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Agricultural Transformation Processes in the Mountains of Nepal: Empirical Evidence from Ilam Districts

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Preface

Applied research on mountain agriculture's sustainability and unsustainability dynamics has been an important undertaking for the Mountain Farming Systems' Programme of ICIMOD since 1988. It was made possible, to some extent, through the constant support of Ford Foundation to the MFS Programme for its project on 'Strategies for Sustainable Mountain Agricultural Development', which was implemented in three phases.

The objectives of the present phase of the project (1994-96) focus on improving the understanding of the transformation processes and sustainability of mountain agriculture in the Hindu Kush-Himalayan (HKH) region (the Indian Himalayas and Nepal). This was accomplished by collecting empirical evidence through conducting field studies on cash crop dominated farming systems in the Indian Himalayas of Himachal Pradesh and Sikkim and in the mountain district of Ilam in Nepal

This is the third in a publication series of the findings of case studies that ICIMOD conducted on Agricultural Development Processes and Sustainability in the HKH. The first is MFS 96/2 on Himachal Pradesh and the second is MFS 97/2 on Sikkim.

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Finally, I greatly appreciate the friendliness and cooperation extended by farmers during the field study. Thanks are also due to officials of various departments of His Majesty's Government of Nepal who supported the study team and provided valuable information for the study.

Shiva Sharma

Abstract

The present study was undertaken in the Ilam District of Nepal to examine the effects of mountain agricultural development processes on livelihood options of local farmers. The micro evidence suggests that transformation processes in agriculture have led mainly to cultivation of high-value cash crops and livestock. It shows that the types of production options selected in the process of transformation have been the same in both the study areas (transformed and non-transformed).

The three most important primary factors that have propelled agricultural transformation in Ilam are farmers who are innovative and aware, availability of a range of options with appropriate technological backstopping, and infrastructure linking the local markets to markets outside. Road facilities are fundamental to raising the educational levels and receptiveness of the farmers and essential for providing market access to the products and inputs for production.

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Chapter 1
Introduction

General

Mountain agriculture in general has a poor development record. Yet some sporadic pockets have gone through a considerable amount of agricultural transformation in the Hindu-Kush Himalayan (HKH) region. This transformation has brought about several positive changes in terms of production and consumption for mountain people with or without natural resource depletion. Some of these so-called success stories have generated an interest in and an incentive for mountain development.

It is in this context that the **Mountain Farming Systems' (MFS) Division** of ICIMOD established a programme called 'Strategies for Sustainable Development of Mountain Agriculture'. The programme was introduced to examine the sustainability implications of transformed mountain agriculture through analysis and documentation of processes of and approaches to development. One objective of the programme was to identify replicable components that might facilitate similar transformations of a sustainable nature in other mountain areas.

One difficulty is the absence of a conceptual and analytical framework through which a proper assessment of the sustainability of mountain agriculture can be made. ICIMOD has made some attempts to make up for this deficit by developing a conceptual framework at operational level. Based on this framework, an empirical study was carried out in the Ilam district of Nepal.

Background

Sustainability of mountain agriculture is an overriding concern, because it is becoming more and more difficult for mountain people to sustain themselves, despite the overall development of agriculture and natural resource systems over the last two or three decades. Although agriculture is the dominant sector in the mountains, it is generally stagnant. In many cases, the quality of life has declined over time. Evidence of this can be seen in unsustainable trends such as the adoption of inferior options, increased aspirations of the people, and diminished flexibility in carrying out farming and other activities (Jodha 1991, Shrestha 1992).

In Nepal, certain hill and mountain pockets have experienced agricultural transformation. For instance, vegetable cultivation has contributed to tripling household incomes in the Khani *Khola* area in Naubise, Dhading district, over the last 15 years (Katwal and Shah 1992). Additionally, the per capita food grain availability has increased almost four times in that area. Further, social welfare improvements are reflected in the increased rate of female literacy; women are more self-confident and have better clothing and housing facilities and their participation in decision-making has increased.

Along with increased production and consumption in the community, the resource regenerative capacity of the area has also increased, as indicated by increased biomass production at the farm level and an increase in stall-feeding practices which reduces pressure on forests and other forms of natural resources. These ultimately lead to increased sustainability of mountain agriculture (Shrestha and Yadav 1992). Similar transformations in agriculture and the natural resource base have taken place in some pockets of the Rapti Integrated Rural Development Project Area through the introduction of high-value cash crops and rehabilitation of degraded land (Mellor Associates and IIDS 1995).

Evidence of successes has generated rays of hope in a mountain region which had previously been perceived as a hinterland and therefore an unproductive and uneconomical area for the purpose of development investments. These success stories ecourage the conviction that mountain areas do create opportunities as well as generating constraints.

Two scenarios are emerging in mountain agriculture. The dominant scenario is that of general degradation and the emerging one is of transformation of mountain agriculture in localised pockets. In this context, several questions are raised.

- Why has one area undergone such transformations when others with similar bio-physical and socioeconomic conditions have not?
- What is the nature of this transformation? It it 'temporary' or a 'long lasting' or sustainable transformation?
- What are the key factors in promoting sustainable development of mountain agriculture?

A better understanding of the process in terms of both range and quality, identified through different biophysical, socioeconomic, and environmental indicators, would contribute to better design and management of sustainable activities; and this should also include policy and programme formulation for the development of mountain areas and mountain agriculture. In this context, an empirical study based on the operational, conceptual, and analytical framework developed by ICIMOD was undertaken in Ilam district of Nepal. The objectives of this study are described in the following section.

Objectives

The main reason for undertaking this empirical study was to examine a range of production options that might lead to improved quality of life and improved welfare of mountain communities without resource depletion and its associated factors and processes in agriculturally transformed areas. The specific operational objectives of the study are as follow.

- To document the diversification of economic activities, examine their role in transformation, and assess the impact of diversification

- To assess opportunities or production options with reference to long-term implications on the natural resource base, the quality of life, and on equity aspects

- To analyse the mechanisms and processes underlying the adoption of options and identify replicable components in terms of the approaches to and methodologies of activities leading to sustainable mountain agriculture

Chapter 2

General Background of the Study District

General

Ilam is the easternmost hill district of Nepal and is bordered by the Indian state of West Bengal in the east and by Jhapa, a Nepal *Terai* district, in the south. In the north and west is another hill district of Nepal, Panchthar. The district headquarters' town, Ilam Bazaar, is at an altitude of 1,200 metres above sea level. With a geographical area of 1,717sq.km., the district is divided into 47 Village Development Committees (VDCs) and one municipality. The district has three clear geographical divisions in terms of altitude: a tropical region bordering with the *Terai* in the south below 1,000 metres, a sub-tropical region in the middle of the district with altitudes ranging between 1,000 to 1,800 metres, and a temperate region with altitudes of 1,800 metres and above. The sub-tropical region accommodates about four-fifths of the district population and is diverse in land systems and farming. Micro-climatic variation is stark in this region and most transformation activities are concentrated there. Rainfall during the monsoon is distributed over a period of five months and is conducive to biodiversity.

Human Resources

Though Ilam is a small district, 230 thousand people live in the area. There are 41,561 households with an average family size of 5.5 (CBS 1991). The urban population accounts for 5.8 per cent, and this has grown over the last decade at an annual rate of three per cent, almost at the same rate the district population has grown. The population density is 14.4 persons per sq.km. In terms of farmland, each farm hectare has a population of 3.2. The literacy rate in the district is 53 per cent; only six other districts of Nepal have such high literacy rates. About two-fifths of the females and two-thirds of the males are literate. Illiteracy is high among the elderly, but the younger population has a literacy rate of virtually 100 per cent.

Land Resource: Its Use and Productivity

Only 41 per cent of the total land is cultivated. Of 71,032 hectares of cultivated land, 13 per cent is irrigated, and this includes the seasonally irrigated area. The average holding size is 1.7 hectares. The distribution of land is skewed as indicated by a Gini

coefficient of 0.46. Almost one-fifth of the households have less than a 0.25 hectare farm size. About 60 per cent of the households own less than one hectare of land and 40 per cent have more than one hectare.

The use of farmland is dominated by cereal crops, athough almost one-fifth of the land is devoted to non-cereal production (Table 2.1). Land under non-cereal production is increasing over time; ten years ago, only about one-tenth of the land was used for crops other than cereals.

Table 2.1: **Land Allocated to Crops and Crop Production**

Crops	% Area	Productivity (MT/hectare)
Maize	46.6	2.19
Rice	22.3	1.95
Wheat	6.5	2.36
Millet	5.8	0.90
Cardamoms	4.2	1.00
Ginger	1.0	13.50
Potatoes	7.7	9.70
Amliso (broom grass)	0.4	6.00
Tea	2.7	0.50
Fruits	1.0	8.50
Vegetables	2.0	3.30

***Source**: District Agricultural Development Office, 1994*

Farming is based predominantly on local inputs. The use of chemicals is minimal and is very much concentrated on tea and a few other crops (wheat, maize, and potatoes). The per hectare chemical fertilizer use in 1993/94 was 3.15 kg of nutrients. Use of pesticides is virtually non-existent. Chemicals and farm implements are distributed by 30 institutional and private dealers.

Raising livestock is another major land-based economic activity in Ilam. There are about 40,000 dairy cattle, of which half are improved breeds. Improved breeds are totally stall-fed, impinging less and less on forests and pastures. The powdered milk factory in Biratnagar has worked as a stimulus to gradually substitute local animals with improved ones. Ilam supplies 25,000 litres of milk to Biratnagar every day. The cheese factory in Pashupatinagar, Ilam, uses about five thousand litres of milk on a daily basis. There are 23 milk collection centres for milk marketing services (including 3 chilling centres).

Infrastructural Development

Forty of Ilam's 47 VDCs are approachable by road, at least during the winter. Including the Charali-Ilam black-topped road, the total road length in the district is 180 km. The

unapproachable VDCs are in the northernmost part of the district where economic activities are also limited. Villages in road-linked VDCs are at the most two to three hours' walk from the road head.

Ilam Bazaar receives electricity from a diesel plant; Gorkhe and Pashupatinagar have hydroelectric supplies; and Mangalbazaar and Fikkal receive electricity from private power supplies using small diesel-run generators. In more than 60 villages, small peltric sets are operated privately, meeting the local lighting needs. Telephone services are available in seven places, including Ilam Bazaar, and there are 250 lines.

Public Institutions

Ilam is rich in terms of institutional infrastructure. There are 270 primary schools and 60 middle and high schools in Ilam. There are 30 health posts (including a hospital in Ilam) and 37 post offices. There are 15 bank branches (including Small Farmers' Development Projects) and 10 cooperatives. Data on institutions and the average number of families served by them are presented in Table 2.2.

Table 2.2: **Public Infrastructure in Ilam**

Institutions	No. of Units	Families Served per Unit
Primary school	270	154
Middle or high school	70	3,274
Health posts/hospitals	30	7,640
Post offices	37	6,195
Bank offices	15	15,281
Cooperatives	10	
Telephone services	7	
Milk collection centres and chilling centres	23	

Source: *District Agricultural Development Office, Ilam, 1994*

Markets and *Hat* Bazaars

Ilam has a developed and dispersed network of *hat* bazaars (periodic markets) and market centres. Weekly and bi-weekly *hat* bazaars are held in seven places and there are at least 13 marketing centres with facilities for daily transactions of goods and services. Unlike in other hill districts, urbanisation is not limited to one or two market centres. The dispersed market network is the result of an improved road network and dispersed development activities.

Development Indicators

Some of the development and distribution indicators for Ilam and all the hills of Nepal are presented in Table 2.3. The Gini coefficient for farm land distribution is 0.46,

Table 2.3: **Distribution and Development Indicators of Ilam**

Indicators	Ilam	Nepal Hills
Gini coefficient for landholdings	0.46	0.47
Gini coefficient for landholdings below 1.0 hectare	0.17	0.29
Sen Index (using 1.0 hectare as a cut-off point)	0.28	0.54
Child literacy rate	71.2	61.5
Girl-boy literacy ratio	86	68
Child activity rate	14.6	26.5
Child marriage rate	1.5	3.3

Sources: *Sharma (1994) and Sharma (1996)*

almost the same as in other hill districts of Nepal. Disparity in land distribution among smallholders is much less pronounced in Ilam. The Sen Index, which measures the skewed characteristics of land distribution among smallholders, is almost half those of the hill districts in Nepal. This indicates there is no serious problem of near landlessness.

Ilam is ahead in terms of the child literacy rate and has a much higher girl-boy literacy ratio. The child activity rate is almost half those of other hill districts. The child marriage rate is less than half the general rate applicable to other hill areas.

Ilam and Neighbouring Districts Compared

Data enabling the comparison of Ilam with immediate neighbouring hill and mountain districts are compiled in Table 2.4. The comparison is made in terms of major socioeconomic characteristics. The districts considered for comparison are Panchthar, Terhathum, Bhojpur, and Sankhuwasabha.

An average household in Ilam has 1.37 hectares of cultivated land compared to an average of only 1.1 hectare in the neighbouring five hill districts. Grasslands and private household forests in Ilam are several times greater than in other districts. Homesteads occupy 0.06 hectares in Ilam compared to an average of only 0.04 hectares in other districts. The district has fewer land parcels per farm and more ownership of farming tools and equipment.

The average household cash income in Ilam is 36 per cent higher than the average cash income in other districts. Consequently, the average annual household expenditure is also significantly higher, indicating a better standard of living. Expenses on education and health are also distinctly higher, suggesting better investments in human capital formation. As a result, the literacy rate, for both males and females, is higher in Ilam. The superiority of the district is also demonstrated by the primary school enrollment figures and primary education.

Table 2.4: **Comparative Socioeconomic Position of Ilam District in Relation to Other Neighbouring Districts**

Particulars	Ilam	Other Districts					
		Ave.	Panch-thar	Terha-thum	Dhan-kuta	Bhoj-pur	San[1]
Total population (1991)	229214		175206	102870	146386	198784	141903
Total households (1991)	41450	28243	31452	18379	27425	37058	26902
Total area (sq. km.)	1703	1560	1241	679	891	1507	3480
Education							
Primary school enrollment	39337		29984	20873	24850		
School enrollment rate	0.22		0.20	0.23	0.19		
Literacy rate (%)	67.9	60.4	58.4	68.7	58.9	56.2	59.6
Male	43.5	40.7	41.3	44.3	38.3	39.4	40.3
Female	24.4	18.7	12.2	24.4	20.6	16.8	19.3
Expenses on education (Rs/yr/family)	798	563	469	742	478	562	566
Assets							
Cultivated land (ha/HH)							
Upland	0.34	0.65	0.82	0.67	0.88	0.41	0.46
Lowland	1.03	0.46	0.40	0.47	0.53	0.32	0.56
Total	1.37	1.10	1.22	1.14	1.41	0.73	1.02
Grassland (ha/HH)	0.20	0.07	0.06	0.11	0.10	0.04	0.05
Private forest (ha/HH)	0.50	0.07	0.06	0.08	0.09	0.04	0.09
Homestead (ha/HH)	0.06	0.04	0.05	0.06	0.04	0.03	0.04
Total holding (ha/HH)	2.13	1.29	1.39	1.39	1.64	0.84	1.20
Operating holding (ha/HH)	1.43	1.19	1.24	1.41	1.30	0.81	1.17
Parcels (no/household)	3.1	3.8	4.4	2.6	3.7	4.2	4.3
Value of livestock shed Rs/HH	7332	5422	5356	5982	4780	6177	4817
Value of tools owned (Rs/HH)	1337	946	929	1152	799	1127	725
Income and expenses							
Avg. cash income (Rs/yr/HH)	18147	13351	10883	21707	11008	12089	11107
Income from livestock (Rs/yr/HH)	2975	1831	1402	2453	1878	970	2453
Avg. annual expenses (Rs/HH)	13430	10284	6934	14476	10963	9027	10018
Expenses on education (Rs/yr/family)	798	563	469	742	478	562	566
Expenses on health (Rs/yr/family)	253	238	50	368	432	181	158
Expenses on asset purchase (Rs/yr/HH)	109	441	313	803	242	434	413
Activity intensification and productivity							
Percentage of hired labour (man days/yr/family)	49	33	46	45	17	42	17
Cropping intensity (%)	115	159	167	150	158	149	173
Households using fertilizer (%)	42.5	38.2	41.0	45.7	57.6	20.0	26.7
Avg. credit borrowed (Rs/family)							
Institutional	19600	11823	10895	15106	5565	14529	13021

Table 2.4: **Comparative Socioeconomic Position of Ilam District in Relation to Other Neighbouring Districts (Cont'd)**

Particulars	Ilam	Other Districts					
		Ave.	Panch-thar	Terha-thum	Dhan-kuta	Bhoj-pur	San[1]
Informal	8360	5713	2600	8557	3679	8142	5589
Cattle milk productivity (lit/yr/animal)	458	298	261	379	283	329	240
Total milk production (lit/yr/family)	557	301	319	283		904	
Dependency on public forests							
Fuelwood consumption (kg/yr/family)	6801	4227	8863	2766	3585	3219	2703
From public forests (%)	8.1	33.9	18.4	31.6	35.0	54.1	30.5
From own forest (%)	59.5	37.6	45.3	38.8	30.0	29.8	44.0
Bought (%)	5.0	5.5	3.4	7.9	6.0	4.4	6.0
Others (%)	27.4	23.0	32.9	21.7	29.0	11.7	19.5
Fodder from public forest (%)	7.8	24.5	20.6	22.2	25.0	29.4	25.2
Fodder from private sources (%)	92.2	75.5	79.4	77.8	75.0	70.6	74.8

***Source**: APROSC 1991, 'Nepal Hill Fruit Development Project: Baseline Survey Report on Ilam, Terhathum, Panchthar, Sankhuwasabha and Bhojpur'*

1 Sankhuwasabha

In Ilam, 42.5 per cent of the farms use some amounts of chemical fertilizer compared to only 38.2 per cent of households in the other districts covered. Average institutional and informal borrowing by households is also higher in Ilam. Ilam was one of the few districts in which the priority sector credit programme was launched in the mid-eighties. Hence, it has extended the lending activities of Nepal Banijya Bank and Agricultural Development Bank. The emerging cash crop activities, including tea plantation and dairy activities, have encouraged the Banks to expand lending activities in Ilam.

In Ilam, livestock, as a part of the farming system are comprised of more improved breeds of animals. An average household in Ilam produces 557 litres of milk per year compared to only 301 litres in the other five hill districts. Productivity of milch animals likewise is more than one and a half times higher in Ilam.

Due to a higher standard of living and processing activities (especially of cardamoms), the consumption of fuelwood per household is quite high. However, only 8.1 per cent of the fuelwood and 7.8 per cent of the fodder requirements are drawn from public forests compared to an average of 33.9 per cent and 24.5 per cent respectively in the other five hill districts. This indicates Ilam's lower dependency on public forests, which is a positive feature from the sustainability perspective.

Chapter 3

Socioeconomic Profile of Farm Households

Selection of Study Area

With the help of widespread consultation at the district level, coupled with analysis of secondary information disaggregated at the district level, two zones were selected which are similar in terms of infrastructure and biophysical conditions but are at different stages of development. Fikkal and Pashupatinagar Village Development Committees (VDCs) were selected to represent the transformed area (TA) and Mangalbare VDC was selected to represent the non-transformed area (NTA). Both the areas are served by roads; Fikkal area having had road facilities for more than a decade and Mangalbare having had road access for three to four years. Many south-west VDCs are less developed, but were not selected for the study as they lacked road connections. They are different in that fewer institutional infrastructures are there when compared with the selected transformed area (VDCs).

Selection of Sample

A sample size of 60 farm households in each TA and NTA was fixed. The sample size is justified as the land distribution in Ilam is not so skewed. In Ilam, almost half of the total farm land is owned by small farms (less than 2 hectares) who constitute three-fourths of the total farms. The Sen Index for Ilam, using one hectare as a cut-off point, is 0.28 (compared to 0.54 for the Nepal hills) indicates that there is a homogeneity among smallholders in Ilam in terms of landholding. This justifies the present sample size.

In each VDC chosen, two to four wards were selected randomly. A list of households with their holding size was then prepared with the help of VDC officials. From the list of households with less than two hectares and those having more than two hectares, a sample was drawn using probability proportional to the size of households in landholding groups.

Information Collection

For household-level information collection, a structured and pre-tested questionnaire was used. Equal proportions of male and female enumerators were trained and sent to

sample respondents' homesteads. Questionnaires were filled using the recall method under the guidance and supervision of researchers and, generally, it took three to four hours to complete one questionnaire. Field observations and secondary data gathering were carried out by the researchers. The field survey was carried out in August-September 1995.

Focus group discussions were also held in each of the selected communities. Area-specific information was collected using this method.

Macro-level information was collected from various line agencies and non-government agencies working in the district. Among them are the Agriculture and Livestock Development Offices, Nepal Rastra Bank, Agricultural Development Bank, the Women's Development Office, the Sericulture Project, and the Mechi Integrated Rural Development Project. Other sources, such as published reports from the Central Bureau of Statistics (CBS), have also been consulted to achieve a comprehensive perspective of the district.

Defining the Household Production Options (Economic Enterprises)

The range of economic activities adopted by households is classified into 12 groups, and they are referred to as options. The options are: (i) cereals, (ii) tea, (iii) cardamoms, (iv) broom grass *(amliso)*, (v) ginger, (vi) mulberry (*kimboo*), (vii) potatoes, (viii) fruit and vegetables, (ix) dairy products, (x) livestock, (xi) cottage industries, and (xii) off-farm employment. Households are grouped into three categories in the analysis: those opting for up to five, from up to seven, and from more than seven options.

Households Adopting Different Options

The number of households adopting particular options in transformed areas (TAs) and non-transformed areas (NTAs) is presented in Table 3.1. Mulberry cultivation (*kimboo*)

Table 3.1: **Number of Households Adopting Various Options in the TA and NTA**

Options	TA	NTA
Total no of households in sample	60	60
Tea	10	1
Cardamoms	42	51
Ginger	28	1
Broom grass (*amliso*)	50	45
Mulberries (*kimboo*)	0	3
Potatoes	59	54
Fruits and vegetables	17	24
Cereal crops	59	60
Dairy products	38	41
Livestock	28	19
Cottage industries	1	2
Off-farm employment	21	43

Source: Field Survey, 1995

and cottage industries are adopted by very few farmers as economic options, while cereal crops, cardamoms, dairy products, and potatoes are the main options adopted by the majority of households.

Population

The average family sizes of sample households in the TA and NTA do not show much variatioin. In the TA it is 6.15 and in the NTA 5.97. However, by range of options, the family size is small among households adopting more than seven options (see Table 3.2). Thus the contention that diversification is a function of family size is not corroborated by the data.

Table 3.2: **Family size by Number of Options**

Number of options	Up to 5	6&7	Above 7	All
TA	6.21	6.32	5.96	6.15
NTA	6.13	6.31	5.74	5.97
All	6.17	6.31	5.84	6.06

Source: Field Survey 1995

The sex ratio (male/female) is around one for both the TA and NTA and for the number of option classifications of households (see Table 3.3).

Table 3.3: **Sex Ratio (male/female) in the TA and NTA**

Age groups	TA	NTA	All
6 years and below	1.00	0.96	0.98
7 to 14 years	1.18	1.26	1.22
15 to 45 years	0.99	1.02	1.01
46 to 60 years	1.22	0.80	1.02
Above 60 years	0.45	0.88	0.63
Total	1.03	1.03	1.03

Source: Field Survey 1995

The composition of families in terms of age cohorts is presented in Table 3.4. In the TA the potentially active population (14-60 years) constitutes 62.3 per cent while in the NTA the percentage is only 58.7. The population below six years of age and above 60 years together account for 14.6 per cent in the TA and 17.3 per cent in the NTA.

Education

The education of the sample population is measured through the literacy status and is presented in Table 3.5. The literacy rate is a little higher in the TA than in the NTA, but the sex ratio of literates is higher in the NTA. The high literacy rate is due to high literacy among lower age cohort groups. The rate declines with the advancement in age. The decline is sharper when one considers the female population only. Across the group of

Table 3.4: **Distribution of Population by Age Group in the TA and NTA**

(in %)

Age groups	TA			NTA			All		
	Male	Female	All	Male	Female	All	Male	Female	All
6 years and below	10.2	10.4	10.3	12.6	13.6	13.1	11.4	12.0	11.7
7 to 14 years	24.6	21.4	23.0	26.4	21.6	24.0	25.5	21.5	23.5
15 to 45 years	47.6	49.5	48.5	48.4	48.9	48.6	48.0	49.2	48.6
46 to 60 years	15.0	12.6	13.8	8.8	11.4	10.1	11.9	12.0	12.0
Above 60 years	2.7	6.0	4.3	3.8	4.5	4.2	3.3	5.3	4.3
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Source: Field Survey 1995

Table 3.5: **Literacy Rate among Sample Households**

Activities	Literacy Rate	Sex Ratio of Literates
TA	81.0	1.33
NTA	75.9	1.29

Source: Field Survey 1995

households adopting different levels of options, there is no systematic difference in the level of literacy and the gender of the literate population.

Land Ownership and Its Use

The sample households are agricultural households, and hence information on land holding size, land quality, and use patterns are the key to characterisation. The operational landholding size is 1.6 hectares in the TA and 2.1 hectares in the NTA (Table 3.6). The number of options adopted by households seems to increase with the decline in farm size - the larger the farm size, the lower the number of options adopted. Due to an increase in the number of households over time and due to population growth, the farm size has declined over time in the TA by 11 per cent and in the NTA by 19 per cent. The reduction in size is sharp among households adopting fewer options.

Table 3.6: **Present and Past Situations in Operational Farm Sizes**

(in ha)

	TA		NTA		All	
	Present	Past	Present	Past	Present	Past
Up to Five	1.2	2.0	2.4	3.3	1.8	2.7
Six and Seven	2.2	1.8	2.0	2.2	2.1	1.9
Above Seven	1.4	1.6	1.9	2.3	1.7	2.0
All	1.6	1.8	2.1	2.6	1.9	2.2

Source: Field Survey 1995

The quality of land by major classification, irrigated and non-irrigated, *khet* (low) and *bari* (upland), and *kharbari* (personal forest/wasteland) plays an important role in determining the use and productivity of land. Operational landholdings are classified according to various types of land in Table 3.7. Of the total land operated about one-fourth is irrigated in both the TA and NTA. *Bari* constitutes 68 per cent of the total land in the TA, while it accounts for only 55 per cent in the NTA. A much larger proportion of land is allocated to *kharbari* (28%) in the NTA than in the TA (23%). About four per cent of the land is under homesteads and used for the purpose of animal sheds (*goth/ gharedi*), in both the TA and NTA.

Table 3.7: **Present and Past Situations in the Quality of Land**

(over a 20-year period, in %)

Quality of Land	TA				NTA				All			
	Present		Past		Present		Past		Present		Past	
	HH	Area	HH	Area	HH	Area	HH	Area	HH	Area	HH	Area
Irrigated												
Khet	5.0	0.5	14.0	3.5	45.0	13.4	35.7	9.5	25.0	7.7	24.8	7.0
Bari	53.3	24.8	45.6	22.5	41.7	11.3	33.9	10.9	47.5	17.3	39.8	15.6
Unirrigated												
Khet	15.0	3.8	12.3	3.2	3.3	0.4	1.8	1.1	9.2	1.9	7.1	2.0
Bari	71.7	42.9	78.9	54.9	81.7	44.1	80.4	49.6	76.7	43.6	79.6	51.8
Kharbari	41.7	23.3	28.1	12.0	56.7	27.5	50.0	23.5	49.2	25.6	38.9	18.8
Goth/Gharedi	96.7	4.6	84.2	3.9	98.3	3.4	80.4	5.5	97.5	3.9	82.3	4.8
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

***Note**: HH = households*
***Source**: Field Survey 1995*

Over the past twenty years, farmers seem to have shifted non-irrigated land (*pakho* or upland) to *kharbari* in both the TA and NTA. In the TA, *kharbari* increased from 12 per cent to 23 per cent, in the NTA it increased from 24 per cent to 27 per cent. The percentage of irrigated land has changed only marginally in both the TA and NTA. Increasing adoption of cardamoms and *amliso* (broom grass) and fodder growing to support dairy cattle seem to have induced farmers to shift land from *pakho* or upland to *kharbari*.

The land tenancy status in both the TA and NTA is presented in Table 3.8. Only about two per cent of the land in the TA and three per cent in the NTA is rented out. Rented in land in the operational holdings of sample households constitutes 0.4 per cent in the NTA. TA sample farmers did not report any renting-in.

Over time, the share of rented-in land in operational holdings has declined in both the TA and NTA. Twenty years ago, seven per cent of the land was rented in (of the operational holding) in the TA and 2.5 per cent was rented in in the NTA. In both areas, renting out was virtually non-existent. Households have begun to rent out their land instead, an indirect method of reducing farm size.

Table 3.8: **Land Tenancy in the TA and NTA**

(in %)

Tenancy Situation	TA		NTA		All	
	Present	Past	Present	Past	Present	Past
Own						
Households	100.0	93.0	100.0	96.4	100.0	94.7
Area	100.0	93.0	99.4	97.5	99.6	95.7
Rented in						
Households	0.0	8.8	1.7	5.4	0.8	7.1
Area	0.0	7.0	0.6	2.5	0.4	4.3
Total operating land						
Households	100.0	100.0	100.0	100.0	100.0	100.0
Area	100.0	100.0	100.0	100.0	100.0	100.0
Rented out						
Households	6.7	1.8	10.0	0.0	8.3	0.9
Area	2.2	0.4	3.1	0.0	2.7	0.2

***Source**: Field Survey 1995*

Livestock

Livestock raising is an integral part of the farming system among the sample households. Cattle raising is the most common livestock activity in both the TA and NTA. More than 90 per cent of the households raise cattle, and an average of three cattle per household are kept. The second-most important animal in the household is the goat. About one third of the households in the TA and about half of the NTA households raise goats. In the NTA, both the proportion of households and the average number of goats raised are higher than in the TA (Table 3.9).

Table 3.9: **Livestock Holding among Sample Households**

Livestock	TA		NTA	
	% of HH	Animal/HH	% of HH	Animal/HH
Cattle	98.3	3.0	91.7	3.0
	(42)		(28)	
Buffaloes	3.3	1.0	63.3	1.5
Goats	38.3	3.4	56.7	5.5
Horses/mules	15.0	1.0	-	-
Pigs	15.0	1.2	38.3	1.6
Poultry	28.3	7.2	36.7	7.0
Milch cows	97.0	1.7	60.0	1.1
	(48)		(27)	
Milch buffaloes	3.3	1.0	46.7	1.1

***Note** : Figures in parentheses are percentages of improved animals.*
***Source**: Field Survey 1995*

In the TA, both the proportions of households owning milch cattle and improved milch cattle are higher than in the NTA. The average number of milch cattle is 1.7 in the TA and only 1.1 in the NTA. Dairy cattle are popular in the TA because of the ensured market of milk due to the presence of chilling centres.

In the NTA the proportion of households raising buffaloes is 63 per cent, while, in the TA, only three per cent are engaged in raising buffaloes. The lack of marketing facilities for fresh milk in the NTA seems to have induced farmers to opt for buffaloes that yield milk with high fat content which is good for making ghee. NTA farmers do not have access to chilling centres, thus they lack a market for fresh milk.

Trees

Tree farming supplements agricultural activities in various ways. Trees supply fodder for animals and timber and fuelwood for household use. In addition, fruit trees are an important source of household nutrition and cash income. In the TA, 65 per cent of the households have fruit trees with an average of about seven trees per household. In the NTA, 38 per cent of households have on average 5.5 fruit trees. The proportion of households and the average number of trees for fodder, fuelwood, and timber are almost the same in the TA and for all types of trees in both the TA and NTA. The proportion of households involved and the number of trees have increased (see Table 3.10).

Table 3.10: **Tree Ownership among Sample Households**

Trees	TA				NTA				All			
	Present		Past		Present		Past		Present		Past	
	%. of HH	No./ HH	%. of HH	No./ HH	%. of HH	No./ HH	%. of HH	No./ HH	%. of HH	No./ HH	%. of HH	No./ HH
Fruit trees	65.0	6.9	26.7	5.9	38.3	5.5	11.7	4.4	51.7	6.4	19.2	5.5
Fodder trees	96.7	44.0	75.0	37.9	100.0	93.9	88.3	45.0	98.3	69.3	81.7	41.8
Fuelwood trees	93.3	125.9	80.0	119.8	91.7	133.3	80.0	81.0	92.5	129.6	80.0	100.4
Timber trees	51.7	34.9	46.7	68.3	38.3	95.5	30.0	76.1	45.0	60.7	38.3	71.3
Total	98.3	185.7	86.7	182.0	100.0	254.7	90.0	142.1	99.2	220.5	88.3	161.7

Source: Field survey 1995

Agricultural Production

Information on the land area allocated to major crops and the yield rates for the TA and NTA are given in Table 3.11. In the TA, 41.4 per cent of land is allocated to food crops such as maize, rice, wheat, millet, and oil seeds. The rest of the land is allocated to crops such as tea, cardamoms, ginger, broom grass, and potatoes. In the NTA, food crops occupy 68.5 per cent of the cropped land. Over time, there has been a 30 percentage point reduction in area under crops in the TA while in the NTA the reduction is 20 per cent.

In terms of yield rates in the TA and NTA, yields in the TA are higher for almost all crops, food, and non-food crops.

Table 3.11: **Percentage of Area under Crops and the Present and Past Yield Rates**

(kg/*ropani*)

Crops	TA			NTA		
	% of Area	Yield		% of Area	Yield	
	Present	Past	Present	Present	Past	Present
Tea	6.8	2.4	12.6	0.7	-	10.0
Cardamom	10.1	7.9	18.7	14.8	3.5	16.0
Ginger	3.0	2.5	365.6	0.2	-	300.0
Broom grass	20.9	7.2	14.9	10.9	4.4	9.9
Potatoes	17.6	11.5	351.6	4.4	3.5	236.1
Maize	30.9	45.1	55.9	33.8	59.5	51.7
Paddy	3.6	9.5	64.7	20.5	16.8	46.6
Wheat	3.6	2.3	35.3	6.2	3.0	35.0
Millet	3.6	12.7	53.9	2.5	4.9	48.9

***Source**: Field Survey 1995*

***Note**:* One hectare equals 20 *ropani*, one ropani = 75ft x 75ft

Agricultural (Crops and Other Products) Income

Information on the breakdown of income from the agricultural sector is reported in Table 3.12. Also reported in the table is the percentage of households participating in the sale of products. The total per household income from the sale of products in the TA is Rs 16,053 and in the NTA it is Rs 7,736. Potatoes, broom grass, cardamoms, and ginger are sold by more than half the farmers in the TA. The average income per household is the highest from potatoes (Rs 5,234) followed by cardamoms (Rs 5,125), ginger (Rs 3,270) ,and broom grass (Rs1,660). In the NTA, half of the farmers are involved in cardamom and broom grass sales. Per household income is the highest from cardamoms (Rs 5,708), followed by broom grass (Rs 684). The significant difference between the TA and NTA in terms of income from potatoes is due mainly to the transport factor. Potatoes being a high-volume product, they are not commercially suitable for the NTA as it lacks year-round transport facilities.

Income

The incomes of households by major sources are reported in Table 3.13. The frequency of households that derive income from specific sources is reported in the table.

The average annual household income in the TA is Rs 44,496, and it is Rs 22,521 in the NTA. Livestock are the main contributor to TA household incomes, accounting for more than half of a household's income. Crops and non-farm sources are other predominant income sources in the TA. In the NTA, non-farm sources are the major household income contributors. The second important source is income from crops. Livestock ranks third in terms of importance as an income contributor.

Across options, cottage industries are a source of income only to the households opting for a low number of options. Horticulture is an insignificant source of income in the TA,

Table 3.12: **Agricultural Income by Activity**

Activities	TA				NTA			
	Present		Past		Present		Past	
	% of HH	Rs/HH	% of HH	Rs/HH	% of HH	Rs/HH	% of HH	Rs/HH
Tea	3.33	456	0.00	0	10.00	810	1.67	18
Cardamoms	68.33	5,125	41.67	2,562	76.67	5,708	16.67	266
Ginger	45.00	3,270	1.67	213	8.33	122	0.00	0
Broom grass	80.00	1,660	23.33	124	68.33	684	6.67	32
Mulberry	0.00	0	0.00	0	5.00	15	0.00	0
Maize	0.00	0	1.67	1	1.67	33	1.67	1
Paddy	0.00	0	0.00	0	1.67	4	0.00	0
Wheat	3.33	26	1.67	3	11.67	56	0.00	2
Millet	16.67	247	11.67	45	6.67	93	1.67	10
Potatoes	91.67	5,234	46.67	706	11.67	188	10.00	58
Oil seed	0.00	0	0.00	0	3.33	20	0.00	17
Pulses	0.00	0	0.00	0	0.00	0	0.00	0
Vegetables	6.67	31	0.00	3	0.00	3	0.00	0
Other	1.67	3	0.00	0	0.00	0	0.00	0
Total	98.33	16,053	65.00	3,658	93.33	7,736	28.33	403

***Source**: Field Survey 1995*

Table 3.13: **Income of Sample Households by Source**

Sources	TA		NTA	
	Frequency (%)	Amount (Rs/HH)	Frequency (%)	Amount (Rs/HH)
Crops (cereals and cash crops)	98.33	16,543	91.67	7,590
Horticulture	6.67	649	0	0
Livestock	95	21,071	86.67	5,897
Cottage Industry	1.67	65	3.33	120
Remittance	0	0	0	0
Non-Farm	35	6,169	71.67	8,914
Total	100	44,496	100	22,521

***Source**: Field Survey 1995*

and there is no income contribution from this source in the NTA. The proportion of households deriving non-farm income increases with options in both the TA and NTA. With regard to other sources, there is little variation in the proportion of households deriving income from both options or between the TA and NTA households.

Expenditure

Cash expenditure by sample households in various consumption groups and other social and cultural activities is presented in Table 3.14. The percentage of households who make particular expenditures is noted in the table. The per household total

Table 3.14: **Expenditure Patterns among Sample Households**

Expenditure	TA		NTA	
	% of Households	Rs/HH	% of Households	Rs/HH
Cereals	98.33	10,118	91.67	4,790
Meat	58.33	1,403	93.33	1,540
Milk	13.33	425	1.67	7
Vegetables	45.00	618	28.33	215
Fruits	70.00	487	46.67	215
Tea	88.33	1,209	95.00	783
Liquor	11.67	312	38.33	458
Tobacco	46.67	283	78.33	288
Spices	100.00	2,530	96.67	1,040
Men's clothing	100.00	2,125	100.00	1,730
Women's clothing	98.33	1,970	100.00	1,745
Boys' clothing	80.00	1,291	63.33	645
Girls' clothing	68.33	976	58.33	587
Maintenance	31.67	1,758	15.00	601
Boys' education	76.67	2,960	68.33	1,312
Girls' education	58.33	1,576	51.67	815
Medical for men	68.33	907	55.00	472
Medical for women	63.33	978	70.00	571
Dhami for men	16.67	103	23.33	99
Dhami for women	23.33	159	18.33	40
Sons' weddings	21.67	1,563	11.67	1,717
Daughters' weddings	26.67	2,563	10.00	1,283
Thread ceremonth (*Bratbandh*)	16.67	162	6.67	292
Girls' puberty rites (*Guniu-cholo*)	3.33	1,100	1.67	3
Funeral	10.00	458	0.00	0
Other social occasions	20.00	437	23.33	337
Kerosene	83.33	447	96.67	550
Electricity	26.67	395	5.00	54
Fuelwood	28.33	359	16.67	82
Transportation	73.33	2,159	80.00	587
Other	25.00	360	11.67	127
Total	100.00	42,190	100.00	22,985

***Source**: Field Survey 1995*

expenditure in the TA is Rs 42,190 and in the NTA it is Rs 22,985. In both the TA and NTA, the level of expenditure increases with an increase in the number of options adopted by the households.

The almost double expenditure by the TA households is due to higher expenditure on cereals, clothing for adults and children, and transport and educational expenditure on children. Gradual shifting of land away from cereal production has caused TA households to spend more on cereals. The high income TA households have shown a trend of spending increasingly of spending income-elastic commodities and services as their incomes rise.

Information on the pattern of investment on tangibles by the households in the TA and NTA over a one-year period is presented in Table 3.15. In the table, the percentage of households engaged in investment and the average investment (in Rs) are presented. On average, in the TA, the per household total investment is Rs 6,572. In the NTA the investment is calculated at Rs 3,639.

Table 3.15: **Investment on Tangibles**

(in Rs)

Activities	TA	NTA
Land purchase	1,584	550
	(6.7)	(5.0)
Livestock purchase	414	750
	(16.7)	(20.0)
Agri-tools' purchase	248	188
	(50.0)	(70.0)
Utensils	325	337
	(38.3)	(35.0)
Radio/TV	8	13
	(1.7)	(1.7)
Watches	123	13
	(6.7)	(1.7)
Cameras	53	20
	(3.3)	(0.7)
Furniture	102	1
	(6.7)	(1.7)
Fans	8	10
	(1.7)	(3.3)
Ornaments	1,333	503
	(8.3)	(6.7)
House/*goth* (animal shed)	1,498	1,113
construction	(25.0)	(18.3)
Land development	61	67
	(5.0)	(1.7)
Plantation	689	64
	(18.3)	(18.3)
Other	125	10
	(3.3)	(1.7)
Total	6,572	3,699

***Source**: Field Survey 1995*

***Note**: Figures in parenthesis are percentages of participating households.*

There is a similarity in the proportion of participating households in various items between the TA and NTA. In terms of per household investment, in four items at least the difference is worth highlighting. With respect to land purchases, TA households spend as much as three times the NTA investment in livestock purchases and NTA households spend one-and-half times more than TA households in ornaments. TA households spend

2.7 times more than NTA households, and for plantation (tea) the per household investment in the TA is 10 times higher than of NTA farmers.

Housing Facilities

All sample households in both the TA and NTA have houses. The types of house in both areas differ. Seventy-seven per cent of houses in the TA are permanent dwellings, while in the NTA only 45 per cent of the houses are of such types. Other types of house (shack, thatch, and double story thatch) account for 27 per cent in the TA and 55 per cent in the NTA.

The average number of bedrooms in TA houses is 3.6, while the average number in the NTA is 2.8. Occupancy for each room is 1.7 persons in the TA and 2.2 persons in the NTA (see Table 3.16).

Table 3.16: **Housing Types and Space**

Particulars	TA	NTA
Types of houses		
Jhupri (temporary)	1	1
	(1.7)	(1.7)
Thatched roof	9	12
	(15.0)	(20.0)
Double story thatched roof	6	20
	(10.0)	(33.3)
Tin roof	30	21
	(50.0)	(35.0)
Pacca (permanent)	16	6
	(26.7)	(10.0)
Total no. of houses	60	60
	(100)	(100)
Bedrooms	216	166
Average number of rooms per household	3.6	2.8
Population per room	1.7	2.2

***Note**: Figure in parenthesis are percentages of total houses*
***Source**: Field Survey 1995*

Gender Division of Labour

The variation in gender roles in economic and other activities between the TA and NTA is not that distinct. In the TA, 60 per cent of the labour is contributed by males and 36 per cent by females. Children account for about four per cent of the total labour involvement. In the NTA, 50 per cent of labour needs are met by men members, 40 per cent by women, and about three per cent by children.

Within the TA and NTA, across different activities, female labour supply is almost equal to livestock-raising activities in both the TA and NTA. In housework, female involvement

accounts for 70 per cent or more. Men are more involved in purchase of agricultural inputs, access to technology, and information acquisition. In the TA, 86 per cent, and in the NTA, 88 per cent of the total labour used in these pursuits comes from male members of the household. The contribution of children in total labour supply is low at about four per cent. Among the various activities, children's involvement is high in livestock and household activities. About six per cent of the total labour in household work is accounted for by children in both the TA and NTA, while six per cent in the TA and four per cent in the NTA are accounted for by child labour in livestock raising (see Table 3.17).

Table 3.17: **Gender Division of Labour in Farm and Livestock Activities**

(in %)

Activities	TA			NTA		
	Male	Female	Children	Male	Female	Children
Farm Work	**62.0**	**33.1**	**4.9**	**60.1**	**38.0**	**1.9**
Land preparation	72.4	23.2	4.4	79.3	19.2	1.5
Manure preparation	56.9	37.5	5.6	44.7	52.8	2.5
Weeding	47.4	47.2	5.3	50.5	47.2	2.3
Irrigation	76.0	19.6	4.4	69.8	29.0	1.2
Harvesting	57.4	37.6	5.0	57.3	40.7	2.0
Livestock keeping	**51.8**	**42.0**	**6.2**	**46.6**	**49.4**	**4.0**
Food preparation	34.5	62.3	3.2	28.7	68.2	3.2
Milking	71.2	25.2	3.6	67.0	32.5	0.5
Sanitation	57.3	35.6	7.1	47.1	49.5	3.4
Grazing	25.0	25.0	0.0	38.3	21.7	4.0
Fodder collection	45.7	45.0	9.3	45.4	49.5	5.1

***Source**: Field Survey 1995*

Chapter 4

Diversification of Livelihood Options - Range and Quality

Range of Options

Households adopt various economic activities, mainly for subsistence and to secure a sustained flow of income. Resources at their command are allocated to these activities in such a way as to maximise the production and income flow and keep the associated risks at a minimum or at an acceptable level. Along with the urge for higher incomes, resource endowments are also crucial in determining the household's economic behaviour, at least in the short run. Economic activities adopted by the households in Ilam have been classified into 12 groups for measurement and analysis of diversification of household production options. They mainly represent the economic options adopted by the households. Both land-based and non-land based activities are included in these production options or economic activities. A brief discussion on the production options being adopted by the households in the survey area of Ilam follows.

1. **Cereal Crops:** Rice, wheat, maize, barley, millet, and oil seeds are considered as cereal crops and their production as one production option. Cereal crop cultivation by and large uses traditional methods and inputs. Use of synthetic inputs is minimal. New high-yielding varieties of rice, wheat, and maize are increasingly being adopted. However, the use of seeds from home farm production is common, hence, seeds are high-yielding types but local in a real sense. This production option, though not considered to be superior in terms of generating income and employment, is an important activity for household food security.

2. **Tea**: Tea plantation, though introduced more than a century ago, has become popular at the farm household level only recently. Tea plantations are not limited to large tea estates only in Ilam; individual farmers are increasingly allocating more and more land to tea. Uncultivated and, lately, even some crop lands are being planted with tea. Proliferation of small tea growers has been induced by the emergence of tea processing and procuring units at the private level.

Tea is grown mainly for cash income, therefore it is considered to be a superior economic activity as it fetches a good cash income.

3. **Cardamom**: Cardamom plants do well in agriculturally unsuitable gully, shady, and moist lands. All farmers have some land like this in varying proportions, and have invariably filled it with cardamom plants over the last decade. Gradually cardamom cultivation is being extended on to other, agriculturally suitable land also.

   Cardamom cultivation is one of the oldest non-traditional economic enterprises at the household level. Cardamoms have been grown for more than three decades, mainly for cash income. Despite disease infestations and marketing and pricing problems, it is still one of the main sources of cash income in Ilam.

4. ***Amliso***: *Amliso* (broom grass) grows well on marginal land such as the bunds and ridges of farm terraces. Hence, it does not compete with cereal crops for land. It yields fodder for animals, fuelwood, roofing materials for household use, and broom for cash income. Grown mostly for fodder purposes, the gradual development of transport facilities in Ilam, and markets for broom in neighbouring Indian states and in the *Terai* towns of Nepal, broom grass is now grown for harvesting also. Currently, broom grass production is one of the major income-generating activities in Ilam. Farmers have been extending broom grass farming on to terraces, replacing cereal crops. The complementary character of broom grass, especially with the livestock sector, has been a key element in the expansion of broom grass and the dairy sector in Ilam. Besides being a high income-generating activity, it generally helps to conserve and protect the natural resource base by checking land degradation, on the one hand, and relieving pressure on forests and pasture lands on the other.

5. **Ginger**: Ginger farming for domestic use was common earlier also, but recently, cultivation for commercial purposes has been on the increase. Grown in maize fields (*bari*) with intensive use of compost and traditional methods, ginger competes with cereal crops in terms of land allocation. The high profit margin from ginger has increasingly encouraged farmers to grow it.

   Ginger cultivation is generally influenced by externalities such as overseas' marketing and pricing. The ginger produced in Ilam is exported to Europe via Indian cities and towns, e.g., Silguri and Calcutta.

6. **Sericulture**: Sericulture, though introduced quite recently in some parts of Ilam district, has promising potential. Farmers have taken a great interest in planting mulberry which is needed to feed silk worms. With some technical and financial support, farmers have not hesitated to convert their crop land into mulberry plantations. It is anticipated that Ilam could become a major sericulture farming

area in Nepal in the future, once farmers start to receive income from the existing preliminary stages of sericulture development. However, cultivation of mulberry is very limited at the moment.

7. **Potatoes**: The potato is a traditional cash crop of Ilam, grown mainly for household consumption. With gradual improvements in accessibility to markets within and outside the district, commercial production of potatoes has increased tremendously. Potatoes also compete with cereal crops for farm land. High yield rates and consequent higher returns have induced farmers to switch over to potatoes.

8. **Horticulture**: Fruit and vegetable farming is included in this option. Horticulture is practised on a very limited scale in Ilam and generally in areas where transport facilities are easily available. Unlike various agriculturally transformed hill areas of Nepal and the Indian hill states, horticulture is not a key factor for economic transformation in Ilam. However, the importance of growing off-season vegetables is now slowly increasing due to the demand for them in adjoining Nepalese and Indian markets. It is likely that, with ease in transport, growing off-season vegetables will become popular over time.

9. **Dairy Farming**: Dairy farming has now become a major source of income in some selected pockets of Ilam due to improved fodder resources (e.g., broom grass, improved grass cultivation, etc) at the farm level. More importantly, direct and guaranteed access to processing facilities (e.g., presence of a cheese factory in Pashupatinagar, Ilam, and a powered milk factory in Biratnagar) has encouraged dairy farming to such an extent that, unlike most developing pockets of the economy, the traditional seasonal variation in milk supply does not exist any more. Consequently, milk production and supply are constant throughout the year. Thus, there are incentives for both producers and processors of milk. It seems that dairy farming will flourish well in the future.

10. **Livestock Farming**: Local livestock raising has not been completely abandoned. Most farmers are found to have raised improved and local breeds together, particularly in relatively remote areas. Local cattle yield little milk and are mainly raised to obtain draught power and compost. Local livestock raising is increasingly being replaced by improved cattle raising.

11. **Cottage Industry**: Participation of households in the production of handicraft products is very limited in Ilam. The items produced at the household level are largely for domestic use and cater to local demands. New initiatives in terms of cottage industries are not visible.

12. **Off-Farm Employment**: All off-farm employment opportunities are lumped together to represent options adopted by farmers. Both casual and permanent employment opportunities, plus engagement in shops and trading, are included. In general,

engagement in casual employment dominates in the non-transformed area, while engagement in shops and trading and in permanent employment opportunities is common in the transformed area.

Adoption of Options

There is a variation in the number of production options and enterprises that farm households have adopted in both the TA and NTA. A broad grouping is made in terms of the number of enterprises adopted by households and is reported in Table 4.1. In both areas, households in general are found to have adopted a large number of production options. The farm households are apparently considered to be very diversified in terms of adoption of economic activities. Table 4.1 reveals that more than four-fifths of the total sample households have adopted more than six different types of activity. One-third of the households in the TA and half of the households in the NTA have adopted more than eight different types of household production option.

Table 4.1: **Number of Households by Broad Grouping of Enterprises**

Range of enterprises (options)	TA	NTA
up to 5	14	16
6 to 7	22	13
8 and more	24	31
Total households	60	60

Source: Field Survey 1995

However, a question such as: is it the case that the higher the number of options adopted by households, the greater the diversification? Is yet to be answered. If it is true that production systems in the NTA are more sustainable than in the TA, it is noted that the quality of life, social welfare, and equity aspects (including the state of the natural resource base) have improved and are much better in the TA than in the NTA. This, therefore, implies that the operational yardstick for measuring the level of diversification could apparently be different from the one discussed above.

Quality of Life

Derived from the 'Basic Need' concept, four components are included in calculating the quality of life index, viz, level of cereal consumption, amount spent on clothing, housing space, and literacy level. Differential weightages are assigned to each of the components to arrive at a composite index (Table 4.2). Food security, shelter, clothing, and education are important elements of basic needs. Their level of importance might be debatable -- that food security is the most important aspect of basic needs and others could follow it according to merit. Since sustainability *per se* is a dynamic concept, the differential weightage is influenced by spatial as well as temporal dimensions.

Table 4.2: **Weightages for Different Components of Quality of Life**

Item	Weightages
Food	0.30
Clothing	0.20
Housing	0.20
Education	0.30
Total	1.00

Therefore, these weightages are not universal. Keeping in mind the context of Ilam, the differential weightages to different elements of the quality of life are assigned as shown in Table 4.2. The method adopted to calculate the index for the individual components and the primary index for the quality of life index is detailed below.

1. **Food**: Household-level annual cereal consumption is used to derive the per capita annual food consumption. The National Planning Commission (NPC) has provided an estimate of different levels of per capita food grain requirements for different ecological zones, viz., the Mountains, the Hills, and the *Terai*. Ilam is a hill district, and for it per capita requirements of 232kg of food grains are assumed. Households are assigned an index value on the basis of the level of basic needs being met. A weightage of 0.15 is assigned to food before including it in the quality of life index.

2. **Clothing**: Again following the NPC's recommendations, the per capita requirement for clothing is considered to be 11 metres of cloth and one pair of shoes, which may cost about Rs 650 (Rs 550 for clothes and Rs 100 for shoes). Households are scaled in terms of the extent the basic need is being met. The data are derived from the information on household expenditure. A weightage of 0.20 is assigned to clothing before including it in the primary index for the quality of life.

3. **Housing**: A basic need of one room for two persons is assumed for calculating the status of housing facilities available at the household level. A weightage of 0.20 is assigned.

4. **Education**: A one hundred per cent household literacy rate is assigned a value of one, and other levels of literacy are scaled between 0 to 1 in calculating an index for education. A weightage of 0.30 is assigned for education before calculating the quality of life index.

Summary measures of the components of the quality of life are presented in Table 4.3. The * signed t-values under individual variables indicate the significant difference in the mean values of the variables between the TA and NTA. Except in the case of food, there seems to be no significant difference in the mean values of the variables between the TA and NTA. When the primary indices for the quality of life are compared, the t-test confirms that the quality of life is significantly higher in the TA.

Table 4.3: **Summary Measures of Components of the Quality of Life: Fo Clothing, Housing, and Education**

Item	TA	NTA
Food (Weight = 0.30)		
Maximum	0.35	0.35
Minimum	0.12	0.01
Mean value	0.276	0.181
Standard deviation	0.077	0.102
	*t = 6.06**	
Clothing (Weight = 0.20)		
Maximum	0.28	0.20
Minimum	0.07	0.06
Mean value	0.192	0.187
Standard deviation	0.028	0.028
	t = 0.91	
Housing (Weight = 0.20)		
Maximum	0.30	0.30
Minimum	0.09	0.08
Mean value	0.262	0.249
Standard deviation	0.065	0.071
	t = 0.78	
Education (Weight = 0.30)		
Maximum	0.15	0.23
Minimum	0.07	0.00
Mean value	0.126	0.117
Standard deviation	0.027	0.038
	t = 1.72	
Quality of life(Weighted)		
Maximum	1.00	1.00
Minimum	0.43	0.27
Mean value	0.86	0.73
Standard deviation	0.12	0.16
	*t = 5.02**	

***Note**: * Significant at a 99 per cent level*

Depending on the index value of the quality of life, households can be classified into different levels. Index values ranging from 0 to 0.5 are assumed to indicate a low level quality of life, values between 0.51 to 0.75 refer to a medium level, and values of 0.75 or more show higher levels of quality of life.

Based on the above arrangement for grouping, Table 4.4 shows that four-fifths of the total sample households in the TA are enjoying a higher level of quality of life compared to only less than two-fifths of the households in NTA.

Welfare

Three components are considered in constructing the welfare index, viz., (a) the female-male ratio in household-level education expenses, (b) the female-male ratio in household-

Table 4.4: **Number of Households with Low, Medium and High Quality of Life**

Level of Quality of Life	Index Value	TA	NTA
Low	Less than 0.50	1	4
Medium	0.50 to 0.75	10	23
High	Above 0.75	49	23

level health expenses, and (c) the female-male ratio in per capita clothing expenses. The less gender disparity in these expenses, the higher the level of welfare attained in the household.

As discussed in the conceptual framework (Chapter 2), other important variables associated with community-level welfare could not be considered due to lack of data. Hence, the gender concern mainly is examined in this report.

The summary measurements of individual components of the welfare index and the primary index for welfare are presented in Table 4.5.

Table 4.5: **Summary Measurements of Components of Welfare: Gender Differentiation in Education, Health, and Clothing**

Item	TA	NTA
Education		
Maximum	1.00	1.00
Minimum	0.13	0.33
Mean value	0.747	0.813
Standard deviation	0.228	0.236
	t = 1.38	
Health		
Maximum	1.00	1.00
Minimum	0.29	0.17
Mean value	0.895	0.877
Standard deviation	0.162	0.218
	t = 0.51	
Clothing		
Maximum	1.00	1.00
Minimum	0.27	0.10
Mean value	0.842	0.840
Standard deviation	0.227	0.205
	t = 0.01	
Welfare index (adjusted)		
Maximum	1.00	1.00
Minimum	0.52	0.49
Mean value	0.828*	0.843
Standard deviation	0.127	0.121
	t = 0.66	

***Note**: * Significant at a 99 per cent level*

A mean difference test is performed to examine whether the individual indicators are statistically different between the TA and NTA. Computed t-values are not significant in the case of both the individual indicators and the primary index for welfare. TA and NTA households are similar in terms of the welfare situation.

Most households, 73 per cent in the TA and 82 per cent in the NTA, enjoy a higher level of welfare, indicating a low degree of gender discrimination (Table 4.6).

Table 4.6: **Number of Households with Low, Medium, and High Welfare Levels**

Level of welfare	Index value	TA	NTA
Low	Less than 0.50	0	1
Medium	0.50 to 0.75	16	10
High	Above 0.75	44	49

Resource Base Condition

Estimation of the index to represent the condition of the natural resource base (forests, pastures, etc) at the household level appeared to be cumbersome. It was difficult to calculate the areas of forest, pasture, and other public land being used by each individual household because of a lack of micro-level data on these resources. Further, it was difficult to obtain information on the extent of use of these resources by each household. Hence, only private land was considered in assessing the status of the resource base at household level.

The natural resource base condition at household level is defined as the mean value of: (i) the ratio of non-tillage to tillage farm land and (ii) the ratio of grassland/marginal land (*kharbari*) to cultivated land. The greater the above ratio is, the greater the allocation of land to crops of a perennial nature. The assumption here is that frequent tillage of slopy hill land is ecologically inimical. Both the lands under perennial crops and grassland/marginal land are not tilled. The soil of such land is less prone to erosion and degradation.

The summary measurements of the index for the resource base condition is presented in Table 4.7. The mean values of the index for the resource condition in the TA and NTA were tested for the statistical difference in the magnitude using the mean difference test. The t-value is significant at a level of 99 per cent. Hence, the mean value of the index for TA households is greater than that for NTA households (see Table 4.7).

In assessing houeholds according to their securing low, medium, or high indices in relation to the resource situation, half of the TA households secured an index value of 0.50 and above. In the NTA, only 35 per cent of the households secured such a high index value. Tillage farming is relatively common in the NTA. Farmers in the TA are

increasingly switching from cereal crops to crops, such as tea, cardamoms, and broom grass, that are perennial in nature.

Table 4.7: **Summary Measurements of Resource Condition**

Index of resource condition	TA	NTA
Maximum	1.00	1.00
Minimum	0.13	0.18
Mean value	0.57	0.47
Standard deviation	0.24	0.19
	t = 2.56*	

***Note**: * Significant at a 99 per cent level*

Chapter 5

Factors and Processes of Agricultural Transformation

Background

Most of the areas of Ilam are witnessing transformation today. The western and some of the southern parts adjoining the *Terai* still remain underdeveloped in terms of both accessibility and adoption of economic activities away from traditional subsistence farming. Changed land-use patterns, changes in terms of adoption of non-cereal crops, and the growing importance of dairy farming, plus the proliferation of non-farm activities induced by farm income growth, are the symbols of transformation. In the transformed area, new economic activities have emerged; income has increased; and quality of life, welfare, and quality of natural resource base (at farm) have registered upward trends. What has triggered transformation in Ilam ? It is naive to single out one or two factors only; many factors are responsible for the change. The historical linkage of the region with Darjeeling, slow but gradual opening up of the areas with the construction of a road network, and keen adaptation of technological innovations from across the border (Darjeeling and Sikkim) have initiated the process of transformation in Ilam. The process has been continually assisted by adoption of varieties of non-cereal crops such as cardamoms, broom grass, ginger, and potatoes; and by switching to dairy cattle. Government support in terms of creation and expansion of roads and communications, agricultural and rural development support, and credit support together have further hastened the process of transformation. The continued increase in farm incomes has initiated multiplier effects in terms of increased demands for off-farm products and services, further accelerating the pace of increase in employment and income.

Darjeeling Effects: Tea Domain

British efforts to develop tea gardens in Darjeeling date back centuries (at least 200 years) and in Ilam also a tea estate was established about a century ago by bringing materials and technology from Darjeeling. Farmers have been keen to grow a few tea

bushes since then, thus acquiring the knowledge and techniques of tea farming. Three tea estates in the public sector were established after the 1960s, followed by a massive drive on the part of the private sector in establishing tea gardens. Tea farming on a small scale, even by small farmers, is becoming common these days. Big private tea gardens have their own processing units and extend processing facilities to private growers and smallholders. Lately, three private processing plants have been in operation in Ilam, making tea processing easy and instant. Farmers do not have to depend upon sun drying any more - they can dispose of the green leaves as soon as they pick them. Many Ilamese working in or having some connection with tea estates in Darjeeling came back and engaged in tea farming. Even to day, tea technicians from Darjeeling are consulted and technology spills over.

Historic events connected with the proliferation of tea plantation and its gradual popularisation can best be traced as follows. In 1860, the Darjeeling effect came first to Ilam in the form of plantation of tea on 120 acres by the then district chief (*Bada Hakim*) importing tea cuttings and technicians from Darjeeling. In 1865, Soktim tea estate was established on an area of 180 acres. In 1966, a Tea Development Corporation (TDC) was established by the government assigning it the responsibility for planned development in tea plantation and marketing.

Tea plantation on private estates really took off after the enforcement of the Land Reform provision that no ceiling would apply to land meant for tea plantation. Land Reform was implemented in 1964 and enforcement has been in place since the late 1960s. Land owners who had evaded ceiling provisions by promising to plant tea began, though reluctantly, to plant tea on their land. Commercial banks, including the Agricultural Development Bank, provided credit to such tea growers at subsidised rates. The subsidy was quite high when the interest rate was seven per cent for general credit, it was only two per cent for credit for tea plantation purposes. Thus, tea plantation was initiated on private farms by compulsion and promoted by capital support from the commercial banks.

In 1976, the Overseas' Development Ministry (ODM) of Britain carried out a tea development project with a total budget of 3.7 million pounds. The project brought the concept of a 'Kenya Model' with an emphasis on tea farming on small farms. The project was instrumental in providing technology on the farmer's doorstep and worked to modernise tea processing. Small and medium farmers also began tea plantation. This had been concentrated in the tea estates only earlier. Before the project, processing of tea in the private sector was carried out using the discarded machines in India and even with the help of modified rice mills. Only tea estates had the privilege of modern tea-processing facilities. The poorer technology was inimical to quality tea production outside the tea estates. To improve the quality of processed tea, the concept of a 'Central Factory' was promoted, and the tea estates were assisted in providing quality processing facilities to small and outgrowers. Due to the project's impact, at least an additional 2,000 acres of tea plantation were established by outgrowers and small farmers.

Production of quality tea leaves mainly because of new plantation (plantation in Darjeeling is relatively old) and modern processing facilities guaranteed a premium price for the harvest. There began a flow of tea leaves to Darjeeling for some years, but soon it was checked when modern processing plants were established to cater to the needs of outgrowers and small farmers. Ilam is self sufficient in tea processing facilities now, and there has been a surge of tea plantation at farm level and also in the form of large tea estates.

Darjeeling Effects: Education and Awareness

Geographical proximity to Darjeeling and Sikkim has tremendously affected Ilam and other close by districts in terms of education. Missionary intervention in education in the Darjeeling area is heralded even in India, and Ilam benefited from it. The Ilamese have family relations in Darjeeling, making education accessible. Frequent and unrestricted movement of people across the border led to exposure to education, living styles, and, importantly, made people aware of development options and possibilities. This also has helped the proliferation of schools in Ilam over a long period of time. Education and citizens' awareness are key to innovations and growth. Ilam developed this infrastructure early as a result of the Darjeeling effect. The literacy rate in Ilam is around 60 per cent, and this is one of the highest among the hill and mountain districts of Nepal. There are about 500 Graduates in Ilam compared to about 200 Graduates in each of the neighbouring Panchthar, Terhathum, and Taplejung districts (Population Census 1991).

Roads

Ilam is at the forefront of the hill districts in terms of its massive road network. Out of the 47 VDCs in Ilam, 40 are connected by road. Except for a few western VDCs and a few further north, all are approachable by road. Motorable roads in Ilam total 180km compared to 90 in Panchthar, 10 in Terathum, and 24 in Taplejung. Only a few settlements require more than two hours walk from the road head. This has facilitated movement of goods and services; and more importantly it has stimulated a flow of technology and ideas. Accessibility has worked as an incentive to the villagers to remain in the villages rather than to move to market towns and urban enclaves. This is one of the important reasons for development of a wide network of marketing centres in Ilam. Unlike in other hill districts, marketing activities are dispersed all over Ilam.

Three important roads, viz., Charali-Ilam, Pashupatinagar-Fikkal, and Bettar-Ilam, have continually been connected by feeder dirt roads. These main roads were built by funding from the centre, but most of the link roads have been constructed using local government funds and people's participation. Though gravelled or blacktopped a decade or so ago, all the important roads have been in operation since the 1960s. Public and local investments in roads have been massive in Ilam. Without roads, commercialisation of farming would not have been possible.

Non-Traditional Crops

Ilam receives a high rainfall (annual average of 2,300 mm) for an extended period of time (June to September) in the year. The altitude is gentle, thus hillocks in the hills dominate. With the exposure to Darjeeling and Sikkim, especially the exposure to cropping diversification there, new crops such as tea, cardamoms, and broom grass are planted invariably in all locations. Gradual development of the road network has made commercial growing of these crops viable. Before embarking on commercial production, farmers are aware of the crops and have already tested them out by cultivating them in their backyards. Because these crops do not compete (when grown on a limited scale) with cereal crops in terms of land area, acceptability among farmers has remained high. Now that the crops have an established commercial viability, some of the cereal crop lands are being reallocated to these crops.

Improved Cattle

Almost half of the milch cattle are of an improved variety in Ilam. Animals were traditionally imported from Darjeeling via relatives and friends. Lately, the road network and, most importantly, establishment of a powdered milk factory in Biratnagar have greatly facilitated promotion of the dairy sector. Every day, 25,000 litres of milk are sent to Biratnagar and 4,000 litres or more are used by the cheese factory in Pashupatinagar. Access to improved livestock technology, on the one hand, and roads and an ensured market in Biratnagar, on the other, have faciliated the development of the daily activities. Veterinary service centres at the private level have come up to serve the dairy farmers. An asssured market for milk and availability of a sustained supply of forage from broom grass have propelled the development of the dairy sector.

Forward Linkages

Adoption of new crops and establishment of new economic activities have been greatly facilitated by the gradual evolution of forward linkages. Two such linkages are worth mentioning, because they have ensured the processing and marketing of local products. First, tea processing plants in the private sector have made every small farmer's involvement in tea plantation possible. There are three tea-processing plants in operation in the private sector in Ilam, and they have enough capacity to cater to the processing needs of individual tea growers. The plants purchase green tea leaves immediately after picking. Farmers do not have to be involved in post-harvesting activities; the plants act on their behalf. There is a great enthusiasm now among farmers for allocating at least some land to tea plantation. Secondly, the milk plant in Biratnagar has ensured a market for milk. The plant purchases 25,000 litres of milk every day. The cheese factory in Pashupatinagar consumes an additional 5,000 litres of milk. Backed by the supply of improved breeds, skills, and suitable climatic and environmental conditions, there seems to be no limit to expansion of the dairy sector.

Cardamom, ginger, and broom grass are traded in Darjeeling and in other neighbouring Indian markets via the Nepal *Terai*. Individual traders are involved, and processing of cardamom and ginger is not yet carried out.

Multiplier Effects

Adoption of new crops and establishment of economic activities have gradually increased the incomes of local farmers and have demonstrated strong multiplier effects. Non-farm economic activities are emerging, especially in terms of trade and services. These activities have helped absorb local labour and talent. Lopsided urbanisation is not to be seen in Ilam, the markets and non-farm activities (trade and services) are dispersed throughout the villages, retaining labour and entrepreneurs locally.

Public Support: Technology and Trade

Public support for agricultural development was and is largely limited to traditional cereal crop based farming in Ilam. The diversification and change in cropping systems that are seen in Ilam today have become possible mainly through farmers' initiatives and adoption. Recently, government agencies have been gearing their efforts towards the changed situation in Ilam, but there is not much these agencies can do as there are no comprehensive research programmes on the crops adopted. Adoption of practices from across the border is still important where technology for non-traditional crops is concerned.

Public support in terms of credit, however, seems to have been instrumental in supporting the transformation of Ilam. Since the early 1980s, due to a built-in social infrastructure (education, exposure, and entreprenurship), the banks have treated Ilam as a priority district and have funnelled credit to it. Credit support is not only essential for innovation and diversification, but it is also vital for the development of trade and commerce in commodities, the product of innovation. Banks have played an important role in promoting commercial activities.

Chapter 6
Conclusions

Critical Issues

The findings of this report suggest that both the TA and NTA areas of Ilam district, Nepal, have undergone a rapid economic transformation. There are similar and distinguishing facets in development of the TA and NTA. The similarities include biophysical conditions. However both areas differ in the levels of transformation. The real transformation processes in the TA started in the mid 1980s and in the NTA in the early 1990s. Economic development in both places has been led by transformation in agriculture, specifically high-value cash crops and livestock. Horticulture seems to have played an insignificant role in the whole transformation process in Ilam. This is in contrast to the transformation experiences of Himachal Pradesh in India, the often cited example of mountain transformation. Land-based options adopted in Ilam are guided by a variation in land types on each farm. Generally farmers own diverse types of land, including flat land, *bari*, and gully land. Different types of land are suitable for different types of crops. The same farmer grows cardamoms, ginger, potatoes, broom grass, and cereals as they suit the qualitative variation in the land.

The basic question or concern is not what technologies or production options brought about such remarkable changes in Ilam. We should not assume that these are technology-oriented transformations. The suitability of technology or options is governed by specific pre-conditions which are not necessarily available in all areas of the Nepalese mountains. Therefore, for the purpose of replication, understanding the process of transformation is important. Technology or production options provide a range of choices. Yet, it is important that the pre-conditions to put these options into practice prevail. It is clear that the types and nature of production options in two areas of Ilam are not different. Indeed, cardamoms, potatoes, broom grass, and dairy farming are the lead options that have propelled the transformation process in both areas of Ilam.

Therefore, understanding the process of increasing options is the most crucial factor to guiding the sustainable development of mountain agriculture. In this situation, people will have another option if the previous one fails to perform well. For instance, when there is a backlash in cardamom production due to disease, people switch to ginger production. When the ginger markets are not guaranteed, people opt for potato production. At one time, rabbit farming became so popular that some farmers even went to the extent of exchanging a buffalo for a pair of Angora rabbits. However, due to the lack of marketing and processing facilities, rabbit farming failed completely. Now they have opted for other production options such as dairy farming.

Creation of Awareness about Sustainable Production Options and Their Practice through Demonstration (Effects?) and Exchange of Visits

Unlike Himachal Pradesh in India, the government support in Ilam in terms of research and extension and also subsidy is minimal. In fact, all the crops that have propelled transformation in Ilam are non-priority crops nationally and receive minimal public expenditure for research. The farmers themselves introduced a variety of cash crops, e.g., cardamom, ginger, broom grass, tea, and potatoes in their villages. This happened in the form of a demonstration effect from bordering areas of India, such as Darjeeling and Sikkim, which are relatively developed areas (Shrestha et.al. 1996). There are many other districts in Nepal that can be reached by road and have some institutional infrastructure, but the transformation process has yet to take place. Farmers' exposure to production options and to other transformed areas can have catalytic effects. This will exert pressure on the government to make production options more widely available. Such awareness can be created among the people through various means such as establishing demonstration plots, exchange of visits by farmers from different areas, and so on.

Development of Transport and Communication Facilities

The experiences in Ilam and Himachal Pradesh strongly indicate that development of infrastructure, such as roads, is a prime factor for the adoption of suitable options, as guided by land types. Transport facilities encourage market production. Compared to the transformed area (TA), there is an insignificant difference in the production environment surrounding farmers in the NTA. But relative difficulty in transportation has hindered the forward linkages, hence keeping the production of non-traditional crops low in the NTA. Farmers can take advantage of production options directed to the market only if transportation is not a bottleneck.

The development of roads and communications is no doubt necessary for the promotion of high-quality options. But the question is, "can poor and developing economies afford such roads wherever needed?" To be realistic, this facility should be developed step by step (Shrestha et. al. 1996). In the beginning it may be necessary to build mule tracks and ordinary bridges, in the second stage earthen roads, then gravel roads, before

establishing roads which require heavy investment. In the case of Ilam, mule tracks are being slowly replaced by better roads.

Integration of the Primary Sector with the Secondary and Tertiary Sectors

If processing facilities had not been available, neither tea nor milk production on small farms would have reached such a massive scale in Ilam. Until five or ten years ago, only a few large and resource rich farmers were interested in tea production and improved dairy farming. Establishment of the semi-government milk powder factory in Biratnagar and provision of three private tea-processing plants have proved to be driving forces behind all-season milk production and small-scale tea gardens in Ilam.

Management of Multiplier Effects within Local Environments

Tea gardening and dairy farming are well developed in Darjeeling, yet the local people have not been able to harness the benefits as they have in Himachal Pradesh. Both areas have adopted the strategy of harnessing the local 'niche' but with different policy interventions. In Himachal Pradesh, local people were encouraged to undertake fruit production. This was facilitated by relaxed land ceilings; access to government-owned marginal land for fruit cultivation; subsidies on nursery establishment, buying fruit saplings, and purchasing inputs; and financial support for establishing processing facilities. There is one restriction in that people from other states within the country cannot purchase land in Himachal. This policy has restricted outsiders from benefiting from harnessing the niche of Himachal, particularly on the agricultural front. The case of Ilam is different. In Ilam, the decentralised pattern of growth has solicited the participation of local farmers and entrepreneurs. There is no restriction in terms of outsiders coming in, but locals dominate the economic activities.

Generation and Promotion of Technologies or Production Options with a High Degree of Complementarity

Broom grass is a multipurpose plant. Its tips are used for making brooms which fetch good cash incomes, the stems are used for firewood, and the leaves are fed to livestock which helps ensure normal milk production throughout the year. Milk production is otherwise very seasonal by nature, due mainly to the lack of fodder in winter. Moreover, broom grass cultivation has led to stall feeding. This practice has indirect effects such as improved soil fertility due to greater availability of manure. It also reduces the pressure on forest land, which ultimately reduces soil erosion. Similarly, cardamom cultivation requires shade, therefore fast-growing trees are normally planted alongside cardamom patches. With mature trees, farmers not only obtain a good income from the cardamoms but also obtain fuelwood for cardamom drying and household needs. Further, tree plantation helps prevent soil erosion and provides fodder to animals. In a similar way, the establishment of orchards in Himachal provides winter grasses for dairy farming, checks soil losses, and provides a cash income flow from the sale of fruit.

Therefore, the agricultural R&D policy should be geared towards generating and promoting technologies and production options that are characterised by a high degree of complemetarity (Shrestha et. al 1996).

Political Commitment

In Himachal Pradesh, Chief Ministers and Ministers have long maintained the slogan, 'Give me an apple, I will give you food grains'. There is always ministerial level representation from the most transformed areas of Himachal Pradesh. Political patronage has remained a strong influence on the subsidy policy, distribution of land to landless farmers for growing fruit, and a relaxed land ceiling on land for fruit cultivation. Official data show no landlessness in Himachal. It is empirically difficult to measure the patronage, but the benefits accrued from political patronage seem to be remarkable.

Ilam has a completely different story. Except in the development of road networks, no policies or programmes seem to have been pursued in Ilam that are any different from those pursued in other hill districts. Innovative farmers with access to technology from across the border in Darjeeling provided all the needed impetus for development initiatives.

Replicability of the Ilam Experience

The success story of Ilam in terms of diversification of farm enterprises for sustainable development holds out an incentive for other mountain regions. The required attempts at replication are few but are crucial in that without these it will be difficult to initiate the transformation process.

The three most important primary factors that have propelled transformation in Ilam are innovative and aware farmers, availability of a range of options with appropriate technological backstopping, and transportation infrastructure linking the local markets to markets outside. Road facilities are fundamental in raising educational levels and the receptiveness of the farmers and essential for providing market access to the products and inputs for production. As discussed earlier, building a road network does not, however, necessarily have to be in the form of a fully fledged all-weather motorable road. Gradual easing of the transport bottleneck is what is required as the economy progresses, with the realisation of benefits through adoption of newer options. Ilam's road history attests to this fact. In Himachal Pradesh, a large proportion of the farm products also travels to market through seasonally operating roads.

Products

The choice of economic activities by farmers is governed by resource endowment, availability and suitability of technology, and ultimately the marketability of the products. Sales' potential is paramount and road networks determine the price spread and the share of the farmer on consumer spending. The choice of commodity to produce

needs to be guided by the extent of transport bottleneck. Distant production pockets cannot afford to produce high volumes of perishable products. High-value, low-volume products need promotion in such pockets. Among the products responsible for transformation in Ilam, cardamom fulfills the criterion best. The resource endowment factor may not be a constraint. Most of the farm holdings are comprised of moist-slopy-gully land suitable for cardamoms. Simultaneous plantation along with cardamoms provides the needed shade effect and necessary fuel for drying the product. Cardamoms are a high-value, low-volume and non-perishable product that is environmentally friendly.

Broom grass can be a miracle item to introduce into the hills and mountains due to its fodder, fuel, and product (broom) values. Its potential to stabilise slope terraces and wasteland is also equally important. In the distant hill tracts, the product value of broom grass may be difficult to realise due to prohibitive transportation costs, but its ability to supply forage to livestock, especially in seasons when other sources dry up, is to be noted. Broom grass does not compete with other productive activities and extended adoption of broom grass can be promoted by improving the knowledge and availability of root stocks among the farmers. Broom grass has the potential to reduce the pressure on forest and pasture resources, supply forage to animals in the lean season, and work as a dependable source of fuel supply to the farmers. Finally, broom grass has the potential to reduce soil loss from steep terraces by obstructing the free flow of rain and irrigation water.

In production pockets accessible by road or those close to markets, dairy farming and high-yielding crops, such as ginger and potatoes, are suitable. Proliferation of these in Ilam is supported by the ease in transportation that has come about by gradual intensification of economic activities. Most of the mountain areas in Nepal lack accessibility and are precluded from adopting these options in spite of their local niche and high productivity.

Processes

Continual exposure to options in the form of demonstration is most important in Ilam. Tea, cardamom, broom grass, and (now) dairy farming were not introduced instantly. With decades of history and experience, farmers gradually extended the options as the markets were explored and found. Seeing the activities in Darjeeling and on neighbouring farms installed confidence and experience among farmers to adopt the options fully. Interventions in terms of familiarisation of farmers to mountain pockets with success stories behind them and demonstration activities can best prepare farmers to embark on new and viable options.

Farmers are keen to adopt products and options to use land resources optimally. In the hills and mountains, the same farmers may own lands with diverse micro-environments. Each environment is suitable for different crops and options. The availability of options matched with a variation in the micro-environment is the key to reaping the full potential

from the available resources. To the extent possible, options that are complementary to each other seem to have full acceptance from farmers as demonstrated by options such as broom grass in Ilam. The role of research and technology, thus, is not only to enlarge the choice of production options, but also to present options that are complementary to each other. What is needed is generation and dissemination of technologies supporting diversity in the area and maintenance of the complementary relationships between options.

Roads and, ultimately, markets are fundamental for the expansion of economic activities on a commercial basis. This is important not only for the movement of people, ideas, and products, but also to evolve forward linkages, especially in the form of products' processing. A strong linkage of primary products with processing facilities is essential to ensure sustained market access. Roads do play an important role in the process, but, as discussed in earlier sections, a gradual development of roads is what is required rather than the creation of fully fledged roads. The aim of transport development should be to facilitate production activities and thus a gradual expansion of activities justifying further development of transport facilities. The immediate, full development of a transport infrastructure would be beyond the capacity of the locals and may not be optimal from the point of view of its contribution to development pursuits.

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ICIMOD serves as a multidisciplinary documentation centre on integrated mountain development; a focal point for the mobilisation, conduct, and coordination of applied and problem-solving research activities; a focal point for training on integrated mountain development, with special emphasis on the assessment of training needs and the development of relevant training materials based directly on field case studies; and a consultative centre providing expert services on mountain development and resource management.

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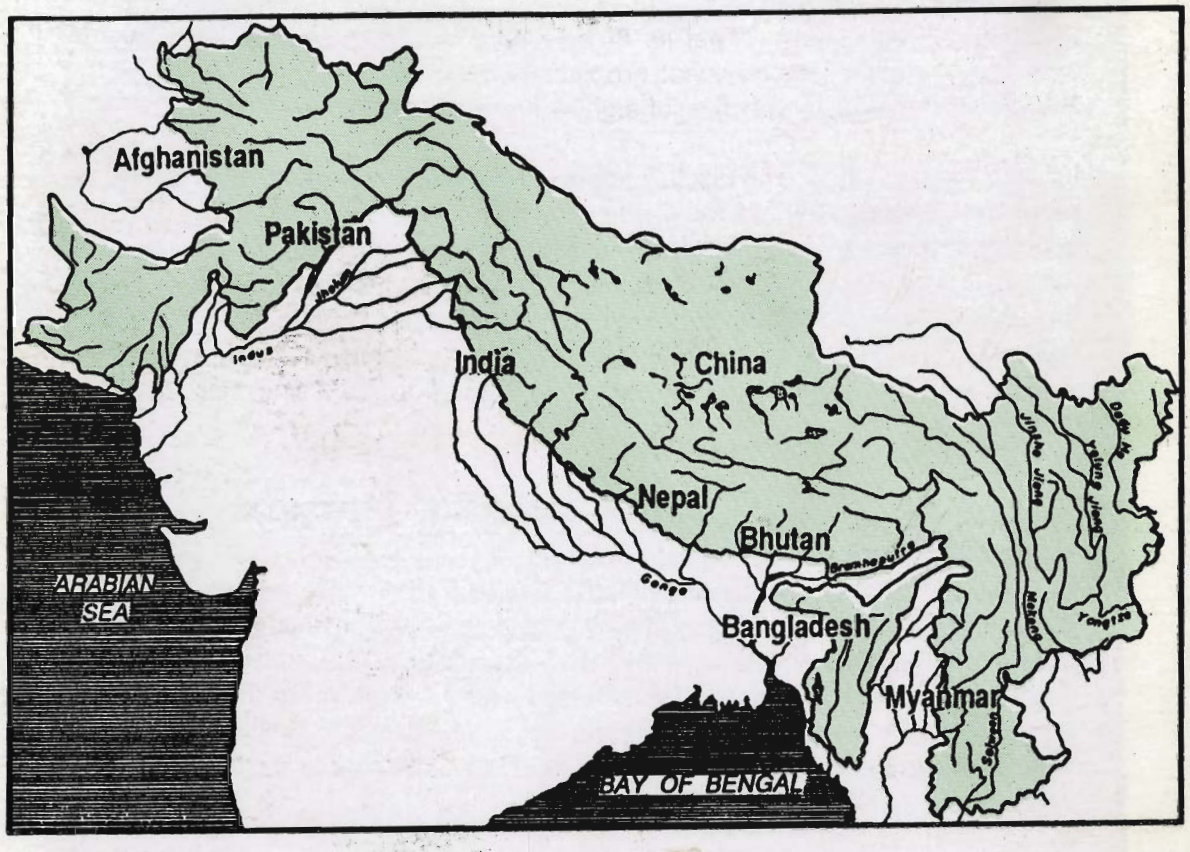
Mountain Farming Systems constitutes one of the thematic research and development programmes at ICIMOD. The medium-term objectives of the programme include i) Appropriate Technologies for Sustainable Mountain Agriculture, ii) Institutional Strengthening for Mountain Agriculture, iii) Integration of Gender Concerns into the Development of Sustainable Mountain Agriculture, iv) Agricultural Research Networking, and v) Better Understanding of Sustainability Dimensions.

Participating Countries of the Hindu Kush-Himalayan Region

- Afghanistan
- Bhutan
- India
- Nepal
- Bangladesh
- China
- Myanmar
- Pakistan



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