ₃	X ₄	X ₅	X ₆	X ₇	X ₈	X ₉	X ₁₀
X ₁	1.0000									
X ₂	0.5164*	1.0000								
X ₃	0.1519*	0.3914*	1.0000							
X ₄	0.2241	0.5332*	0.2810*	1.0000						
X ₅	0.3938*	0.6422*	0.2910*	0.7948*	1.0000					
X ₆	0.4842*	0.5828*	0.3251*	0.3276*	0.4069*	1.0000				
X ₇	- 0.0699	0.0143*	-	0.0695*	0.1005*	0.0404*	1.0000			
X ₈	0.0913*	0.3391*	0.3366*	0.6538*	0.3287*	0.3684*	0.0384*	1.0000		
X ₉	0.3467*	0.6511*	0.3687*	0.5647*	0.6433*	0.5210*	0.1938*	0.5320*	1.0000	
X ₁₀	0.4420*	0.5890*	0.4886*	0.5213*	0.4613*	0.6608*	0.1034	0.5034*	0.5133*	1.0000

Source: Computed from Field Data

Note: (I) significant at a 5 per cent level of probability, (ii) X₁ = Non-farm income; X₂ = Total household income (IRs); X₃ = Number of options; X₄ = Land owned (Bighas, 12.5 Bighas = one hectare); X₅ = Land under orchards; X₆ = Family size; X₇ = Livestock (IRs) X₈ = Total assets; X₉ = Number of educated members in a family; X₁₀ = Education of the head of the family

agricultural labour, contributing one-fifth of the total employment, are the main non-farm sources of employment. The pattern was almost similar among different categories of household in both the transformed and non-transformed areas. For example, in the case of small households, livestock were an important source of employment followed by fruit crops in the transformed areas and crop production in the non-transformed areas (Table 29). Regarding medium households (Table 30), the pattern was different with fruit crops, and these accounted for

Table 28: Determinants of Livelihood Options, Transformed Areas: Zero Order Correlation Matrix

Variables	X ₁	X ₂	X ₃	X ₄	X ₅	X ₆	X ₇	X ₈	X ₉	X ₁₀
X ₁	1.0000									
X ₂	0.5662*	1.0000								
X ₃	0.3399*	0.2858 *	1.0000							
X ₄	- 0.1533	0.5175 *	0.1010	1.0000						
X ₅	- 0.1265	0.5941 *	0.0282	0.9090*	1.0000					
X ₆	0.2965 *	0.3249*	0.1527	0.1174	0.1211	1.0000				
X ₇	- 0.1015	0.1408*	0.1306	0.1362*	0.1501*	- 0.3267	1.0000			
X ₈	- 0.1034	0.4018*	0.0990	0.4702*	0.4895*	0.2290	-0.0509*	1.0000		
X ₉	0.0739*	0.5355*	0.0026	0.6069	0.5644	0.1014*	0.1282*	0.2894	1.0000	
X ₁₀	-0.2478*	0.3172*	0.0989	0.1379	0.1701	0.8936*	0.2021	0.3051*	0.1963	1.0000

Source: Computed from Field Data

Note: (i) significant at a 5 per cent level of probability, (ii) X₁ = Non -farm income; X₂ = Total household income (IRs); X₃ = Number of options; X₄ = Land owned (Bighas, 12.5 Bighas = one hectare); X₅ = Land under orchards; X₆ = Family size; X₇ = Livestock (IRs) X₈ = Total assets; X₉ = Number of educated members in a family; X₁₀ = Education of the head of the family

Table 29: Livelihood Options and Their Quality (Employment): All Households (Person days)

S. No.	Livelihood Options	Transformed Areas		Non-transformed Areas	
		Per Worker	Per Household	Per Worker	Per Household
1.	Crop Production	19 (5.54)	41 (5.50)	69 (17.00)	143 (16.88)
2.	Vegetable Production	3 (0.87)	6 (0.82)	-	-
3.	Livestock	119 (34.70)	250 (34.01)	127 (31.28)	251 (29.63)
4.	Fruit Crops	99 (28.87)	212 (28.84)	39 (9.60)	83 (9.80)
5.	Wild Products	-	-	5 (1.23)	10 (1.18)
6.	Weaving	3 (0.87)	5 (0.68)	3 (0.74)	6 (0.71)
7.	Agricultural Labour	15 (4.18)	32 (4.49)	45 (11.08)	116 (13.70)
8.	Non-agricultural Labour	-	-	43 (10.59)	76 (8.97)
9.	Services	79 (23.03)	173 (23.54)	53 (13.06)	115 (13.58)
10.	Business/Shop	7 (2.04)	15 (2.04)	22 (5.42)	47 (5.55)
	All Options	343 (100.00)	735 (100.00)	406 (100.00)	847 (100.00)

Source: Field Survey, 1995

Note: Figures in parentheses are percentages

more than half of the person days in the transformed areas and fruit crops followed by services and crop production in the non-transformed areas. The fruit crop was, however, the most important source of employment for large households, particularly in the transformed areas (Table 31). It, however, needs to be underlined that the amount of employment in various production options, particularly in the backward regions, does not reflect their quality. As is well known, the households in these areas are disguisedly unemployed; despite the fact that they remain fully employed throughout the year, they are hardly able to make both ends meet, let alone make a decent living.

In the case of household income (Table 32), agriculture-related activities contribute two-thirds of the total income, fruit production (mainly apples) alone accounts for more than two-fifths of the income in the transformed areas. In the non-transformed areas, the share of agriculture-related activities is nearly one-half, with fruit production contributing nearly one-fifth, crop production, 16 per cent, and livestock, 13 per cent. Among the non-farm activities, service contributes more than one-fourth, followed by business and non-agricultural labour. Neverthe-

Table 30: Livelihood Options and Their Quality (Employment): Small Households (Person days)

S. No.	Livelihood Options	Transformed Areas		Non-transformed Areas	
		Per Worker	Per HH	Per Worker	Per HH
1.	Crop Production	15 (4.32)	29 (4.24)	50 (12.99)	88 (12.55)
2.	Vegetable Production	1 (0.29)	3 (0.44)	-	-
3.	Livestock	116 (33.43)	223 (32.60)	140 (36.36)	231 (32.96)
4.	Fruit Crops	87 (25.08)	172 (25.15)	22 (5.71)	38 (5.42)
5.	Wild Products	-	-	8 (2.08)	12 (1.71)
6.	Weaving	3 (0.86)	6 (0.88)	-	-
7.	Agricultural Labour	21 (6.05)	42 (6.14)	60 (15.58)	122 (17.40)
8.	Non-agricultural Labour	-	-	56 (14.55)	95 (13.55)
9.	Services	99 (28.53)	199 (29.09)	31 (8.05)	59 (8.42)
10.	Business/Shop	5 (1.44)	10 (1.46)	18 (4.68)	56 (7.99)
	All Options	347 (100.00)	684 (100.00)	385 (100.00)	701 (100.00)

Source: Field Survey, 1995

Note: Figures in parentheses are percentages

Table 31: Livelihood Options and Their Quality (Employment): Medium Households (Person days)

S. No.	Livelihood Options	Transformed Areas		Non-transformed Areas	
		Per Worker	Per HH	Per Worker	Per HH
1.	Crop Production	23 (9.24)	78 (9.46)	67 (16.96)	177 (17.07)
2.	Vegetable Production	8 (3.21)	19 (2.31)	-	-
3.	Livestock	143 (57.43)	348 (42.23)	127 (32.18)	310 (29.88)
4.	Fruit Crops	26 (10.44)	263 (31.92)	38 9.62	90 (8.68)
5.	Wild Products	-	-	3 (0.76)	9 (0.87)
6.	Weaving	1 (0.40)	2 (0.24)	4 (1.01)	11 (1.06)
7.	Agricultural Labour	-	-	40 (10.13)	112 (10.80)
8.	Non-agricultural Labour	-	-	35 (8.86)	99 (9.55)
9.	Services	24 (9.64)	57 (6.92)	77 (19.49)	217 (20.93)
10.	Business/Shop	24 (9.64)	57 (6.92)	4 (1.01)	12 (1.16)
	All Options	249 (100.00)	824 (100.00)	395 (100.00)	1037 (100.00)

Source: Field Survey, 1995

Note: Figures in parentheses are percentages

less, taking into account the amount of household income without taking cognisance of the amount of employment does not truly reflect the quality of livelihood options. Therefore, to measure the quality of different livelihood options, both employment and income have to be considered. One such measurement is the per worker, per day earnings from different options. Guided by the per worker, per day earnings, the quality of livelihood options adopted by households in transformed areas is far superior to the quality of options in the non-transformed areas. Among various options, fruit crops, vegetable production, businesses, and shops are of a very high quality. It needs to be mentioned that vegetable production, though contributing very little towards total household income and employment, is of very high quality, indicating a potential and scope for diversification. On the other hand, in the non-transformed areas, daily earnings from various options are extremely low, reflecting their inferior quality; a striking example is that of livestock activities which account for more than one-fourth of the total employment, whereas per worker, per day earnings are as low as IRs 18. As per this criterion, livelihood options, such as collection and sale of wild products, weaving, and agricultural and non-agricultural labour, are of a distress nature, undertaken primarily with the survival motive in mind, and are characteristic of

Table 32: Livelihood Options and Their Quality (Employment): Large Households (Person days)

S. No.	Livelihood Options	Transformed Areas		Non-transformed Areas	
		Per Worker	Per Household	Per Worker	Per Household
1.	Crop Production	32 (9.82)	98 (9.90)	146 (30.67)	374 (30.89)
2.	Vegetable Production	5 (1.53)	15 (1.52)	-	-
3.	Livestock	112 (34.36)	331 (33.43)	84 (17.65)	230 (18.99)
4.	Fruit Crops	135 (41.40)	412 (41.62)	167 (35.09)	302 (24.94)
5.	Wild Products	-	-	-	-
6.	Weaving	1 (0.31)	4 (0.40)	9 (1.89)	25 (2.06)
7.	Agricultural Labour	-	-	-	-
8.	Non-agricultural Labour	-	-	-	-
9.	Services	41 (12.58)	130 (13.13)	38 (7.98)	202 (16.88)
10.	Business/Shop	-	-	32 (6.72)	78 (6.44)
	All Options	326 (100.00)	990 (100.00)	476 (100.00)	1211 (100.00)

Source: Field Survey, 1995

Note: Figures in parentheses are percentages

options taken by hard-working peasants. A more or less similar pattern is in evidence among different categories of household; the notable exception is higher per worker, per day earnings from crop production compared to vegetable production in the case of large households and an equal amount of per day earnings from vegetable production and fruit crops in the case of medium households in transformed areas (Tables 33 through 36).

Numerous factors contribute to the extremely low productivity of different livelihood options in the non-transformed areas. Some of these factors, as mentioned earlier, are poor quality of livestock breed, low use of modern inputs such as chemical fertilizers and high yielding varieties, lack of infrastructural facilities, and low level of education. One of the most important factors, however, is that of inaccessibility, e.g., the lack of roads. As may be seen from Table 37, while there is no significant difference in the percentage contribution of different cost components of a 20kg box of apples to total production and marketing costs, the transport costs up to the road head alone account for as much as 23 per cent in the non-transformed areas compared to a low three per cent in the transformed areas. Therefore, the provision of all-weather roads is essential not only to improve the quality of livelihood options, but also, in the ultimate analysis, to promote sustainable development.

Table 33: Livelihood Options and Their quality (income): All Households (IRs per household)

S. No.	Livelihood Options	Transformed Areas		Non-transformed Areas	
		Per Household	Per Worker Per Day	Per Household	Per Worker Per Day
1.	Crop Production	4148 (5.93) [1197]	101	5781 (16.37) [5516]	40
2.	Vegetable Production	940 (1.34) [26721]	157	-	-
3.	Livestock	12428 (17.78)	49	4648 (13.17)	18
4.	Fruit Crops	30962 (44.3) [41080]	146	6975 (19.76) [23598]	84
5.	Wild Products	-	-	230 (0.65)	23
6.	Weaving	371 (0.53)	74	327 (0.93)	54
7.	Agricultural Labour	1035 (1.48)	33	2786 (7.89)	24
8.	Non-agricultural Labour	-	-	2609 (7.39)	34
9.	Services	18452 (26.40)	106	9952 (28.19)	86
10.	Business/Shop	1548 (2.22)	103	1997 (5.65)	42
	All Options	69884 (100.00)	95	35305 (100.00)	42

Source: Field Survey, 1995

Note: 1. Figures in parentheses are percentages
2. Figures in square brackets are net income per hectare

To conclude, while there is no significant difference in the range of livelihood options adopted by the households in both areas, the evidence at our disposal lends credence to the belief that, in the transformed areas, multiple options are undertaken with a view to maximising net returns and internalising the external economies; for example, households keep animals to use the fodder available in the orchards. On the other hand, in the transformed areas, households resort to multiple options with a survival motive and to minimise the risk and stabilise their household incomes. The evidence at hand also supports the hypothesis that the availability of basic infrastructural facilities, for instance roads, plays an important role in sustaining and improving upon the quality of livelihood options.

Backward and Forward Linkages

The extent and nature of the linkages associated with different livelihood options are yet other important indicators of their quality. A livelihood option that generates a variety of backward-forward linkages is considered superior and of high quality. In fact, the essence of the argument behind the strategy of unbalanced

Table 34: Livelihood Options and Their Quality (Income): Small Households (IRs per Household)

S. No.	Livelihood Options	Transformed Areas		Non-transformed Areas	
		Per Household	Per Worker Per Day	Per Household	Per Worker Per Day
1.	Crop Production	2880 (4.79) [9753]	99	3423 (14.51) [5182]	39
2.	Vegetable Production	533 (0.89) [22755]	177	-	-
3.	Livestock	10421 (17.35)	46	3074 (13.03)	13
4.	Fruit Crops	22527 (37.50) [48391]	131	2706 (11.47) [23126]	71
5.	Wild Products	-	-	-	24
6.	Weaving	426 (0.71)	71	2825 (11.97)	-
7.	Agricultural Labour	1366 (2.27)	33	2942 (12.47)	23
8.	Non-agricultural Labour	-	-	5910 (25.05)	31
9.	Services	20894 (34.79)	105	2425 (10.28)	100
10.	Business/Shop	1021 (1.70)	102	2425 (10.28)	43
	All Options	60068 (100.00)	88	23593 (100.00)	34

Source: Field Survey, 1995

Note: 1. Figures in parentheses are percentages

2. Figures in square brackets are net income per hectare

development is to identify and promote key activities/sectors having the potential for generating maximum linkages.

As is well known, in poor agrarian economies, including mountainous regions, there are strong linkages between various economic activities in general and crop production and livestock, in particular; the former supplies fodder, both green and dry, in terms of crop residue, by-products, weeds, grasses, etc, and the latter farmyard manure and animal power to carry on diverse agricultural operations. It, however, needs to be underlined that, in such economies, linkages, though very strong, barely sustain the system at a low level of productivity without resulting in any improvement in either activity. In essence, a production option which has a potential for strong and high quality linkages between farm and non-farm sectors helps not only to sustain closely related activities but also to improve upon their productivity. In brief, the mere existence of linkages between different options neither indicates their quality nor offers any insight into their sustainability nuances. In the final analysis, what matters really is the nature and

Table 35: Livelihood Options and Their Quality (Income): Medium Households (IRs Per Household)

S. No.	Livelihood Options	Transformed Areas		Non-transformed Areas	
		Per Household	Per Worker Per Day	Per Households	Per Worker Per Day
1.	Crop Production	5992 (7.80) [144381]	77	8366 (18.16) [5561]	47
2.	Vegetable Production	3005 (3.91) [30050]	158	-	-
3.	Livestock	13582 (17.68)	39	4814 (10.46)	16
4.	Fruit Crops	41376 (53.85) [37445]	157	9143 (19.87) [22857]	102
5.	Wild Products	-	-	188	21
6.	Weaving	125 (0.16)	63	406 (0.88)	37
7.	Agricultural Labour	-	-	2786 (6.05)	25
8.	Non-agricultural Labour	-	-	4039 (8.78)	41
9.	Service	6750 (8.79)	118	15938 (34.63)	73
10.	Business/Shop	6000 (7.81)	105	350	29
	All Options	76830 (100.00)	93	46019 (100.00)	44

Source: Field Survey, 1995

- Note: 1. Figures in parentheses are percentages
2. Figures in square brackets are net income per hectare

quality of linkages and not merely their existence and magnitude. In this context, the evidence at our disposal suggests that, in the transformed areas, the introduction of high-value cash crops (mainly apples), a dominant production option contributing as much as 44 per cent of the total household income, is not only in conformity with mountain specificities and ecology but has also generated backward-forward linkages of a very high quality as well. Some of these linkages are discussed below.

Backward Linkages

The expansion in areas under fruit crops and an increase in apple production have encouraged business and shop activities. For example, to cater to the needs of fruit growers, many shops have begun to supply chemical and other inputs, e.g., tree spraying oil; numerous private nurseries have also begun to meet the growing needs for apple saplings. Some self-help institutions, such as the Fruit Growers' Association and cooperatives, have also been formed to ensure a timely

Table 36: Livelihood Options and Their Quality (Income): Large Households (IRs Per Household)

S. No.	Livelihood Options	Transformed Areas		Non-transformed Areas	
		Per Household	Per Worker Per Day	Per Household	Per Worker Per Day
1.	Crop Production	10549 (8.25) [172533]	108	13374 (17.20) [5088]	36
2.	Vegetable Production	1311 (1.03) [32786]	87	-	-
3.	Livestock	24588 (19.23)	74	13265 (17.06)	58
4.	Fruit Crops	75692 (59.20) [33115]	184	26410 (33.97) [24848]	87
5.	Wild Products	-	-	-	-
6.	Weaving	286 (0.22)	72	2014 (2.59)	81
7.	Agricultural Labour	-	-	-	-
8.	Non-agricultural Labour	-	-	-	-
9.	Services	15429 (12.07)	119	19371 (24.92)	96
10.	Business/Shop	-	-	3314 (4.26)	42
	All Options	127855 (100.00)	129	77748 (100.00)	64

Source: Field Survey, 1995

supply of post-harvest facilities like packing boxes, transportation, and so on. Apple cultivation has also given a big boost to the local cottage industry, locally known as *kilta*, for which the demand has increased substantially. Also, many sawmills have been opened to manufacture packing boxes. And, despite the fact that many of these have been closed due to non-availability of timber from the local forests, many still manufacture boxes of timber imported from the neighbouring states of Punjab and Haryana where agroforestry has been taken up on a large scale to supply timber to fruit growers. Thus, the spread of apple cultivation has helped to harness comparative advantages across different regions. In addition, it has also led to expansion in link roads, setting up of cold storage facilities, opening up of banks, government department offices, and so on.

Forward Linkages

The most important effect falling under forward linkages of the spread of apple cultivation has been the increasing house construction leading to a surge in the demand for carpenters, masons, and unskilled labour, apart from the demand for cement, iron, steel, and bricks. This has led to a multiplier effect on the wages and employment of the local labour force, both skilled and unskilled. The increased

Table 37: Costs and Returns from Apple Cultivation: Per Box of 20kg

S. No.	Cost Components	Transformed Areas (Farmers)				Non-transformed Areas (Farmers)			
		Small	Medium	Large	All	Small	Medium	Large	All
i	Fertilizers	4.96 (6.94)	5.26 (7.02)	7.36 (11.08)	5.94 (8.48)	3.76 (5.96)	5.86 (8.15)	3.63 (5.43)	4.26 (6.29)
ii	Hired Labour	6.00 (8.40)	9.39 (12.54)	6.06 (9.12)	6.68 (9.54)	2.20 (3.49)	3.80 (5.28)	5.28 (7.90)	4.44 (6.52)
iii	Spraying	15.56 (21.79)	15.86 (21.15)	8.77 (13.20)	13.02 (18.59)	2.90 (4.61)	7.11 (9.88)	3.99 (5.97)	4.70 (6.90)
iv	FYM	2.40 (3.36)	2.40 (3.20)	2.25 (3.39)	2.40 (3.43)	2.44 (3.86)	3.40 (4.73)	2.15 (3.22)	2.94 (4.32)
v	Packing material (box+nails+paper)	15.00 (21.00)	15.00 (20.03)	15.00 (22.58)	15.00 (21.41)	16.00 (25.37)	16.00 (22.24)	16.00 (23.95)	16.00 (23.49)
vi	Transportation cost up to road head	2.00 (2.80)	2.00 (2.68)	2.00 (3.00)	2.00 (2.86)	16.00 (25.37)	16.00 (22.24)	16.00 (23.95)	16.00 (23.49)
vii	Transportation to Delhi market	15.50 (21.70)	15.00 (20.03)	15.00 (22.58)	15.00 (21.41)	12.20 (19.35)	12.20 (16.96)	12.20 (18.26)	12.20 (17.92)
viii	Commission agent and market fee	10.00 (14.01)	10.00 (13.35)	10.00 (15.05)	10.00 (14.28)	7.56 (11.99)	7.56 (11.32)	7.56 (11.32)	7.56 (11.10)
ix	Total cost	71.42 (100.00)	74.89 (100.00)	66.44 (100.00)	70.04 (100.00)	63.06 (100.00)	66.81 (100.00)	66.81 (100.00)	68.10 (100.00)
x	Average price received by the farmers	125.00	125.00	125.00	125.00	94.50	94.50	94.50	94.50
xi	Net returns	53.58	50.11	58.56	54.96	31.44	22.57	27.69	26.40

Source: Field Survey, 1995

Note: Figures in parentheses are percentages

income from fruit cultivation has encouraged many households to buy tractors, vans, and trucks in order to transport apples and supply construction materials. This has helped to expand services in the tertiary sector such as marketing, i.e., for traders and contractors. It has also promoted dairy farming; since good quality grasses are available in the orchards practically all households have purchased improved animals and sell milk, for which there is a huge demand. Another recent impact, though not very strong, is the establishment of small shops and factories to process fruits and make products such as juices, jams, and pickles. These activities are likely to expand in the future because of the ongoing process of liberalisation. Many private entrepreneurs have sought the permission of the government to start fruit processing units. Another very powerful impact of the spread of apple cultivation is the establishment of big marketing centres in the area to cater for the high demand for modern consumer goods. This in turn has provided many people with their livelihoods. The introduction of high-value cash crops has also given rise to a very powerful rural-urban nexus. Almost all fruit growers visit Delhi in connection with the marketing of their produce. It has affected the lifestyles of the local people in many ways; most modern goods can

be seen in these areas. The high literacy rate in the transformed areas can mainly be attributed to a substantial increase in incomes at household level; there is a mushrooming of private English schools in the area. Though indirectly, it has also contributed to the promotion of other related activities, e.g., tourism. Land prices have skyrocketed, and many big hotels and restaurants have been opened, providing the local people with employment opportunities.

The diverse livelihood options adopted by the households, as discussed in Chapter 4, have implications for different dimensions of sustainability, namely, natural resource base, equity, and quality of life. Some indicators related to these three dimensions of sustainability are discussed in the present chapter.

Crop cultivation, a dominant production option practically in all mountainous regions, although hampered by inaccessibility, marginality, and fragility, has adverse ecological implications. As is well documented by now, the cultivation of arable on steep and steep-sloping lands causes soil erosion, landslides, and environmental degradation. Therefore, from the sustainability perspective, among the different livelihood options, the cultivation of fruit crops is more sustainable than other options. Furthermore, recent developments, most notably the introduction and ever-increasing replacement of wooden boxes with cardboard boxes for packing apples, recycling of packing boxes, and export of timber from neighbouring states, have lessened the dependence on these crops on natural resources, mainly forests, thereby enhancing the sustainability prospects.

Livestock are yet another dominant production option in mountainous regions, and the study areas were no exception. In this regard, recent developments again, particularly in the transformed areas, for instance the sharp decline in the number of animals, improvement in their quality as a result of the complete replacement of local animals with improved animals, increasing cost of stall feeding, and a better market for dairy products, have made the livestock production option economically viable and also compatible with the natural resource base of the local area and have enhanced its sustainability. In comparison, in the non-transformed areas, a high livestock population, poor quality of livestock, and grazing practices result not only in low production but also in degradation of pastures and grazing lands.

The remaining livelihood options, in particular, businesses and shops and agricultural and non-agricultural labour, have better prospects for sustainability because they are tertiary in nature and much less dependent on the natural resource base. It, however, needs to be underlined that these options are direct manifestations of the forward and backward linkages generated by the dominant production option of high-value cash crops. Their sustainability, therefore, hinges on the sustainability of high-value cash crops.

Ecological Indicators

Different indicators reflecting ecological health and the status of the natural resource base in the transformed and non-transformed areas are given in Tables 38 and 39 respectively.