3

Flow of Highland Resource Products

Introduction

This chapter provides an overview of the major highland resource products. It deals mainly with their dominant features, magnitude of flow, and factors governing the flow process in Nepal. However, detailed information on the different resource products is not available. The discussions are conducted through four major headings; namely, natural resources, products, human resources, and financial resources. Under natural resources, non-timber products consisting of herbs[2] (herbs and medicinal plants) and *allo* (nettle fibre) and *lokta* (daphne bark) are discussed. Information on non-renewable resources is very limited, except for information on royalties collected from mining and quarrying licenses issued. These are highlighted. Products are mostly perishable farm products (vegetables, fruit, and milk). The NLSS household survey is used to identify the flow of human resources from the highlands to the lowlands. Lastly, the flow of financial resources is also highlighted dealing with remittances sent by highland households to lowland areas and remittances received by highland households from the lowlands. Under the flow of financial resources, an estimate on the flow of remittances to the highlands and expenditure on food by urban households for highland products are also examined in an aggregate context. The principal findings and issues are discussed in each section.

Natural resources

Non-Timber Forest Products (NTFP)

All forest products, other than timber, fuelwood, and animal fodder are con-

[2] Herbs in this chapter is a translation of the term *Jaributi* in Nepali which is used to describe a wide range of herbs and medicinal plants.

sidered to be NTFPs in Nepal (Edwards 1993). The Himalayan region has been regarded as a repository of medicinal and aromatic plants. About 690 species of medicinal and aromatic plants (about 8% of the Nepalese vegetation) have been recorded in Nepal (Malla and Shakya 1984/1985). These plants have a myriad products and uses in addition to medicinal use, e.g., fibre, gums, dyes, oil, etc (Malla 1994).

Herbs and Medicinal Plants

Among the NTFP, herbs and medicinal plants are a major item exported from the highland areas of Nepal. About 100 different medicinal, aromatic, and spice plants are considered to be herbs and medicinal plants (Olsen 1996). Herbs and medicinal plants have different kinds of value for local people, ranging from food and nutritional supplements, housing materials, and so on. Some herbs and medicinal plants are also used as raw materials by small-scale industries found in highland areas, but larger quantities are exported to lowland areas and overseas. For the present study, only the herbs and medicinal plants exported in raw or processed form from highland areas are considered.

There does not appear to be any systematic reporting of the total area under different herbs and medicinal plants (naturally growing), total growing stock, annual sustainable yield, annual harvest, or the magnitude of total trade in herbs and medicinal plants. From the information available, the importance of some herbs and medicinal plants as highland export items is nevertheless apparent.

There is no single source from which the flow of herbs and medicinal plants from highland areas can be derived. The different sources available are the Annual Bulletin of the Department of Forests (DOF) (in Nepali), which provides the volume harvested based on licenses issued by the DOF; export volumes and values are provided in the Nepal Overseas' Trade Statistics; and the Herbs' Production and Processing Co. Ltd provides information on the export of some processed products. In addition, the Department of Botany (HMG) has published short monograms (3 to date) on some herbs and medicinal plants that discuss the distribution, cultivation, uses, and harvesting patterns. Finally, there are some studies conducted by different individuals and institutions on selected herbs and medicinal plants and trade in them.

Spatial Distribution

The herbs and medicinal plants that feature importantly in the exports from highland areas are mostly found in the high Himal areas (northern areas), almost across the entire 830km length of the country. Most of these districts have temperate, sub-alpine, and alpine climates and such climates appear to be conducive to their growth. Despite the favourable climatic condition of these areas, the environment in the various niches is fragile with extremely short growing periods and poor soils. These factors thus can quickly erode the comparative advantage of these areas if one does not adhere to strict supply management practices.

The Central Development Region, which includes the districts of Rasuwa, Kabhre, Sindupalchok, Dhading,

Nuwakot, Kathmandu, Lalitpur, Bhaktapur, Ramechap, and Dolakha, contains the largest distribution of different herbs and medicinal plants. Licenses for harvesting were provided for 55 different types. Likewise, in the Eastern Development Region, the districts of Taplejung, Panchthar, Ilam, Dhankuta, Bhojpur, Sankhuwasabha, Udaypur, Khotang, Okhaldhunga, and Solukhumbu are the prime areas for herbs and medicinal plants. Licenses for harvesting are issued for 29 different types of herbs and medicinal plants. In the Western Development Region licenses are issued for 43 different herbs and medicinal plants, and they are collected in Palpa, Argakhachi, Baglung, Gulmi, Myagdi, Mustang, Syangja, Tanahu, Lamjung, Gorkha, and Manang. The main districts for collection are Jumla, Kalikot, Humla, Mugu, Dolpa, Surkhet, Jajarkot, Dailekh, Pyuthan, Rolpa, Salyan, and Rukum in the Mid-Western Development Region. Generally, licenses are issued for the collection of 55 types. Finally, in the Far Western Development Region, the number of licenses issued for collection was for 38 different types and the districts for collection are Achham, Bajura, Bajhang, Dadeldhura, Baitadi, and Darchula. Herbs and medicinal plants are also found in the lowland districts in all the development regions but are not considered in the present study.

Herbs on sale in a local haat bazaar in the Arun Valley

Harvest

For the most part, herbs and medicinal plants are not harvested in a scientific way; meaning that generally no care is taken to manage the growing stock. Harvesting generally implies cutting or uprooting (Sharma 1995; Edwards 1993; Malla 1994). This practice is believed to be serious as annual harvests in a given area are declining and people have found it more difficult to collect the products (personal communication with the Herbs' Production and Processing Centre). Additionally, the growing period in highland areas (where the herbs and medicinal plants are found) is short, generally between June to August, after which, due to a rapid decline in the temperature, the plants go into hibernation. This is the time when herbs and medicinal plants are collected and the time when livestock are grazed in large numbers on highland pastures. Livestock trampling, due to unmanaged grazing practices, harvesting the resource too early, and often over-harvesting are the main threats to sustained supply. In simple terms, there is no supply management, and harvest-ing is not carried out in a scientific way; these are both major threats to the continued existence of herbs and medicinal plants. Little is known about the environmental implications of such faulty practices (Amatya

et al. 1995; Bhattarai 1996; Malla 1994; Sharma 1995).

Ownership

Most of the herbs and medicinal plants harvested or collected are from government-owned pastures, shrublands, and forests, and thus access, for those who care to collect them, is not restricted. Due to dwindling supplies, conflicts between communities may occur during harvests (Sharma 1995). Since most herbs and medicinal plants grow on government land, they are subject to royalty. Such lands are generally in remote and inaccessible areas where government monitoring (and enforcement) of annual harvests is not carried out. Several reasons that suggest poor enforcement and hence over-extraction of the resources may be as follow (Edwards 1996; Olson and Helles 1997; Amatya *et al.* 1995).

1. The stipulated royalty rates do not have any bearing on the abundance of the products.
2. The stipulated rates do not reflect the market value of the product.
3. The rates are the same over the entire country for the same products, irrespective of their supply, access to market, and demand.
4. The royalty rates can vary for the same products because of the difference in the names used in different areas.
5. Royalty rates are not enforced on individual collectors at the collection point, but at the wholesale point in the districts. As a result there is little prospect of relating the volumes collected to sustainable harvesting rates.
6. Products collected from government-managed and other forests cannot be distinguished. In practice, all herbs and medicinal plants traded can be taxed regardless of ownership. The taxing of private property is a common source of conflict between collectors and forestry officials. Currently, the royalty system provides no preferential incentive for cultivation on private land, or for common property management.
7. The growing success in community forestry has yet to be applied to management of herbs and medicinal plants.

Volume and Magnitude of Flows

Table 3.1 below provides the volume of different herbs and medicinal plants originating from different development regions (considering only highland areas) and the royalties collected by the government through issuing licenses. The licensed amount of all herbs and medicinal plants combined is in excess of 3,120 MT and the total royalty is about Rs 30 million (or about half million US$). The actual amounts harvested/collected may be in excess of the figures reported in the table, but by how much is difficult to ascertain (Karnali Institute 1994; Olsen and Helles 1997; Edwards 1993; Sharma 1995). For example, based on the licenses issued for Chirayta (*Swertia chirata* — an Indian plant of the gentian family), the total amount harvested is 137,349kg. The Trade Promotion Centre (TPC) data show export of 27,000kg. The remaining amount cannot be accounted for accurately. Large quantities of Chirayta are exported to India where

Table 3.1: Quantity of Different Herb and Medicinal Plants Harvested Based on Licenses Issued by the DOF and Royalties Generated by Development Regions, 1996/97

	Types	Eastern	Central	Western	Mid Western	Far Western	Total	%
1	Amalbed	-	-	1475	-	-	1475	0.05
2	Bajradanti	-	-	-	2000	-	2000	0.06
3	Bhojho	255	-	250	14768	18890	34163	1.09
4	Bhojwada	-	-	-	-	4200	4200	0.13
5	Bikh	3357	8381	2015	-	-	13753	0.44
6	Chabo	4505	-	241	-	-	4746	0.15
7	Chatiwan	650	-	11800	-	-	12450	0.40
8	Chiraito	99066	31722	3730	806	2025	137349	4.40
9	Dalchini	8815		71899	41246	9075	131035	4.20
10	Falkira	-	-	-	17141	-	17141	0.55
11	Jatamansi	1915		1219	99981	-	103115	3.30
12	Jiwanti	1000	-	-	-	-	1000	0.03
13	Kakarsingi	-	-	-	5382		5382	0.17
14	Kukur Tarul	-	14420	460	-	-	14880	0.48
15	Kurelo	2360	52100	11929	47798	6077	120264	3.85
16	Kutki	10531	6090	4018	72855	27320	120814	3.87
17	Lauhan	5050	-	-	-	-	5050	0.16
18	Lauthsal	7000	-	110498	-	-	117498	3.77
19	Lohasalla	-	109378	-	-	-	109378	3.51
20	Majitho	66142	24892	4366	5391	-	100791	3.23
21	Mushroom	300	-	-	-	-	300	0.01
22	Nagbeli	14363	12636	10051	-	-	37050	1.19
23	Padamchal	-	-	6814	101502	200	108516	3.48
24	Pakhanbed	12858	-	-	340225	17120	370203	11.86
25	Pangree	1230	-	-	-	-	1230	0.04
26	Pipla	165	-	3151	1000	-	4316	0.14
27	Rasulla	-	-		21600	-	21600	0.69
28	Rittha	156235	-	2040	298219	287918	744412	23.85
29	Rudrakhchya	475	-	-	-	-	475	0.02
30	Saldhup	27	-	-	-	-	27	0.00
31	Satawari	5836	-	12316	2071	150	20373	0.65
32	Setakchini	-	-	6835	52	15634	22521	0.72
33	Shugandhawal	-	-	1577	19463	-	21040	0.67
34	Sikakai	550	-	15600	1985	15500	33635	1.08
35	Silajit	-	-	-	38074	-	38074	1.22
36	Sitalfal	2000	-	-	-	-	2000	0.06
37	Sunpate	-	4035	-	-	-	4035	0.13
38	Tayari	-	-	45000	-	-	45000	1.44
39	Tejpat	28205	-	305	3680	18243	50433	1.62
40	Thinguresal	2500	-	-	-	-	2500	0.08
41	Thungeful	-	-	-	-	-	0	0.00
42	Timur	871	-	5601	478996	958	486426	15.59
43	Wild garlic	3465	-	-	-	-	3465	0.11
47	Others	1153	17990		1883	25473	46499	1.49
	Total Quantity (kg)	440879	281644	333190	1616118	448783	3120614	100.00
	Total Royalty (Rs)	1950008	4488407	5475731	16224109	2282077	30420332	
	% Royalty	6.41	14.75	18.00	53.33	7.50	100.00	

Note: Other products for which licenses were issued and for which amounts collected were small are not reported.
Source: Department of Forests, Annual Bulletin, 2053/54, HMG (in Nepali)

the demand for this product in the beverage industry is believed to be high. Chirayta is not exported in any processed form from Nepal. In addition, the total quantity of Spikenard air-lifted from Jumla (1994) exceeded the licensed amount (Karnali Institute 1994; also see Box 3.1). In short, the volume of herbs and medicinal plants exported annually is far in excess of the official records. Quantities harvested and royalties are increasing annually (Table 3.2). Nepal has been the leading supplier of herbs and medicinal plants to India and overseas' countries, e.g., Singapore, Hong Kong, Korea, Japan, Britain, France, and Germany, for the last two decades. (Export items also include spices such as ginger, cardamom, and turmeric and rosin.) The total volume of exports in 1989 was 63.4 tonnes. The high volume of exports, which are mostly in crude form, fetches a low price. Export of processed or semi-processed products from herbs and medicinal plants only accounts for a small share of the market.

Table 3.2: Commercial Harvesting of Herbs and Medicinal Plants in Nepal with Royalties Collected

Year	Quantity (tonnes)	Rs ('000)	US$ ('00)
1989/90	3348	3490	69.80
1990/91	6217	7400	148.00
1991/92	3372	5650	113.00
1992/93	5679	11330	226.60
1993/94	11694	15812	316.24

Source: Department of Forests, Annual Bulletin, 2053/54, HMG (in Nepali)

The total value of herbs and medicinal plants exported to India and other countries has increased from Rs 27.5 million in 1992/93 to Rs 64.5[3] million in 1996/97 with an average growth rate of about 24 per cent per annum. While India has been the major trading partner in terms of total export value, the export of herbs and medicinal plants to other countries is increasing at a much faster rate than to India (Table 3.3).

Not all herbs and medicinal plants harvested enter the overseas' market or trade with India. The quantities that are traded within Nepal (highland, lowland, and urban areas) cannot be derived from the available information. The people of Jumla, who go on seasonal trading trips to India, are known to take along with them different herbs, medicinal plants, and other natural products such as *silajeet*[4] to

Table 3.3: Trends in Herbs and Medicinal Plants Exported to India and Overseas' Countries (Rs in 000)

	1992-93	1993-94	1994-95	1995-96	1996-97	Growth rate
India	24000	28100	41700	40500	47400	18.55
Overseas	3500	3500	7200	8100	17100	48.67
Total	27500	31600	48900	48600	64500	23.75

Source: Federation of Nepalese Chambers of Commerce and Industry , Nepal and the World: A Statistical Profile, 1998

[3] The exchange rate was about 67 rupees to one US dollar at that time.

[4] Silajeet is a kind of oil found in the rock crevices. It is valued as a tonic.

Box 3.1: Benefit from Spikenard Collection and Trading in a Small Village of Jumla District

Chaudabisa Valley in Jumla district has a population of about 15,000 people, spread across 4 VDCs and 17 villages. The average household size is about 8 persons per household. Despite the fact that only about 10 per cent of the land is arable, the main occupation of most households is agriculture. The main crops grown are maize, buckwheat, wheat, and potatoes. With low crop yields and cropping intensity, only about 60 per cent of the households have sufficient food, and therefore migration is a common practice. About 80 per cent of the households in Chaudabisa involve themselves in the collection of Spikenard. Harvesting conflicts are known to occur. Official permits are required from the Department of Forests for collection of the resource for which the royalty that has to be paid is in proportion to the amount that is collected. The Spikenard collected is generally airlifted from the STOL airfield at the district headquarters.

On an average, the amount of Spikenard collected per household was about 100kg, given that in Chaudabisa a total of 69,500kg was collected. The employment generated by this trade (collection and pottering) was 20,600 days per year. In 1992/93, the average earning was about US$ 20 per household. Since raw Spikenard cannot be exported, a processing plant is located on the Nepal-India border at Krishnanagar. The price of Spikenard in Nepal (US$ 1.70/kg) is lower than the price across the border in India (US$ 2.24/kg), which gives rise to illegal trade. The oil that is extracted from Spikenard sells for US$ 180/kg. In short, the Chaudabisa households gain the least from the product they harvest.

Source: Karnali Institute 1994

trade. The quantities traded are not known.

Factors Governing the Flow from and Benefits to the Highlands

While huge quantities of herbs and medicinal plants are exported from the highlands, the highland peoples who collect these resources get only a small part of the benefit. Despite the large volumes of high-value herbs and medicinal plants being exported every year from the highlands, the highland people are not benefitting sufficiently due to a number of reasons, mostly related to marketing. The lack of processing plants at the collection points and existence of a large number of intermediaries in the marketing channel appear to reduce the benefits to highland collectors. Another factor in the poor benefits accruing to the highland people is the low prices they receive for their goods. Both of these factors reflect the worsening terms of trade against the highland.

Marketing and Distribution Channels

The flow of herbs and medicinal plants from the place of origin (highlands) to the destination

(lowlands, mainly Indian Plains in the south) involves a number of intermediaries in the marketing chain (Figure 3.1). Throughout the Himalayan region, herbs and medicinal plants are collected, transported, and traded. The collection method at the source involves cutting, removing the bark, or uprooting. The herbs and medicinal plants gathered are carried to collection points, which may be at the district headquarters or at a roadhead.

Three main groups are distinguishable in herb marketing; namely, the collector, the trader (middlemen), and, to a lesser extent, the officials. Collectors could be either hired collectors or those holding permits. After the hired collectors hand over the harvest to the trader they are paid, usually at the road-head, and these hired collectors completely disappear from the marketing system. Permit holders are local collectors who have permits and are better informed about

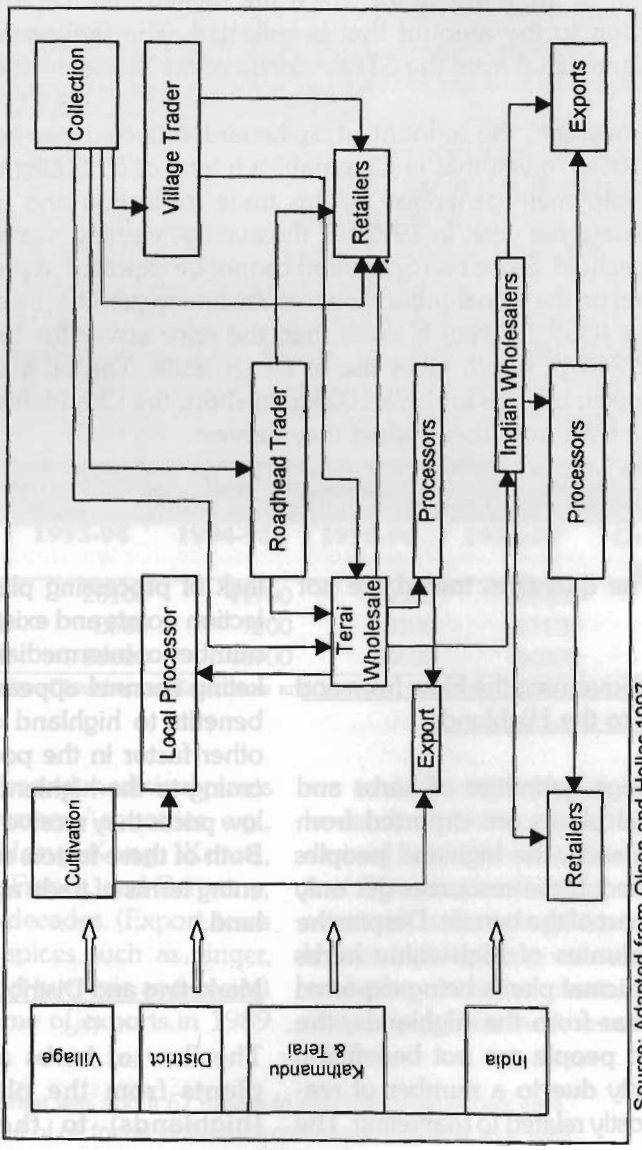


Figure 3.1: Marketing Chain for Herbs and Medicinal Plants in Gorkha District

Source: Adapted from Olsen and Helles 1997.

plants and details about their location. Because of the information at their disposal, their bargaining power is relatively better than the hired collectors, and hence they benefit more in relation to that. The local collectors go to nearby forests to graze their cattle and collect whatever herbs and medicinal plants they can find.

Terai-based wholesalers are few and small but are comprised of a powerful group of middlemen, who have close links with traders in Delhi (Figure 3.1). Given their close contact with Indian merchants, they have the latest market information and are thus able to control marketing and the prices paid to road-head traders and thus to collectors (Edwards 1996). Despite the high marketing margin enjoyed by *Terai* wholesalers, entry into the trade is difficult for new participants due to a number of market imperfections. Not only is the cost of establishing a network of buyers in India high for new participants but the capital investment required to buy stocks is also enormous, amounting to several million Nepalese rupees. Competition in the market is restricted not only by the control of price information exercised by the *Terai* wholesalers but also by the limited number of road-head traders at each collection centre. If the collectors find prices to be unacceptable, they may have to spend up to several days to reach another wholesaler in some other location, and this adds to their costs and weakens their bargaining position—on the other hand, the cost of establishing sales in India combined with a lack of knowledge of Indian market prices are constraints to road-head traders establishing direct sales to India. Maintaining secrecy about the details of trade and concealing the financial gains would be necessary to maintain oligopsony (Olsen and Helles 1997).

A direct contact made by the collectors with the end-use buyers would completely change the marketing chain as highlanders would most likely benefit more and the trader margins would decline. This is one reason why the trade remains highly secretive (Aryal 1993). The long marketing chain obviously implies lower payments to collectors. Scope also exists to add more value internally through processing.

Spikenard (*Nardostachys grandiflora*)

Spikenard or *jatamansi* as it is known in Nepal is found between 3,000 to 4,500masl. It is has been used since ancient times to make costly perfumed ointments. It is available in the northern districts of Nepal, namely, Taplejung, Therathum, Sankhuwasabha, Solukhumbu, Gorkha, Lamjung, Kaski, Parbat, Baglung, Gulmi, Mustang, Myagdi, Rolpa, Dailekh, Jumla, and Jajarkot. The literature indicates that there is a concentration of Spikenard in the Karnali Zone of western Nepal because of its favourable climate and topography. The total collection permitted by the district office in 1997 was about 103 metric tonnes, of which about 100 tonnes were collected in the Mid-Western Development Region (MWDR) alone and the rest in the Eastern Development Region (EDR) and the Western Development Region (WDR) (Table 3.1). The volume of Spikenard collected by development regions is summarised in Table 3.4.

Table 3.4: Trend in Spikenard Collection by Development Regions

Year	Quantity collected (MTs)	Development region	Number of districts
1987/88	64.35	E,C,W,MW	9
1988/89	111	E,C,W,MW,FW	14
1989/90	118.1	E,C,W,MW	9
1990/91	70.4	E,C,W,MW,FW	10
1992/92	203.3	E,C,W,MW	14
1992/93	113.3	E,C,W,MW,FW	19
1993/94	260	C,W,MW	14

Source: Federation of Nepalese Chambers of Commerce and Industry, Nepal and the World: A Statistical Profile, 1998

The applications of Spikenard are varied and almost the entire plant has applications. The plant is valued for its rhizomes/ roots which are used medicinally in China and the Indian subcontinent for various medicinal purposes. The main parts of the plant are used for the distillation of oil (called Spikenard [*jatamansi*] oil, the price of which in 1993 was Rs 5,800/ kg in India), and it is one of the most expensive oils used in perfumes.

Among the herbs and medicinal plants, Spikenard is one of the top exports from the highlands. Whilever the export of unprocessed Spikenard was allowed, it used to be exported officially in amounts of over 100 tonnes per annum. With the ban on its export in unprocessed form in 1989, the official export figure for this item is not available in customs' statistics. However, in spite of the ban on its export in unprocessed form, it is finding its way to the Indian market and subsequently to processors in India, Germany, and other countries (Malla 1994). A study carried out by Bista *et al.* shows that 150 tonnes were shipped form Jumla airport, whereas the revenue paid to the district forest office was for 75 tonnes only. This indicates that there is a wide discrepancy between the quantity permitted and the quantity actually airlifted from Jumla.

The collectors' margin estimated by Olson and Helles (1997) for Gorkha ranges from 37 to 62 per cent, and this compares well with Edwards' estimate (39-89%). Estimates of both gross and net marketing margins for collectors, road-head traders, and *Terai* wholesalers involved in marketing Spikenard are summarised in Table 3.5. The road-head traders are not able to make a profit but are forced to buy all products offered because, if they do not do so, the collector may sell elsewhere. These traders generally speculate and take the advantage of the price in the *Terai* during the year (scenario III). The *Terai* wholesalers receive relatively higher net margins than the road-head traders. Road-head traders who are assumed to transport the product to the *Terai* are, on the other hand, able to make high net margins even when selling at the average price (Scenarios I and II). Moreover, they may also increase their income substantially by speculating on the Indian wholesale market (Scenario III) (See Box 3.1).

Table 3.5: Average Marketing Margin for Spikenard from Gorkha District

	Scenario I Price during one year period (Sept 94-Aug 95)	Scenario II Prices during the main trading season	Scenario III Average of two maximum sale prices offered during the year	% of Delhi wholesale price
Collectors				
Delhi wholesale price	92.40	93.87	104.00	100.00
Collector price	46.03	46.95	46.95	52.2
Road head trader				
Roadhead wholesale	56.51	46.95	65.31	59.1
price	10.48	8.49	18.36	9.0
Gross margin (3-2)	16.68			
Marketing cost	-6.28	-8.18	0.60	-8.7
Net margin (4-5)				
Terai wholesaler	35.89	38.43	48.56	40.9
Gross margin (1-3)				
Marketing cost	21.51	23.98	33.50	25.6
Net margin(7-8)				

Source: Olsen and Helles 1997

Chirayta *(Swertia chirata)*

Another major export from the high Himal area is Chirayta or *Swertia chirata*. It is generally found at altitudes of between 1,200-3,000m, mostly on open ground. The habitats most favourable for its growth are forest areas that have been slashed and burned, and these can be found in all development regions (Table 3.6). The main production pockets are in Eastern Nepal, mainly in the catchment areas of Hile road-head (Therathum, Panchthar, Sankhuwasabha, and Bhojpur districts). It is also collected in lesser quantities in Central Nepal (Edwards 1993). The EDR is the major belt for collection in Nepal and accounts for over 70 per cent of the total export. Chirayta is harvested from government land, after acquiring a permit and paying a nominal royalty fee. The total volume of export, based on the royalty collected, was about 137.3 metric tonnes in 1997.

Edwards' study shows that collection of *Swertia chirata* is an important activity for many poor households in the Kosi hill area, and he estimated that

Table 3.6: Trend in *Swertia chirata* Collected by Development Regions

	Quantity collected (MTs)	Development Regions	Number of districts
1987/88	159.5	EDR,CDR,WDR,MWDR	15
1988/89	131.8	EDR,CDR,WDR,MWDR	18
1989/90	165.1	EDR,CDR,WDR,MWDR	18
1990/91	85.6	EDR,CDR,WDR,MWDR, FWDR	19
1992/92	159.3	EDR,CDR,WDR,MWDR, FWDR	27
1992/93	200.8	EDR,CDR,WDR,MWDR, FWDR	36
1993/94	304.6	EDR,CDR,WDR,MWDR, FWDR	35

Source: Department of Forests, Annual Bulletin, 2053/54, HMG (in Nepali)

it brings in an estimated US$ 280,000 per year in the area. Edwards also provides the distribution of benefits from this trade in the Kosi Hills (Tables 3.7 and 3.8) and Olsen and Helles (1997) for Gorkha.

lowland areas but also for export. In terms of the revenue raised by the government from the licenses issued for collection of NTFPs, the revenue raised from NTFPs was about Rs 25,741,337 in 1995/96 (DOF 1998).

Table 3.7: Estimated Distribution of Benefits from *Swertia chirata* Trade in the Kosi Hills

	Month	Income (Rs/kg)	% of Retail Price	Quantity (kg)	Total (Rs)
Harvesters	Sept.	60	50	20	1200
Village traders	Oct.	28	23	500	14000
Porters	Oct.	12	10	500	6000
Roadhead traders	Nov.	10	8.3	4000	40000
Terai traders	Dec.	4	3.3	20000	80000
Retailer	Dec.	6	5	10000	60000

Source: Edwards 1993

Table 3.8: Average Marketing Margin for *Swertia chirata* from Gorkha1994-95

	Scenario I Price during one year period (Sept 94-Aug 95)	Scenario II Prices during the main trading season (Oct 94-March 95)	Scenario III Average of two maximum sale price offered during the years	% of Delhi Wholesale price
Collectors				
Delhi wholesale price	92.75	95.73	120.00	100.00
Collector price	48.23	49.98	49.98	52.2
Roadhead trader				
Roadhead wholesale price	64.33	65.73	78.44	68.7
Gross margin (3-4)	16.10	15.75	28.46	16.5
Marketing cost				
Net margin (5-7)	2.63	2.08	13.39	2.2
Terai wholesaler				
Gross margin (1-3)	92.75	95.73	120.00	100.00
Marketing cost	82.10	83.69	85.15	87.4
Net margin(8-9)	10.65	12.04	34.85	12.6

Source: Olson and Helles 1997

Other Non Timber Forest Products (NTFP)

Other NTFPs for which there is a demand in the lowlands and overseas are briefly discussed in this section. The importance of other non-timber forest products has been increasing over the years. Currently, most of the NTFPs are used by local communities, but some NTFP products made from them are in demand not only in

There is not much information on most NTFPs, despite their extraction and export. Two NTFPs on which some studies have been conducted are Daphne (*lokta*) and *allo* (nettles), and these are briefly discussed below.

Lokta (Daphne bholua)

Lokta is used to refer to three plants belonging to the family of Thymelasceae, namely, *Daphne*

A Cinnamon bush—a forest product that can be a valuable cash crop

bholua, *Daphne papyracea* and *Edgeworthia gardneri*. The bark of *Daphne bholua* is the principal ingredient used for making Nepali paper and other paper products that are sold in the domestic market and exported to many countries.

across the entire belt of the Himalayan foothills of Nepal, except in the FWDR where its occurrence is relatively sparse. *Lokta* is found relatively more abundantly in the WDR according to the figures derived from the number of harvesting licenses issued by the DOF (Table 3.9). As for herbs and medicinal plants, the amount of *lokta* collected may be more than stipulated in the licenses (Dhungana and Chhetri 1995).

The harvesting methods used are primitive. The bark is generally stripped directly from the plants, left to stand, or uprooted. These are all

Table 3.9: Daphne(*Lokta*) Harvest Based on Licenses Issued by the Department of Forests, 1995/96

District	Amount Collected kg	District	Amount Collected kg
Illam	1000	Ramechhap	20000
Taplejung	27000	Dolakha	11983
Bhojpur	1000	Sindhupalchok	43000
Therathum	4000	Dhading	8461
Sankhuwasabha	3700	Central Dev. Region	47447
Khotang	1750		
Okhaldhunga	8000		
Solukhumbu	10600		
Total Eastern Dev Region	57050		
Lamjung	28000	Rukum	3450
Gorkha	17000	Mugu	2119
Myagdi	332500	Jajarkot	6993
Western Dev region	377500	Mid Western Dev Region	12562

Source: Department of Forests, Annual Bulletin, 2053/54, HMG (in Nepali).

Spatial Distribution and Harvest

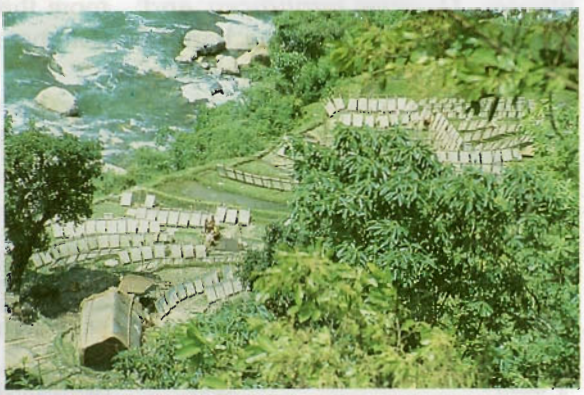
Lokta is found as an understory shrub standing one to three metres high in oak/laurel and oak/rhododendron forests, generally between 2,100-2,700masl. It is distributed almost

unscientific methods and not conducive to plant regeneration. Although detailed studies on annual yield and regeneration and stock are lacking, it has been indicated that present harvesting methods are unsustainable as regeneration is being negatively af-

Lokta bark being dried to make Nepali paper.

annually. In addition, the total quantity consumed within the nation is not known. What is available is the value of Nepali paper exports. The countries of Western Europe and Japan are the main countries buying Nepali paper and paper products. In 1995/96 the value of total exports was Rs 59,085,168, which is close to a million US$. Currently, the product is exported to 46 different countries (21 in Asia, 17 in Europe ,and some countries in Africa, and America).

fected (Nepali *et al.* 1990). Some trials have been conducted for the cultivation of *lokta* in the Makalu Barun National Park and Conservation Area.



Nepali paper being dried for shipment to the lowlands.

Paper Making

The collected bark is dried and sold to traders or registered industries. Some collectors use the bark to make ropes for domestic purposes. To manufacture paper, the dried bark is boiled for several hours. This boiling process uses up a lot of firewood, and, thus, encouragement of Nepali paper-making must also include provision of alternative energy sources. About three kilogrammes of firewood are required to produce one kilogramme of *lokta* pulp (Nepali *et al.* 1990). After the boiling is completed, the pulp prepared is spread on screens with wooden frames to dry. Once dried, it is ready for use.

Exports

There is no information on the total volume of paper prepared from *lokta*

Allo (Girardinia diversifolia)

Many communities in Nepal, living in highland areas, make use of this plant for its rich fibre content. It is also called the Himalayan nettle, and it is found growing in wooded or deciduous forests of oak, maple, and cherry in subtropical and temperate climates between altitudes of 1,000-4,000m. Three main species of *allo* (*Girardinia*) are found, namely, *Girardinia palmata*, *Girardinia zeylanica* and *Girardinia heterophylla* or *Girardinia diversifolia* (most commonly found in Nepal). The plant is an evergreen shrub and usually grows from about one to 2.5m tall.

Uses

Traditionally, the fibre is used for making bags, fishing nets, ropes, sacks, and clothes. Trials in blending this fibre with cotton, wool, and polyester have been successful. The polyester mixed fibres are suitable for shirts and suits and as such the fibre is used to make cloth which is exported out of the highland areas. Also the plant is used to make vegetable dyes and many local people use the leaves as vegetables. The fibres are also used for weaving carpets, but this practice is not common (Shrestha 1994).

Fibres produced from this nettle plant (*allo*) are used to weave materials that have export value.

Harvest and Yield

The plant is generally found in areas unsuitable for agriculture, in shady damp places as undergrowth in the forest. Growth is best on north facing slopes. The number of shoots increases every year if plants are appropriately harvested and not uprooted. Regeneration from seeds is very slow. The plant matures in about three years. Poor harvesting methods are known to cause low yields the following year (Shrestha 1994). Estimated yield (dry bark) varies from about 43kg per ha to 254kg/ha.

The plant is harvested best before the flowering season, when the quality of fibre is at its best. Collection is generally carried out in groups by both men and women. Often the walking distance is more than one day away. Villagers generally agree on the time of collection. Sickles are used to chop the stems, leaving a stump. The plants contain stinging hairs and hence hands are wrapped with thick cloth for holding the plant. Gloves may also be used. Teeth are used to separate the bark from the inner part of the stem. The inner stem is discarded and the peeled portion (dried ribbon) is gathered and sun dried. The entire process involves a lot of wastage.

Processing

After drying completely, the ribbon is soaked in water for one or two days. It is then boiled three to four hours in wood ash-water solution and left to simmer over night. The material is then washed in running water by frequent beating of a mallet. The fibres are then mixed with white clay, used to soften the fibre, and then dried in the sun and, after complete drying, the clay is removed by beating the fibre with a stick. Large quantities of firewood are required for boiling (1kg of fibre to 12kg of firewood). Information on the total production of fibre from *allo* is not available, although the fibre is available in the market from several outlets.

Other Renewable Resource Products

There are many other products originating in the highlands that are exported to India and other countries (Amatya 1995). Unfortunately, information on the production, spatial distribution, and marketing is not available. The Federation of Nepalese Chambers of Commerce and Industry and Trade Promotion Centre report export values of some renewable resource products (Tables 3.10 & 3.11). The exports are either in raw form, processed to some extent, or finished products. It is known that *rudrakchya* (Elaeocarpu sphaericus) and orchids are also exported from Nepal, but information on these items could not be obtained.

Issues and Options

Traditional harvesting methods need to be improved, as currently the methods are not conducive to plant growth, its sustainable supply, as well as the environment it grows in. The management regime suggested is to harvest the plant on a six-year cycle. Total stocks and harvest zones need to be identified and harvesting needs to be regulated, monitored, and enforced. Herbs, medicinal plants, spices, and other NTFP cultivation must be encouraged on private lands since herbs and medicinal plants can

Table 3.10: Renewable Resources to India and Overseas

PRODUCT	1992/93	1993/94	1994/95	1995/96	1996/97
India					
Ginger	73900	73800	90900	137300	121600
Dried Ginger	30700	23100	76900	47200	40600
Marble Slabs	13330	5300	19800	41800	36500
Stones & Sand	23900	24900	24500	19700	27100
Cinnamon	5900	8900	3700	5800	10100
Turpentine	2300	NA	5100	20600	9100
Turmeric	200	NA	200	1100	1600
Overseas					
Nigerseeds	198000	134300	84300	409300	259200
Tea	2700	5200	13000	11600	19800
Herbs	3500	3500	7200	8100	17100
Cardamom	100	NA	200	NA	NA
Perfume Oils	3700	NA	3600	4600	800

Source: Federation of Nepalese Chambers of Commerce and Industry , Nepal and the World: A Statistical Profile, 1998

Table 3.11: Other Exports Overseas Originating from Highland Products (1996/97)

Product	Volume (kg)	Value (Rs)
Lycopodium	15600	6386238
Other Medicinal Herbs	27111	2203708
Spices		279416
Coffee	4245	602259
Honey	887	132372
Apple	3403	155993
Dry Fruits		13907
Essential Oils	4544	5460882
Flowers and flower seeds		584351
Fruit Jam		72198

Source: Trade Promotion Centre, Kathmandu Nepal, Nepal Overseas' Trade Statistics, 1996/97

earn more income from the same piece of land than from traditional crops such as maize and millet. Setting the royalty rates is an important first step to encouraging cultivation of herbs and medicinal plants on private land.

Export of unprocessed produce results in high economic loss. The value of processed exports is many times higher than the unprocessed products. The export of unprocessed herbs and medicinal plants in an inefficient marketing system limits the benefits that can be reaped by the highland people. More focus and incentives need to be provided to encourage processing within the country. Supply management to ensure sustainable supplies need to be promoted. Farmers need to be encouraged to cultivate plants so that natural habitats can be conserved as a seed reservoir. Without assurance of sustainable supplies, processing within the country will not be possible.

A necessary step in promotion production, processing, and marketing to benefit the highland people may lie in getting them organized first. The haphazard collection and marketing practices of local people prohibits them from deriving higher benefits. Additionally, small-scale NTFP enterprise development would be possible if the local people could be organized into groups. Many different activities could perhaps be developed at the local level to generate employment and value added.

Problems caused by intensive use of firewood to process some herbs and NTFPs must be addressed, or with increased production of NTFPs, demand for firewood can increase and have negative impacts on forest resources.

Fuelwood stored for the coming winter

One area that needs to be addressed is marketing. The benefits local people can derive from marketing depend on how long they can effectively stay in the marketing chain. Currently, most local people are out of the marketing chain once the product is sold to the roadhead dealers. Secondly, the marketing chain is fairly long, and this is also believed to reduce the prospects for highlanders to benefit from NTFP trade. Their disappearance from the marketing scene, once NTFPs are sold to the roadhead dealers, and the absence of processing and production of products from NTFPs in the highlands, therefore, severely limit highlanders in deriving sufficient benefit from the very resources with which they are endowed.

Mountain Tourism

Dominant Features of Mountain Tourism Products

Tourism as a specialised service product has some specific characteristics that set the products apart from the more general goods sold in the market place. An understanding of the

dimensions of the service product concepts is an essential prerequisite for successful marketing. While most products combine the attributes of pure goods and services, tourism is generally believed to have more service contents than others, given the dominant features of intangibility, perishability, and inseparability of products. Tourism is a composite product comprised of attraction, services, transportation, information, and promotion (Banskota and Sharma 1995b).

Tourist destinations provide a convenient focus for the examination of tourist flow and its impact and significance. Destination is where most significant elements of tourism occur and where attraction and all other support facilities needed by tourists are found. Understanding the diversity of tourist destinations in mountain areas first requires identification of their common features.

Mountain tourism products are unique highland resources consisting of Himalayan scenery, the flora and fauna, the village people and their customs, and so on that have limited substitutes and which tourists come to enjoy. In contrast to other tangible products, mountain tourism products are intangible. In tourism, certain facilities and services are made available for a specified time and for specified use. Intangibility implies that tourism products cannot be easily evaluated or demonstrated in advance of its purchase. Unlike other goods, tourism products cannot be stored and this adds to the risk in the industry as it involves devising complex pricing and promotion policies. Tourism service products are often consumed and produced simultaneously, i.e., the visitors have to be physically present at the destination to experience tourism. Unlike many products, tourism products are an amalgamation of many components that together make a complete product. The products tourists consume cover the complete experiences of their visit to a particular place and are contingent on marketing efforts, coordination among different agencies, services, and so on (Banskota and Sharma 1995a).

Tourism is a seasonal business in the highlands. Besides seasonality, other political unrest in different parts of the world and economic instability influence tourism. Seasonality becomes an issue because the products cannot be stored and this results in them not being used to capacity in lean seasons. In Nepal, highland tourist arrivals peak during the winter season (October-January), followed by the dry season (February-May), and slacken considerably during the rainy season (June-September). The seasonal nature of tourism has certain disadvantages in the context of mountain tourism. First, seasonality leads to crowding or congestion in an area. Second, the income and employment generated are seasonal. Seasonality may also be a blessing to the mountain environment, as it gives a chance for vegetation to regenerate and for local people to participate in agriculture during the monsoon season when tourism is also at a low ebb (Banskota and Sharma, 1995a).

Highland Tourists and Distribution

Highland or mountain tourists in Nepal are of three types, namely, moun-

taineers, free independent trekkers (FITs), and group tourists (GTs). The distribution of these types of trekkers varies by region as well as over time (Table 3.12). Mountaineering tourists cent of the tourists visited Nepal for pleasure, 23 per cent for trekking, and the rest for business (6.4%), official (5.1%), and others (13%). The percentage share of trekker and moun-

Table 3.12 Trends in Tourist Arrivals by Purpose of Visit

Year	Holiday/ Pleasure	Trekking & mountaineering	Business	Pilgrimage	Official	Conference	other	Total
1970	41881	556	918		1528		1087	45970
1985	128217	28707	10416		9230		4419	180989
1986	163958	33609	10863		8825		6076	223331
1987	184979	36164	11781		8882		6274	248080
1988	200775	36937	12008		9781		6442	265943
1989	180973	40093	2630		12275		3974	239945
1990	161839	39999	11728	6713	26578	2838	5190	254885
1991	1773770	42308	14601	9103	37274	5441	6898	1889395
1992	237711	35166	31765	7219	20967	815	710	334353
1993	170279	69619	19495	10429	15812	5367	2566	293567
1994	168155	76865	23522	5475	20431	5361	26722	326531
1995	183207	84787	21829	5257	20090	5272	42953	363395
1996	209377	88945	25079	4802	20191	6054	39165	393613
Share	53.19	22.60	6.37	1.22	5.13	1.54	9.95	100.00

Source: Banskota and Sharma 1996

can also be classified into two categories, namely, those who climb peaks above 6,000m and those who climb peaks below 6,000m. Each of these groups has different impacts on the areas they visit (Banskota and Sharma 1995a). In 1996 about 53 per taineering tourists has been gradually increasing over time. Currently, there are 14 protected areas of different status in Nepal, covering roughly 12 per cent of the country's surface area (Table 3.13), out of which nine are in the highlands. Also, there are 84

Table 3.13: Protected Areas in Highland Nepal

Name	Area (sq.km.)	Location	Gazetted
Rara National Park	106	High mountains	1976
Shey Phoksundo National Park	3555	High Himal	1984
Annapurna Conservation Area[1]	7000	High mountain to high Himal	
Langtang National Park	1710	High mountain to high Himal	
Sagarmatha National Park	1148	High Himal	1976
Makalu-Barun National Park & Conservation Area[2]	2330	High mountain to high Himal	1992
Shivapuri Watershed Protected Area[3]	144	Mid mountains	
Dhorpatan Hunting Reserve	1325	High mountain	1987
Kaptad National Park	225	High mountain	

Source: Master Plan for the Forestry Sector Project 1988, Main Report

peaks opened for mountaineering throughout the country. The most popular areas in the mountain regions visited by trekkers are the Annapurna, Langtang, and Sagarmatha regions. The areas in the highlands visited by tourists are mostly protected areas (Table 3.13).

Mt. Makalu (5th highest in the world), located in the Makalu Barun National Park and Conservation Area is a prime tourism attraction.

Volume and Magnitude of Benefits

Significant income and employment benefits have been realised from mountain tourism. These benefits are attributed to the direct expenditure of tourists. The benefits that accrue to mountain people are currently confined to small pockets and small groups. Currently, income benefits to mountain people are through expenditure by tourists on food and accommodation. Employment benefits are primarily in the form of porter services for trekkers and mountaineers. There are variations in the amount of benefits generated by group and independent trekkers, with the former contributing more to employment generation and the latter to income generation (Banskota and Sharma 1995a). Potentials to generate greater than current benefits through appropriate valuation of the mountain tourism assets exist (Wells 1992).

Estimates of income generation from mountain tourism are provided in Table 3.14. The total revenue generated from mountain tourism in 1992 was about Rs 641 million compared to about 74 million in 1980. Wages paid to porters and other support staff constituted about 23 per cent, food and accommodation expenditure for nearly 50 per cent, mountaineering

Table 3.14 : Income Generated by Mountain Tourism in Nepalese Rupees (Rs in 000)

Year	Wages	Food	Mountaineering		Trek & Park	Peak Fee	Total Mountain Revenue	Expenditure Per Trekker per day
			Exp	Royalty				
1980	16328	35558	15827	843	3295	2121	73972	192
1981	18595	39073	18217	5281	3525	1760	86452	210
1982	22811	47206	17504	1036	3880	2108	94545	209
1983	24836	52414	18575	1150	3876	2521	103372	229
1984	36343	74121	20169	2752	4945	3104	141434	245
1985	31483	64272	17870	3298	3928	3646	124497	272
1986	52485	117298	28854	4063	5949	5602	214251	309
1987	55596	115481	34020	4330	5673	7770	222870	337
1988	81310	159630	42582	5079	7353	8523	304477	355
1989	89938	184416	63976	7222	7303	1389	354244	416
1990	103952	197112	68368	7266	7451	1605	385754	444
1991	120225	309618	156363	8929	7892	13053	616081	669
1992	146663	332838	101355	30351	8573	20883	640662	641

Source: Banskota and Sharma 1996

expenditure for 15 per cent, and mountaineering royalties accounted for less than two per cent on average. The share from the various permit fees has been decreasing steadily over the years and is less than the share contributed by trekking peak fees. The estimates made are lower than they should be due to gaps in the information. Despite this underestimate, it is nevertheless clear that mountain tourism assets generate a substantial amount of income, and that there is scope to increase this income

The ratio of the import content of the tourism sector in Nepal is about 62 per cent at the macro-level, indicating high leakages. There is a possibility of decreasing leakages through development in the domestic sectors that have a strong linkage with tourism. The leakages are fairly high, even in mountain areas (Table 3.15) and promotion of agricultural activities can help reduce them.

the flow of tourists and generation and higher retention of benefits generated. Currently, one of the main factors limiting generation of increased benefits is the lack of supply side management of mountain tourism in highland areas.

Evidence also indicates that there is limited scope for sharing benefits from mountain tourism. This is primarily due to the poor linkages of this sector with local production and other activities that have remained underdeveloped. Substantial benefits can be accrued from tourism provided there is interrelated development of all supply side components of tourism through sound action planning. Opportunities exist to use entry fees for development of infrastructural facilities. Above all, in order to realise these potentials fully and sustain the impacts, capacity building of local participatory institutions is vital (Banskota and Sharma 1998).

Table 3. 15 Estimate of Leakage of Tourist Generated Income (% imports) in Lodges in Ghandruk and Ghorepani

Item	Ghorepani	Ghandruk
Rice	100	96.82
Flour	95.88	51.59
Bread	85.29	57.58
Vegetables	414.75	20.91
Meat	25.00	18.06
Eggs	100	98.86
Milk	100	78.86
Fruits	99.12	100
Jam/Butter	100	100
Furniture	9.71	14.55
Cloth/drinks/Mattress	94.44	100
Overall	76.41	68.09

Source: :Banskota and Sharma 1995

Issues and Options

Supply side planning and marketing play important roles in determining

Continuing to promote trekking tourism alone is unlikely to increase benefits to the nation or to local communities. There is a great deal of

Tourists camping in Chandanbari on the way to Gosainkunda in Langtang National Park.

A clear long-term policy on what is desired from tourism in the context of mountain development has yet to emerge in Nepal. Tourism development cannot be viewed in isolation from conservation and natural resource management and mountain development, as it is the mountain resources that form the very basis of mountain tourism as well as the basis of survival for local mountain communities. This lack of scope for developing new mountain tourism products, and favourable government policies for investment in mountain areas needs to be encouraged.

Local people constructing a cottage along a tourism trekking route.

Use of firewood by tourists has been restricted (kerosene is mandatory in some mountain areas), but its use by tourist support staff and local tourism outlets continues. Policy failure arises from the fact that this derived demand for firewood by tourists is not considered an integral part of the mountain-tourism energy policy.

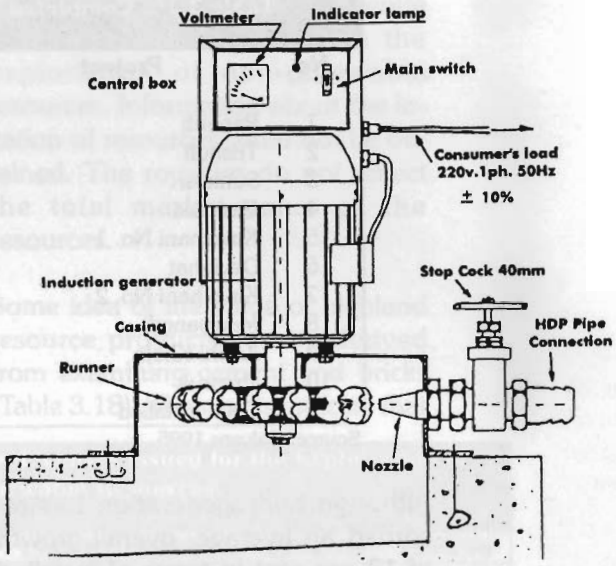
Nepal's mountaineering tourism is now suffering from self-glorifying and *ad hoc* policy changes (Banskota and Sharma 1995a). Besides the ACAP, institutional and participatory approaches to mountain and tourism development are lacking. Tourism-led development has been an individual response to meet tourist needs, and community development has been externally driven. The need to organize mountain communities for both community and tourism development has not been addressed.

realisation has resulted in a demand-induced tourism growth pattern, with local people responding to tourist needs; and thus it has not contributed to mountain development in a meaningful way.

Hydropower Generation and Consumption

In Nepal, the Ministry of Water Resources is the guardian of water bodies. Hydropower is essentially an *in situ* water resource (a flow resource converted to a fund resource). Nepal Electricity Authority (NEA) was created in 1985 to undertake all planning, construction, operation, and maintenance of electrical services in the country. NEA is the largest government undertaking in terms of

human resources, capital investment, and assets. Over the years, NEA has been providing electricity services to households, industrial enterprises, government and other offices, and other commercial outlets. NEA is actively involved in rural electrification. Currently, about 15 per cent of the households in the country have access to electricity. About 254 MW of electricity are produced from the Marsyangdi, Kulekhani, Trishuli, and other smaller and diesel plants.



Peltric turbine

Highland areas by virtue of their water resource endowments are prime locations for hydropower generation. Hydropower generation may be categorised as small- or large-scale. Small-scale refers to the units established by individual households (peltric turbines) to generate power for domestic and other uses. Power consumption for such small projects is generally not connected to the national grid and hence consumed locally. Only larger-scale projects that enter the national grid have direct relevance in the context of highland-lowland linkages, as power is used to meet lowland or urban area energy needs.

Projects with a potential capacity of 82,000 MW have been identified, but less than one per cent (254 MW) of this energy has so far been tapped. Advanced studies (pre-feasibility) have been conducted to tap 14,742 MW. Nepal electricity supply systems primarily consist of two sub-systems: the interconnected Nepal power system, better known as the national grid, and isolated systems. Out of the installed capacity of 254 MW, 248 MW is connected to the national grid. The remaining five MW are in isolated systems serving remote areas of the country, and they consist of over two dozen small/mini plants (Shrestha 1996). Forty-five per cent of the electricity generated by the national grid is used by Kathmandu alone. The national grid accounts for almost 98 per cent of the capacity and 99 per cent of the associated electric energy supplied, and as such the national grid represents the overall hydroelectric industry of Nepal. In Nepal, 356 plants of varying sizes in both the public and private sector, with a total capacity of 254 MW, including the isolated systems, exist. The numerous, small privately-owned plants account for only 0.66 per cent (1.68MW) of the total installed capacity. Losses and internal consumption (producing units) account for about 25 per cent.

All hydropower plants are obviously located in highland areas. The major projects with installed capacities, and the year they became functional, are provided in Table 3.16. Marsyangdi is the largest (69 MW) project in Nepal.

Table 3.16: Completed Major Hydropower Projects

No	Project	Capacity (KW)	Year
1	Panauti	2400	1965
2	Trishuli	21000	1962
3	Sunkosi	10050	1973
4	Gandaki	15000	1979
5	Kulekhani No. 1	60000	1982
6	Devighat	14100	1983
7	Kulekhani No. 2	32000	1986
8	Marsyangdi	69000	1989
9	Andhi Khola	5100	1991
10	Jhimruk	12500	1994
	Total Installed	241150	1994

Source: Salvans 1995

Although hydrogeneration has recorded an average, overall growth of 13 per cent in terms of installed capacity, Nepal's electricity supply has always lagged behind demand. About 12 per cent of the total population have access to electricity, and this increased from nine per cent in 1992. Of those having access to electricity, about 90 per cent are urban dwellers (Shrestha 1996). Per capita consumption is highest in the CDR and lowest in the FWDR. Supply constraints are already a serious problem, as load shedding on a regular basis continues.

Benefits to the Highland People

The benefits to the highland people can be seen from the rural electrification that is being carried out by NEA. Rural electrification is a costly investment and, given the large-scale poverty in rural areas, rural electrification implies large subsidies. Although there is no transfer of resources directly to the highlands after using highland water, rural electrification is a direct benefit received by rural highland households. The magnitude of subsidies provided could, however, not be obtained.

Non-renewable Natural Resources

There are certain non-renewable natural resources occurring in highland areas that are directly in or in intermediate demand in various urban and lowland industries. Although detailed information on the different non-renewable natural resources used by lowland areas is not available, different sources provide some idea. Non-renewable natural resources that flow out of the highland areas can be placed in the following groups.

- Metallic (copper, ores)
- Non-Metals (agriculture-lime, clay, garnet, limestone, magnesite, mica, ochre, quartz crystal, salt, tourmaline, coal, boulders and gravel, cement clinker, flag stone, stone boulders, sand, lime stone-cement grade, marble, chips, raw stone, slab).

Urban construction in highland areas consumes a great deal of sand. Some construction work uses rocks and boulders. All construction work requires bricks which are manufactured from clay. In addition, there are currently three big cement

factories in Nepal that consume considerable amounts of limestone; and this is available only in highland areas. Almost all construction work needs cement. The three cement industries in Nepal cannot meet the total demand, and Nepal has to import cement from abroad. Almost all lowland road construction uses rocks and other rock materials from highland areas. Some materials, such as quartz, garnet, tourmaline, and so on, are even exported. Table 3.17 gives the volume and the revenue generated from royalties on the exploitation of non-renewable resources. Information about the location of resources could not be obtained. The royalties do not reflect the total market value of the resources.

Some idea of the value of highland resource products can be derived from examining cement and bricks (Table 3.18). The results indicate that

Table 3.17: Royalties Raised form the Licenses Issued for the Exploitation of Various Non-renewable Resources

		Unit	1986/87	1990/91	1994/95	1995/96
Metalics	Copper	Mt	1.66	3.5	Na	Na
	Copper ore	Mt	14	21	Na	Na
Non-	Agriculture-lime	Mt	12200	Na	Na	Na
metalics	Clay	Mt	44750	8850	8225	10000
	Lime stone (1)	Mt	Na	19700	14004	13000
	Magnesite	Mt	3838800	Na	Na	Na
	Quartz crystal	Kg	Na	1062	1864	1500
	Salt	Mt	Na	7.3	6.5	8.5
	Tourmaline	Kg	Na	4.5	2.05	2.95
	Talc	Mt	3359	3170	2363	5323
	Coal	Mt	4653	127040	7485	7253
	Construction Materials (2)	Mt	Na	128823	97656	Na
	Lime stone (3)	Mt.	334270	221920	411942	488883
	Marble aggregates	cu.m	Na	31948	34779	40040
	Marble chips	Mt	1664	1037	0.308	548
	Marble craggy	sq.m	6263	6464	1414	2690
	Marble raw stone	cu.m	Na	25230	Na	22500
	Marble slab	sq.m	Na	24749	33245	688841
Total revenue from royalty (NRs '000000')			4.1	1.3	5	0.8

Notes: 1. Chemical grade. 2. Figures are for 1991/92 and 1993/94. 3 Cement grades
Source: Statistical Yearbook of Nepal, 1997, Central Bureau of Statistics (Tables 16.1 and 11.4)

Table 3.18 Production of Bricks and Tiles and Cement 1986/87-1995/96

Products	Units	1986/87	1990/91	1994/95	1995/96
Bricks and Tiles	000' pieces	33876	32625	23449	25911
Value of Bricks Tiles	Rs	50,814,000	49,937,500	35,173,350	38,866,500
Cement	Mt	151631	135897	326839	343181
Value of Cement	Rs	758,155,000	679,485,000	1,634,195,000	1,715,905,000

Note: Bricks and tiles are valued at Rs 1.5 per piece and cement at Rs 250 per 50 kg.
Source: Statistical Yearbook of Nepal, 1997, Central Bureau of Statistics (Tables 16.1 and 11.4)

the volume of production originating from highland resources is substantial. There is little doubt that the value of non-renewable resources flowing out of highland areas is also substantial.

Farm Products

Mountain areas in recent times have begun to export cardamoms, different vegetables, and horticultural products to lowland areas, thus breaking the traditional flow of natural resource-based raw materials. Large numbers of live animals and livestock products, such as milk and cheeses, are being exported from highland areas in increasing amounts. Attempts have been made in this section to examine the nature and magnitude of the flow of vegetables, fruit, and livestock products (mainly milk and dairy products). Marketing processes and constraints are identified and options for improving the income of highland farmers are suggested.

Cardamom (*Amomum subulatum Roxburghi*)

This fruit is also called *alaichi* or false cardamom. The fruit of the cardamom is a deep red globose capsule, each cell of which contains small seeds held together by a viscid sugary pulp and possesses the properties of the true cardamom (small yellowish). The seed is valued as a spice in food preparations and for its oil in the perfume industry. For many farmers in the highland areas of Eastern Nepal (Ilam, Panchthar, Taplejung, Therathum, Dhankuta, Sankhuwasabha, and Bhojpur), cardamom is becoming a high-value crop. Although there is no record on the area under cardamoms, increasingly farmers in these districts are cultivating this crop. This crop is generally cultivated in damp areas under the canopy of *Utis* (*Ulnus nepalensis*). In other words, cardamom grows in damp wasteland areas that are unsuitable for other crops. At least, in Sankhuwasabha district, there was no competition reported between cardamom and other crops. Owing to the very high returns from cardamom, farmers were found to have converted their *khet* (irrigated rice land) to cardamom production in Sankhuwasabha district (Banskota *et al.* 1991). India is currently the largest importer of cardamoms from Nepal. Table 3.19 shows that the value of exports to India increased from Rs 124.4 million in 1992/93 to Rs 171 million (over US$ 2 million) in 1996/97.

Table 3.19: Value of Cardamom Export to Other Countries and India (Rs '000)

Year	Other Countries	India
1992/93	100	124400
1993/94	Na	147200
1994/95	3600	137700
1995/96	4600	195400
1996/97	800	187600

Source: Federation of Nepalese Chambers of Commerce and Industry , Nepal and the World: A Statistical Profile, 1998

Vegetables

Spatial Distribution of Vegetable Production

Nepal's diverse topographic features and climatic conditions permit production of about 250 vegetable crops, of which about 50 are common. While vegetables are grown almost everywhere, the more concentrated areas are located along the major highways and near urban centres.

Vegetables in the highland areas are primarily grown during summer as off-season vegetables and are in great demand in the lowland and urban centres, the main consuming markets. Winter vegetables from the *Terai* (tomatoes and aubergines) are grown as summer vegetables in the mid-hills. Temperate vegetables (cauliflowers, cabbages, radishes, and carrots, etc) are grown in the high hills during summer as off-season crops. With the improvement of the north-south transportation system, these main season and off-season vegetables are supplied to urban areas all year round. The highlands are also ideally suited for vegetable seed production.

The statistics available provide the regional distribution of the aggregate area under vegetable production. The total area has increased steadily from 82,000 ha in 1975 to about 144,368 ha in 1996, with growth rates of about 76 and 225 per cent respectively. The highlands currently account for about 41 per cent of the country's total area under vegetables (Table 3.20).

due to the lack of proper harvest management. This situation leads to a glut in the market and prices fall. During the off season when vegetable supplies are in short supply, prices peak. Steps to stabilise prices through harvest and supply management become necessary in order to protect both farmers and consumers. In the highland areas the lack of adequate transportation and storage facilities, together with the lack of producer organization, severely limit the prospects for vegetable production on a commercial scale as well as export to urban and lowland markets.

Volume and Magnitude of Flow

Precise estimates of the vegetable flow from highland to lowland areas are not available. Kathmandu is the main market centre consuming the bulk of the vegetables imported from both the hill and *Terai* districts, including India. Information was obtained from the Kalimati vegetable wholesale market to assess the annual volume of vegetables going to Kathmandu, the largest urban centre in Nepal.

Table 3.20: Area and Production of Vegetables in the Mountains and Hills by Development Region (1995/96)

	Area (ha)	%	Prod (Mt.)	%	Yield (kg/ha)
E. Region	10795	18.23	88924	16.09	8238
C. Region	27273	46.07	280244	50.70	10276
W. Region	9274	15.67	84452	15.28	9106
MW. Region	8962	15.14	74782	13.53	8344
FW. Region	2898	4.90	24391	4.41	8416
Highlands	59202	100.00	552793	100.00	9337
Nepal	144368		1327298		9194
% Highland	41.01		41.65		

Source: Agricultural Statistics Division, Ministry of Agriculture (1996/97)

Perishability and Seasonality Characteristics

During the harvest season there is always an excess supply of vegetables

According to the experts on vegetables, Nepal is almost self sufficient in vegetable production, except for some vegetables, such as pointed gourd, of which the

cultivation in Nepal has not yet begun on a commercial scale. Demand for other seasonal vegetables is almost entirely met through domestic production, some of which is carried out in the highland areas neighbouring Kathmandu.

Table 3.21 shows the monthly volume of different types of vegetables coming in from the highland and *Terai* districts. About 107 thousand metric tonnes of vegetables were marketed through the Kalimati wholesale market in 1996/97. Of this, about 45 per cent (47,972 MT, Table 3.22) came from the highland areas of Kathmandu Valley (Kathmandu, Lalitpur, Bhaktapur) and neighbouring districts of Dhading, Kabhre, Nuwakot, Makawanpur, Gorkha, and Tanahu. The remaining 55 per cent came from lowland districts (Chitwan, Bara, Parsa, Rautahat, Siraha, Sunsari, Jhapa, and partly from India). In terms of value the highland share is also almost 50 per cent (Rs 526,169,093).

The accessibility (physical link) largely conditions the flow of vegetables from the highland to the lowland markets. The vegetable flow from the highlands is high in those areas that are connected by roads. However, the exact volume of vegetables flowing from the highlands to the lowlands among the major north-south road corridors is not available. While areas, which have motorable roads and access to markets, have received priority for vegetable programmes, little attention has been paid to support the facilities needed for efficient marketing of vegetables.

Vegetable Marketing and Distribution Channel

A proper understanding of the market structure, marketing channels, and its functions is essential to understand the factors governing the vegetable flow from highlands to lowlands and urban market centres. There are two types of vegetable market. The first is the producer supply market or collection centre.These are usually located near production pockets. Producers or middlemen bring vegetables to such markets for sale to wholesalers. The second type of market is the consumer market, and these are usually located near major urban centres. Wholesalers and commission agents supply vegetables from collection centres to consumption centres.

In the case of the Kathmandu vegetable market, the most common marketing channel for vegetables produced in adjoining districts is from producer to wholesaler to retailer to final consumers. In the case of potatoes, the marketing channel is different. The following types of marketing channel are common for potatoes grown in the highlands.

When potatoes are exported to India, the marketing channel mostly used by growers involves farmers, local wholesalers/assemblers, and Indian assemblers for export to India. The vegetables imported from India are supplied through commission agents who sell them to wholesalers in the Kathmandu market.

Farmer- wholesaler – retailer- consumer.
Farmer- cold storage – wholesaler - retailer- consumer.
Farmer- assembler - wholesaler – cold storage - retailer- consumer.

Table 3.21 Monthly Volume of Vegetables and Fruit in Kalimati Wholesale Market (Kathmandu) by Sources of Supply (2053)

Unit in MT

	Kathmandu	Lalit-Bhaktapur	Dhading	Makawanpur	Kavre	Nuwakot	Gorkha/Tanhun	Total Hill District	Chitwan Nawal parasi	Bara Parsa	Rautahat	Sarlahi	Sunsari	Jhapa	Other	Total
Shrawan	55.0	62.5	489.0	352.0	1097.0	417.0	201.0	2673.5	860.1	1185.0	397.0	362.0	643.0	178.0	1447.0	7745.6
Bhadra	55.4	47.2	380.3	3014.0	1044.0	530.0	194.0	5264.9	578.0	978.0	280.0	259.0	602.0	514.0	1569.0	10044.9
Ashwin	128.9	46.1	563.3	731.0	915.0	614.0	253.0	3251.3	536.0	1019.0	307.0	255.0	567.0	497.0	1453.0	7885.3
Kartik	113.8	55.6	904.0	662.0	1163.0	1054.2	350.0	4302.6	450.0	1022.0	217.0	168.0	421.0	522.0	1280.0	8382.6
Mangsir	148.5	69.7	972.2	1384.0	1484.0	1074.0	448.0	5580.4	340.0	1265.0	196.0	183.0	376.0	400.0	1602.0	9942.4
Poush	98.8	106.4	902.0	907.0	1697.0	1368.0	614.0	5693.2	764.0	764.0	1886.0	369.0	523.0	373.0	275.0	10647.2
Magh	108.6	119.6	765.0	660.0	1730.0	916.0	121.0	4420.2	779.1	1957.0	467.0	572.0	408.0	249.0	1949.0	10801.3
Falgun	108.8	117.1	839.0	696.0	1699.0	725.0	261.0	4445.9	1086.0	2052.0	528.0	161.0	366.0	289.0	2146.0	11073.9
Chaitra	107.1	113.7	926.1	529.0	1551.0	418.0	289.0	3933.9	773.0	1691.0	273.0	405.0	349.0	286.0	2146.0	9856.9
Baisakh	na	Na	na	na	na	na	Na	na	na	na	na	na	na	na	na	na
Jestha	230.4	479.2	1052.1	695.1	1584.0	785.9	112.3	4938.8	1621.3	2295.2	530.5	1125.7	258.1	299.9	2738.3	13807.8
Ashad	na	Na	na	na	na	na	Na	na	na	na	na	na	na	na	na	na
Total	1155.3	1217.1	7793.0	9630.1	13964.0	7902.1	2843.3	44504.8	7787.5	14228.2	5081.5	3859.7	4513.1	3607.9	16605.3	100188.0
%	1.15	1.21	7.78	9.61	13.94	7.89	2.84	44.42	7.77	14.20	5.07	3.85	4.50	3.60	16.57	100.00

Source: Kalimati Whoslesale Project 1998

Table 3.22: Total Inflow of Vegetables to the Kalimati (Kathmandu) Wholesale Market

	Commodities	Volume (kg)	Price	Value (Rs)	Hills Share in supply		percent	
					Volume	Value	Volume	Value
1	Tomato (small)	5984500	14.89	89119179	2693025	40103631	6	8
2	Tomato (Large)	4437000	17.50	77647500	1996650	34941375	4	7
3	Potato (red)	13590000	9.08	123442500	6115500	55549125	13	11
4	Potato (White)	13360000	7.58	101313333	6012000	45591000	13	9
5	Onion Dry	9570000	8.83	84535000	4306500	38040750	9	7
6	Carrot	383400	25.60	9815040	172530	4416768	0	1
7	Cabbage	6307700	5.17	32589783	2838465	14665403	6	3
8	Cauliflower local	5666800	17.78	100743111	2550060	45334400	5	9
9	Cauliflower Terai	329600	12.86	4237714	148320	1906971	0	0
10	Radish white	3785000	8.33	31541667	1703250	14193750	4	3
11	Radish red	144300	7.20	1038960	64935	467532	0	0
12	Brinjal long	5157323	7.78	40123973	2320795	18055788	5	3
13	Brinjal gland	877000	8.89	7795556	394650	3508000	1	1
14	Cow pea	1954000	12.25	23936500	879300	10771425	2	2
15	Green peas	1818000	13.60	24724800	818100	11126160	2	2
16	French Bean	15559400	13.88	215886675	7001730	97149004	15	18
17	Sword bean	1561000	10.71	16725000	702450	7526250	1	1
19	Bitter Gourd	2011100	15.20	30568720	904995	13755924	2	3
20	Bottle gourd	1656000	7.60	12585600	745200	5663520	2	1
21	Pointed gourd	3711000	18.13	67261875	1669950	30267844	3	6
23	Smooth gourd	1656000	11.50	19044000	745200	8569800	2	2
24	Sponge Gourd	547000	15.70	8587900	246150	3864555	1	1
25	Pumpkin	698000	6.09	4251455	314100	1913155	1	0
26	Squash	896000	5.56	4977778	403200	2240000	1	0
27	Turnip	188000			84600	0	0	0
28	Okra	1320000	11.88	15675000	594000	7053750	1	1
29	Sweet potato	56000	10.25	574000	25200	258300	0	0
30	Barela	240200	10.50	2522100	108090	1134945	0	0
31	Arum	1273000	9.20	11711600	572850	5270220	1	1
32	Christophine	583200			262440	0	1	0
33	Broad leaf Mustard	243550			109598	0	0	0
34	Spinach leaf	202000			90900	0	0	0
35	Cress Leaf	178000			80100	0	0	0
36	Mustard Leaf	124100			55845	0	0	0
37	Fenugreek leaf	3800			1710	0	0	0
38	Onion Greeen	185500			83475	0	0	0
39	Bakalu	4300			1935	0	0	0
40	Yam	343000	18.33	6288333	154350	2829750	0	1
	Total	106604773		1169264652	47972148	526169093	100	100

Source: Kalimati Whoslesale Project 1998

Several studies have computed the share of different actors in the marketing channel for vegetables mostly transported from the *Terai* to the Kathmandu market. These studies show that the retailer's share of the consumer's rupee is higher than that of the wholesalers due mainly to the high physical loss at the retail level, together with the high local transport costs borne by retailers. Packaging, transportation, handling, and management costs do not vary much by crops, which ranged from 12 to 14 per cent of the total marketing cost. Estimates indicate that farmers get only 20 to 25 per cent of the consumer rupee and the balance of 75-

Box: 3.2: Vegetable Production in the Highlands: Lessons from the CEAPRED Vegetable Programme in Dhankuta District

In recent years, many NGOs have been actively involved in disseminating vegetable production technology to different parts of rural Nepal and to some highland areas. The Centre for Environmental, Agricultural, Policy Research, Extension and Development (CEAPRED) is one active NGO whose work in vegetable production in the Kosi Hills has brought significant change to the living standards of several farmers living in the Hele-Basantapur area. The project began in 1990. This story is about the success of vegetable farming through development of producer cooperatives for vegetable production and marketing.

First, farmer groups were organized and a cooperative formed. This helped to reduce transaction costs for input delivery, technology dissemination, and output marketing. The groups formed also raised nominal savings from members on a monthly basis. The accumulated savings were used for lending within groups to provide credit security to the members.

A main feature of this project is the marketing arrangements. A marketing committee was formed and is comprised of seven members from seven cooperatives. This committee purchased a truck to transport vegetables with a bank loan. Having their own transportation means the farmers do not have to depend on middlemen to transport their vegetables from the collection centres to Dharan, Biratnagar, and even Jogbeni—a border town in India.

Farmers transport the vegetables from their farms to collection centres along the road where sorting and repackaging take place. Vegetables are then transported in trucks to the marketing centre. Losses reported due to poor grading, packing, and other factors initially ranged from 10 to 20 per cent but were reduced through improved packing in wooden boxes. The farmers are charged five paisa per kg of vegetables marketed through the collection centre, and the amount collected is deposited as group savings.

The cooperative marketing has helped prevent farmers from being at the mercy of monopsonists. The farm-gate price is usually fixed on the basis of the prices prevailing in Dharan after deducting the costs associated with transportation and losses incurred through transporting and handling,it is usually more than half of the retail *Terai* price. Depending on the vegetables grown, farmers are making 3 to 5 thousand rupees per ropani (72ft by 72ft or 0.075ha) and about Rs 15,000 per household form vegetable sales. Farmers are switching from maize cultivation to vegetable cultivation, as the returns from vegetables are at least six times higher than from food crops. The profitability of vegetable farming has induced farmers to allocate about one fifth of their cultivated land to vegetable cultivation. The land has been systematically withdrawn form maize cultivation.

CEAPRED is currently enaged in similar work in other highland areas; namely, Surkhet, Baitadi, Kabhre, Kaski, and Lalitpur districts. Table 3.23 gives a summary of the vegetable cultivation programme implemented by CEAPRED.

Source: CEAPRED Progress Report 1996

Table 3.23: Data on Vegetable Production Programme Implemented by CEAPRED

Project district	VDCs covered	Area under vegetables (ha)	Producer group formed	Marketable production (MT)	Market value of production (Rs)	Major market centres	Major crops grown
Dhankuta	3	20	51	For consumption			Radish, Carrot, Cabbage, Knolkhol, Spinach, Broccoli, Turnip, Cauliflower, Mustard Spinach
IGPWF	8 Coopera-tives	500 as of 1994	85 (more than 1300 members)	900(5-6 Mt per day for six month)	35 million per year	Dharan, Jogbani, Damak	Beans, Aubergines, Cauliflower Cabbage, Capsicum, Chilli Radishes, Cucumber Tomatoes, Squash, Bitter Gourd, Lady Fingers, Cow Pea s, Peas, Swiss Chard
Surkhet	8	43	38	73	615533	Nepalgunj, Surkhet	
Baitadi	8	30	47	122	1170970	Jhulalghat, Pithoragarh	DO
Kaski	8	179	42	580	7915644	Pokhara, Narayan ghat	DO
Kabhre	8	670	132	3967	5528000	Kathamandu, Tatopani	DO
Lalitpur	45	35	41	122	990608	Lagankhel	DO
Total	2	1043	401	5764	49305000		

Source: Information provided by CEAPRED.

80 per cent is shared by the middlemen. The share of highland farmers may be even less than that of lowland farmers due to poor packaging and higher transport costs.

Information available from highland growers in the eastern belt of Nepal (Dhankuta) indicates that farmers get not more than 50 per cent of the retail price even when producer groups are organized into cooperatives to market their products. This implies that correcting the existing marketing inefficiency through reducing the costs and risks associated with marketing can play an important role in vegetable marketing (See Box 3.2).

Marketing

Vegetable production in the highlands has taken place in an *ad hoc* manner without considering the post-harvest operations and product marketing. Despite the wide scope for promoting commercial vegetable farming in the highlands, a number of production and marketing constraints needs to be addressed to improve the incomes of producers. These problems include shortage of good quality seed, poor irrigation facilities, lack of credit, and shortage of production inputs such as chemical fertilizers. Likewise, infrastructural facilities and support systems, such as integrated market centres, wholesale markets, collection centres, warehouse processing, packaging, and storage facilities are also lacking.

Additionally, as with other highland resource products, marketing information related to prices prevailing in different markets is not made available for producers. Nor have the linkages and coordination among farmer transporters, middlemen or agents, wholesalers, and retailers been institutionalised. Farmers have to bear significant economic losses due to the lack of a support system on post-harvest technologies. A study carried out in selected markets in Nepal in 1991 showed that the physical losses from producers to retail outlets were 23 per cent for tomatoes, 16 per cent for cabbages, and 12 per cent for cauliflowers. The retailers pass on this loss to the producers as well as the consumers. Scope exists to minimise the marketing inefficiency through improving farmer knowledge about post-harvest technologies. The lack of vegetables and fruit processing industries in the area remains the major obstacle to ensuring a fair price for farmers and for economic use of such products in inaccessible areas from where the transport of fresh fruit is difficult (SAPPROS 1998).

Fruit

Spatial Distribution

Like vegetables, there is a variety of fruit cultivated in Nepal, owing to the wide variations in altitude and climate. Fruit grown in Nepal can be broadly grouped into citrus, winter (deciduous), and summer (tropical) fruit. Ecologically, the mountain and hill regions are relatively more suitable for citrus and deciduous fruit farming. Mandarin orange, sweet orange, lime, and lemon constitute the major citrus varieties grown in highland areas, whereas apples, pears, walnuts, peaches, apricots, persimmons, and pomegranates are the main winter fruit varieties (deciduous) grown in the highlands.

Oranges fetch good income for highland farmers

Likewise, mangos, bananas, guavas, papayas, jackfruit, pineapple, and litchis are the main summer (tropical) varieties grown in the lowlands. Oranges, or citrus in general, and apples are important on a commercial scale in the highlands. Keeping in mind the favourable climatic conditions for horticultural[5] development, HMG has launched a horticultural development programme in different parts of the country.

Table 3.24 summarises the trends in the area and production of citrus and non-citrus fruit in the country (1993/94 -1996/97) and other details are given in Table 3.25. The Table (3.24) shows that the total area under fruit (both citrus and non-citrus) increased by 11 per cent and the total production of fruit by 22 per cent between 1993/94 and 1996/97. During this period, the area and production of citrus grew by about 18 and 22 per cent respectively, whereas the area and production of non-citrus increased by less than 12 per cent. Currently, citrus accounts for about 22 per cent of the total fruit cultivation area in the country (42,285 ha in 1996/97) and the remaining 78 per cent is used for winter/deciduous fruit (22%) and summer /tropical fruit (56%). Highlands contributed about 58 per cent of the country's total fruit production and areas and almost 60 per cent of the total fruit areas. Excluding summer fruit, which is mostly (70% of the total area) grown in the *Terai*, highlands by far produce most of the citrus and deciduous winter fruit in the country (Table 3.26).

Table 3.27 summarises the percentage distribution of area and production of different fruit grown in the highlands by development regions. Within the highland area, the CDR ranks first in terms of both area and production of fruit followed by the WDR and EDR, respectively. These three development regions together contributed more than 75 per cent of the highland's total fruit production,

Table 3.24: Changes in the Area and Production of Varieties of Fruit in Nepal

	Citrus		Winter (deciduous)		Summer (tropical)		Overall	
	Area (ha)	Production (MT)	Area (ha)	Production (MT)	Area (ha)	Production (MT)	Area (ha)	Production (MT)
1993/94	7899	76471	8632	72876	21377	228564	37946	352290
1996/97	9330	92994	9402	81640	23553	253591	42285	428225
Annual growth	5.71	6.74	2.89	3.86	3.28	3.52	3.67	6.72
% change	18.12	21.61	8.92	12.03	10.18	10.95	11.43	21.55

Source: Agricultural Statistics Division, Ministry of Agriculture (1996/97)

[5] Horticulture in this usage refers to the cultivation of fruit (and also vegetables) for market sales (market gardening).

Table 3.25: Trends in Area, Production and Yield of Fruit Varieties in Nepal

	Total Area (ha)	Productive Area (ha)	Production (MT)	Yield (MT/ha)
Citrus				
1993/94	13544.44	7899	76471	9.68
1994/95	14628.69	8488	83375	9.82
1995/96	15243.59	8977	88635	9.87
1996/97	15923.59	9330	92994	9.97
Winter Deciduous)				
1993/94	12055.16	8632	72876	8.44
1994/95	12361.55	8670	75231	8.68
1995/96	12869.97	9137	78267	8.57
1996/97	13261.1	9402	81640	8.68
Summer (Tropical)				
1993/94	30591.51	21377	228564	10.69
1994/95	31999.08	22287	239682	10.75
1995/96	32846.44	22894	200588	8.76
1996/97	33734.28	23553	253591	10.77
Overall				
1993/94	56191.11	37946	352290	9.28
1994/95	58989.32	39445	398288	10.10
1995/96	60960	41008	367490	8.96
1996/97	62918.97	42285	428225	10.13

Note: Productive area includes area of fruit bearing trees only.
Source: Agricultural Statistics' Division, Ministry of Agriculture (1996/97)

Table 3.26: Percentage Distribution of Area (ha) and Production (MT) of Different Types of Fruit Grown in the Highlands (1996/97)

Development Region	Citrus		Winter Fruits		Summer Fruits		Overall	
	Area	Prod.	Area	Prod.	Area	Prod.	Area	Prod.
Eastern	27.61	25.46	20.00	20.34	21.60	22.03	23.11	22.75
Central	30.07	29.26	24.37	25.22	26.26	26.29	26.89	27.05
Western	28.64	28.23	19.33	19.28	31.22	32.12	25.88	26.46
Mid Western	11.53	10.00	22.36	21.64	15.06	13.95	16.55	15.00
Far Western	2.15	7.06	13.94	13.52	5.86	5.61	7.57	8.74
Overall	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Total	8796	92622	9377	81513	6966	74332	25139	248467
Fruit Type Share (%)	34.99	37.28	37.30	32.81	27.71	29.92	100	100

Source: Agricultural Statistics' Division, Ministry of Agriculture (1996/97)

the rest being contributed by the Mid Western (15%) and Far Western regions (9%). Also note that citrus alone contributed about 37 per cent of the highland's total fruit production in 1996/97; winter fruit contributed 33 per cent and summer fruit 30 per cent.

Several fruit development programmes and projects have been launched. They are listed below.

- The national priority programme for the commercial development of citrus fruit in several districts.
- A horticultural development project to promote fruit production techniques for sweet oranges, grapes, and chestnuts (since 1986) through the horticultural research and training station in Kirtipur.
- A hill-fruit development project has been implemented since 1988 in

Table 3.27: Regional Distribution of Productive Area and Production of Citrus in Nepal (1996/97)
Unit: Area in Ha & Production in MT

Regions	Oranges		Sweet Oranges		Lime		Lemon		Others		Total		Regional Share	
	Area	Prod.	Area	Prod.	Area	Prod.	Area	Prod.	Area	Prod.	Area	Prod.	Area	Prod.
Eastern	1423	15526	240	2542	630	4572	122	813	14	126	2429	23579	26.0	25.4
Mountains	236	2171	30	293	83	552	39	193	1	9	389	3218	4.2	3.5
Hills	1187	13355	210	2249	547	4020	83	620	13	117	2040	20361	21.8	21.9
Terai														
Central	1044	10814	1212	13285	341	2632	58	422	16	141	2671	27294	28.6	29.4
Mountains	154	1325	25	225	51	430	15	101	2	18	247	2099	2.6	2.3
Hills	877	9385	1187	13060	284	2159	38	291	12	109	2398	25004	25.7	26.9
Terai	13	104			6	43	5	30	2	14	26	191	0.3	0.2
Western	1870	20696	137	1314	370	2627	121	1354	34	285	2532	26276	27.1	28.3
Mountains											0	0	0.0	0.0
Hills	1859	20580	137	1314	369	2620	120	1347	34	285	2519	26146	27.0	28.1
Terai	11	116			1	7	1	7			13	130	0.1	0.1
Mid western	735	7068	73	671	140	980	49	397	20	163	1017	9279	10.9	10.0
Mountains	14	147									14	147	0.1	0.2
Hills	721	6921	73	671	137	959	49	397	20	163	1000	9111	10.7	9.8
Terai					3	21					3	21	0.0	0.0
Far Western	346	3246	166	1728	107	825	59	613	13	124	691	6536	7.4	7.0
Mountains	47	376	10	90	8	49					65	515	0.7	0.6
Hills	299	2870	156	1638	99	776	59	613	13	124	124	6021	1.3	6.5
Terai														
NEPAL	5418	57350	1828	19540	1588	11636	409	3599	97	839	9340	92964	100.0	100.0
Highlands	5394	57130	1828	19540	1578	11565	403	3562	95	825	8796	92622		
% Highland	99.56	99.62	100.0	100.0	99.37	99.39	98.53	98.97	97.94	98.33	94.18	99.63		

Source: Agricultural Statistics' Division, Ministry of Agriculture (1996/97)

various hills districts of the eastern development region for citrus fruit development.

Despite these efforts, the expansion of fruit farming on a commerical scale in Nepal and in the hills in particular has been severely limited by lack of roads and storage and marketing facilities. Consequently, commercial fruit growing has been developed in accessible areas, particularly along the roads and near urban areas.

Perishability and Seasonality

Fruit crops are not only bulky and highly perishable but their production is also seasonal (production characteristics) and poses a variety of marketing problems. To avoid loss in weight and rotting, fruit has to be disposed of as early as possible through proper packing, transport, cold storage and handling. The lack of adequate facilities (transportation, storage, and others) creates difficulties in marketing fruit, which forces farmers to sell their produce mostly to middlemen at very low prices. While farmers are good producers, they are poor sellers because they are not organized to carry out marketing (Banskota 1993). There are no regulated and organized wholesale markets for fresh fruit, and this may be the reason why fruit production from highland areas is below potential. Large quantities of fruit rot annually in many inaccessible highland areas.

Volume and Magnitude of Flow

Kathmandu is the main market centre, consuming the bulk of the fruit imported from both the hill and *Terai* districts and from India. Because it can be an ideal place to assess the nature and volume of flow of fruit, information was obtained from the Kalimati wholesale market. Table 3.28 shows the monthly volume of different types of fruit coming from the highland and *Terai* districts. In 1996/97, about 6,760 metric tonnes of fruit were marketed in the Kalimati wholesale market. Of this, it is estimated that

Table 3.28: Sources of Fruit for the Kalimati (Kathmandu) Wholesale Market (2053)

Month	Hill districts (kg)	*Terai* Districts (kg)	Total (kg)	Highlands Share (%)
Shrawan (Jul/Aug)	54000	0	54000	100.0
Bhadra (Aug/Sept)	104000	4000	108000	96.3
Ashwin (Sept/Oct)	265200	0	265200	100.0
Kartik (Oct/Nov)	776000	0	776000	100.0
Mangsir (Nov/Dec)	1103000	175000	1278000	86.3
Poush (Dec/Jan)	956000	1292000	2248000	42.5
Magh (Jan/Feb)	164000	52000	216000	75.9
Falgun (Feb/Mar)	194000	202000	396000	49.0
Chaitra (Mar/Apr)	184000	356000	540000	34.1
Baisakh (Apr/May)	Na	Na	Na	
Jestha (May/Jun)	503100	375700	878800	57.2
Ashad (Jun/Jul)	Na	Na	Na	
Total	4303300	2456700	6760000	63.7
%	63.66	36.34	100.00	

about 64 per cent came from the hill districts (Kathmandu, Lalitpur, Bhaktapur, Dhading, Kabhre, Nuwakot, Makawanpur, Gorkha, and Tanahu) and the rest from the *Terai* (mainly, Chitwan, Bara, Parsa, Rautahat, Siraha, Sunsari, and Jhapa) and from India. The seasonal nature of the flow of fruit from the highlands to the urban markets can be assessed from the monthly volume of fruit supplies from the hill districts to the Kathmandu wholesale market (Table 3.28). The flow is high during the winter months, the prime season for most highland fruit.

Among other things, physical linkages (transport accessibility) largely condition the flow of fruit from the highland to the lowland markets. Naturally, flow of fruit from the highlands is high in those areas connected by road. However, the exact volume of fruit flowing from different parts of the highlands to the lowlands is not available. Even in organized wholesale markets in Kathmandu, the recorded volume is perhaps underestimated. The estimated volume of fruit coming from the highlands to the Kathmandu wholesale market in 1997 was 4,303 MT or about 10 per cent of the total fruit production in the mountain and hill regions of the CDR.

Marketing and Distribution Channels

The marketing channel for fruit varies according to the type of grower, kind of fruit, and origin. Fruit with a relatively short life, such as mango and banana, is harvested as soon as it matures and is sold mostly to middlemen or commission agents. The fruit grown in the highlands is marketed through a number of channels in which different functionaries are involved. Pre-harvest contractors undertake all the difficulties involved in the marketing of fruit and bear the risk of price fluctuation. Before making a contract, contractors visit the fruit producing areas in the flowering season to assess the crop. Contracts are generally finalised long before fruit reaches maturity and conditions regarding the mode of payment are all settled at this time. Village merchants, apart from acting as pre-harvest contractors, also buy fruit at the production sites and transport it to markets at their own risk and cost. Small growers generally prefer this type of business arrangement. Forwarding agents are involved in arranging the transportation and dispatch to specified traders in different markets. Commission agents sell the produce and charge a certain percentage on the total sale of the value of the commodity. Sometimes commission agents act as wholesalers also. Cooperative societies are also emerging as an important body in fruit marketing. They arrange for packaging, transportation, storage, and sale of products to benefit their members.

The marketing channel adopted for the fruit grower may differ from product to product depending on the fruit, areas of production, and point of consumption (Figure 3.2). The share of the consumer rupee received by the producer is determined by the channels used. In Nepal, no systematic studies have so far been made to estimate the marketing margin of different actors along this marketing chain. However, available information reveals the widespread inefficiency resulting from market imperfections; and these include lack of knowledge about post-harvest technologies and operations (SAPPROS 1998).

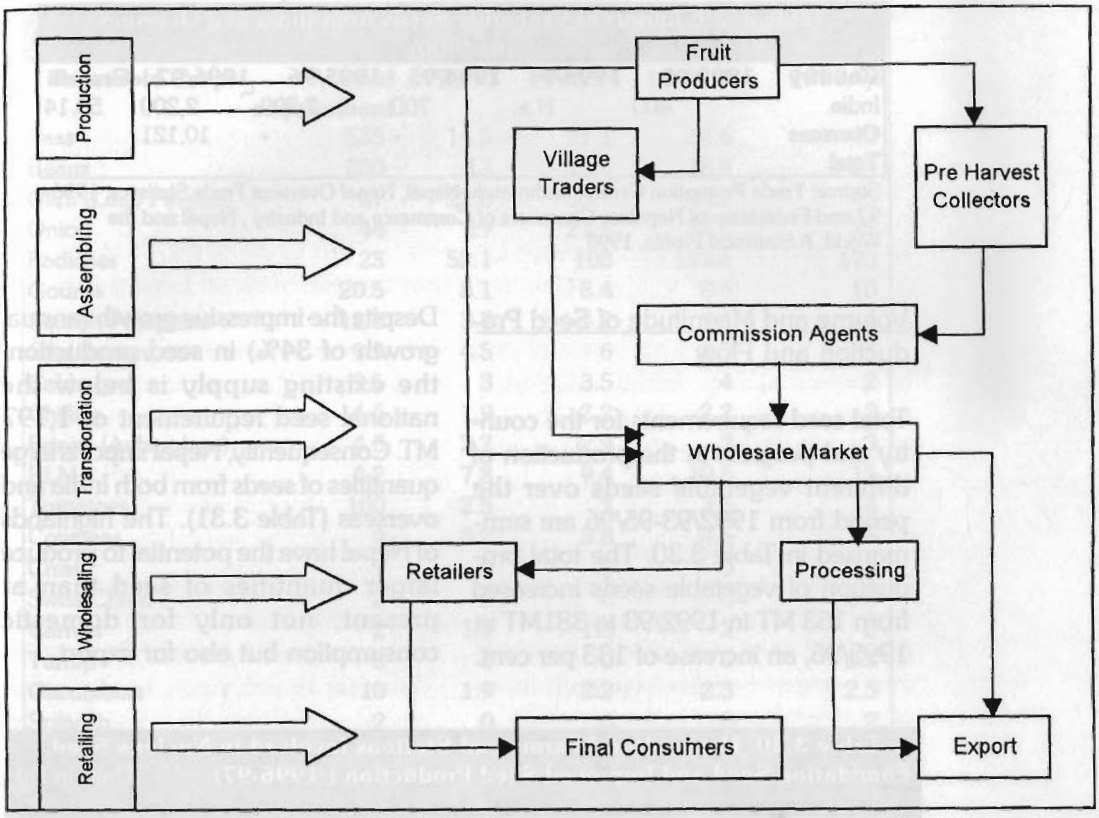


Figure 3.2: The Marketing Channels for Highland Fruit

Vegetable Seeds

Production Pockets

The growing demand for vegetables in the country has resulted in an increasing demand for vegetable seeds. To cater to this demand, vegetable seed production programmes have been launched in different agro-ecological zones. Ecologically, the highlands are ideal for seed production. Since 1981, a HMG/FAO vegetable seed production project has been operating in the country. This project has been able to identify different varieties of vegetables suitable for Nepal and has been providing support to develop the necessary technical manpower. Various seed production pockets in the highlands have been identified and seed development programmes in various farms and stations disseminate to production pockets.

Seeds produced on the horticultural farms are of two types: foundation seeds for further multiplication and improved seeds for sale in commercial production pockets. Improved seeds are handed over to the Agricultural Inputs' Corporation for distribution. Table 3.29 lists various horticultural farms and stations involved in the production of foundation seeds, improved seeds, and nucleus seeds in the country. Horticultural farms and stations produced a total of 296kg of nucleus seeds, 9,994kg of foundation seeds, and 1,722kg of improved seeds in 1996/ 97.

Table 3. 29: Import of Vegetable Seeds from India and Overseas (Rs '000)

Country	1992/93	1993/94	1994/95	1995/96	1996/97	Growth
India	400	N.a.	700	2,300	2,200	53.14
Overseas	-	-	-	-	10,121	-
Total						

Source: Trade Promotion Centre, Kathmandu Nepal, Nepal Overseas Trade Statistics, 1996-97 and Federation of Nepalese Chambers of Commerce and Industry , Nepal and the World: A Statistical Profile, 1998

Volume and Magnitude of Seed Production and Flow

Total seed requirements for the country and progress in the production of different vegetable seeds over the period from 1992/93-95/96 are summarised in Table 3.30. The total production of vegetable seeds increased from 163 MT in 1992/93 to 381MT in 1995/96, an increase of 133 per cent. Despite the impressive growth (annual growth of 34%) in seed production, the existing supply is below the national seed requirement of 1,197 MT. Consequently, Nepal imports large quantities of seeds from both India and overseas (Table 3.31). The highlands of Nepal have the potential to produce larger quantities of seed than at present, not only for domestic consumption but also for export.

Table 3.30: Horticultural Farms and Stations Involved in Nucleus Seed, Foundation Seed and Improved Seed Production (1996-97) (Units in kg)

	Horticultural farms	Nucleus seed	Fountain seed	Improved seed
1	VSCP, Khumaltar	5	1323	223
2	VSPC, Rukum	15	1167	0
3	VSCP, Dadeldhura	4	79	533
4	HC, Sarlahi	0	3848	0
5	HC, Trisuli	0	365	102
6	HC, Palpa	0	418	0
7	HC, Dolakha	0	0.25	0
8	HC, Sindhuli	0	17.3	183.3
9	HC, Solukhumbu	0	53	0
10	HC, Panchkhal	0	110	0
11	HC, Daman	0	315	0
12	HC, Marpha	2	142.5	147.4
13	HC, Dolpa	0	47	81
14	HC, Pokhara	0	325.5	0
15	LAR	0	784.3	0
16	ARC, Dasarathpur	0	0	257.5
17	ARC, Nepalgunj	0	595	0
18	ATRC	270	110	0
19	ARC, Dhanakuta	0	294	195
	Total	296	9993.85	1722.2

Note:
VSPC=Vegetable Seed Production Centre
LAC= Lumle Agricultural Centre
ATRC= Agricultural Tarharae Research Centre
HC= Horticultural Centre
ARC= Agricultural Research centre
Source: Nepal Seed Company 1998

Table 3.31 : Crop-wise Vegetables Seed Production in Nepal

(Units in MTs)

Vegetable Crops	Seed requirement	1992/93	1993/94	1994/95	1995/96
Peas	535	14.5	21.1	34.6	40
Beans	300	13	15.6	18.8	24
Okra (Lady Fingers)	87	22.8	35.7	44.2	45
Onion	44	19	27.1	34.6	25
Radishes	23	52.1	108	159.6	170
Gourds	20.5	8.1	8.4	8.6	10
Squash/Pumpkins	12.3	3.7	4.2	4.2	4
Cauliflowers	9.9	4.5	6	8.3	8
Cabbages	9.5	3	3.5	4	2
Chillies	4.6	1.9	2.2	2.2	2
Brinjal (Aubergines)	4.5	2.2	2.9	3	3
BLM	4.2	7.8	9.4	10.5	15
Tomatoes	100	2.5	3	3.5	4
Cowpeas	4	3.2	3.8	4.5	18
Cress	1	0	0	0	0.5
Swiss Chard	2	0	0	0	0.5
Carrots	2	1.9	1.8	2	2
Turnip	5	0	0	0	0.5
Cucumbers	10	1.9	2.2	2.3	2.5
Spinach	2	0	0	0	2
Broccoli	2	0	0	0	0.5
Coriander	2	0	0	0	0.5
Capsicum	2	0.5	0.7	1	1
Methi (Fenugreek)	10				0.5
Water Melon	1				0.5
Total	1197.5	162.6	255.6	345.9	381

Source: Kalimati Wholesale Project 1998

Issues and Options: Vegetables and Fruit

In the context of vegetables and fruit, the multiple problems related to preservation, processing, distribution, marketing, and retailing need to be improved concomitantly. Lack of cheap and easy transport has led to limited use of products from different highland areas. Lack of markets limits the prospects for farmers and poor facilities limit the benefits they can accrue. Given the poor facilities, farmers lose substantially by having to bear the loss inccurred during transport to urban markets. Additionally, urban consumers also lose, as they have to pay higher prices for products than would otherwise be the case. In the case of vegetables and fruit, the marketing facilities appear to be poor and may be a major factor in the relatively higher prices consumers have to pay and the poor prices farmers receive for their products.

A second issue relates to poor harvest management. During the season, the market is saturated and prices fall and, although this is good for the consumer, it is not good for the producer. Harvest management is essential to stabilise prices and benefits to the farmers.

Besides products that are directly harvested (vegetable and fruit), there are a few activities to process and preserve the products. Processing can help highland areas to generate employment and income. Processing helps convert high-volume products to high-value low-volume products. In remote areas, such as Marpha and Jumla, where apples are cultivated on a large scale, fruit unfit for the table is processed as jam, jellies, dried fruit, brandy, and wine. Processing also helps to manage supplies and stabilise prices.

Most farmers cultivating fruit and vegetables in the highlands are not organized. As the existing marketing system is long and does not benefit the farmers, their involvement in an organized manner by forming farmer cooperatives would help overcome some of the problems. Organization will help strengthen their bargaining positions.

Other issues can be summarised as follow.

- Lack of support systems such as an integrated market centre, wholesale market, collection centre, warehouse, and processing units
- Lack of dissemination of post-harvest technologies to farmers
- Marketing is mostly in the hands of middlemen or commission agents who manipulate the operation and take a major share of the consumer rupee.
- There is no marketing information system to provide farmers with information about the prices prevailing at different stages of marketing and in different markets for different products.
- Linkage and coordination among farmers, carriers, middlemen or agents, wholesalers, and retailers need to be institutionalised.
- Farmers have to bear significant economic losses due to lack of access by farmers to post-harvest technologies as currently large losses are incurred.
- There is no organized effort to establish a cooperative marketing centre in the highlands.
- While areas that have motorable roads and access to markets in the vicinity have received priority for special programmes in vegetable production, there are few facilities for efficient marketing.
- The existing marketing structure limits the prospects for farmers to increase benefits.
- Control of grazing livestock is poor.
- Knowledge of crops and seed yields of various crops and cultivars is limited.
- National programmes do not give this sufficient priority.
- Inadequate training of human resources.
- Lack of knowledge of appropriate production technology
- High risk in investment
- Lack of marketing knowhow vis a vis liberal government import policies
- Lack of proper processing, packaging, and storage facilities

Milk and Dairy Products[6]

Milk

Animal husbandry is an indispensable component of the highland farming system. The highland economy played and continues to play an important role in meeting the growing demand for milk and milk products in the urban areas of the country. The Dairy Development Corporation (DDC), a public sector enterprise, has played an important role in establishing milk-collection centres and chilling centres in Biratnagar, Hetauda, Kath-mandu, Pokhara, and Lumbini and thereby increasing milk production in the country due to an assured, limited market.

Collecting milk from t farms.

Milk Supply Sources

Milk catchment areas are located in different parts of the country and cover a total of 36 hill and *Terai* districts. The supply of milk at the Kathmandu collection centre originates from eight highland districts. In Biratnagar the supply comes from seven districts, three of which are highland districts; in Hetauda from six districts, one of which is a highland district; in Pokhara from eight hill districts; and in Lumbini from seven districts (one hill). Table 3.32 shows the trends in the collection and production of milk over the last five years. Between the fiscal years 2049/2050 and 2053/54 (1993 and 1997), milk collection from all these centres increased by 67 per cent with an average annual growth rate of 14 per cent.

Volume and Magnitude of Milk Flow from the Highlands

The flow milk from the highlands to urban areas and the lowlands is given in Table 3.33. All the milk collected and processed in Kathmandu and Pokhara and, to a great extent (85%), in Biratnagar originates in the highlands, whereas in Hetauda and Lumbini most of the milk is collected from the lowlands. In the fiscal year 2053/4, a total of 58.45 million litres

Table 3.32: Milk Collection in the Fiscal Year 2054/55 (1997/98) by Supply Source

Dairy Centre	Volume of Milk collection (litres)			% Hills
	Hill	*Terai*	Total	
Biratnagar	7409337	1295888	8705225	85.11
Hetauda	268071	12519679	12787750	2.10
Pokhara	2847279	0	2847279	100.00
Kathmandu	23118939	0	23118939	100.00
Lumbini	777214	4646270	5423484	14.33
DPPDC*	1846168	0	1846168	100.00
Total	36267008	18461837	54728845	66.27

* Dairy Products Production and Distribution Centre
Source: Dairy Development Corporation 1998.

[6] We are very grateful to Mr. Arun Shrestha, Chief Technical Officer of the Dairy Development Board, for providing us with all the information used in this section.

Table 3.33 : Trends in Collection, Production and Distribution of Milk by Dairy Centre (100,000 litres)

Projects	2050	2051	2052	2053	2054	% Change	Av. Growth
Kathmandu							
Collection	114.16	152.57	156.8	196.06	234.53	105.44	19.72
Production	341.88	396.59	417.37	453.64	475.5	39.08	8.60
Biratnagar							
Collection	62.05	63.68	75.64	80.31	86.12	38.79	8.54
Production	55.61	57.79	70.76	98.06	109.52	96.94	18.46
Hetauda							
Collection	101.77	103.08	113.23	147.56	152.13	49.48	10.57
Production	89.08	81.11	87.23	89.66	89.6	0.58	0.15
Pokhara							
Collection	25.71	32.14	33.47	34.34	33.82	31.54	7.09
Production	34.2	40.24	45.24	47.15	49.71	45.35	9.80
Lumbini*							
Collection	31.74	34.95	46.39	65.71	58.36	83.87	16.45
DPPD Project							
Collection	13.82	13.67	7.15	15.5	19.61	41.90	9.14
Total							
Collection	349.25	400.09	432.68	539.48	584.57	67.38	13.74
Production	520.77	575.73	620.6	688.51	724.33	39.09	8.60

* Collected milk supplied to Kathmandu due to the lack of dairy facilities
Source: Dairy Development Corporation 1998

of milk was collected and about two thirds (387.3700,000 litres) were estimated to have come from the highlands and the rest from the lowlands (*Terai*) (Table 3.34).

Table 3.34: Estimated Volume of Milk Collected from the Highlands (2053/54)

(Unit in 100, 000 litres)

Dairy Centre	Total	Highland
Kathmandu	234.53	199.6171
Biratnagar	86.12	1.805343
Hetauda	152.13	152.13
Pokhara	33.82	33.82
Lumbini	58.36	8.363297
Milk products	19.61	19.61
Total	584.57	387.3753

Benefit to Milk Producers

It cost the DDC about Rs 923.04 million to collect milk in the fiscal year 2053/54. Of this amount, 94 per cent (Rs 864.5 million) was actually paid to the farmers (Rs 760.7 million for milk purchase) and their cooperative associations (Rs 103.7 million as a lump sum commission for the milk collection, transportation, and institutional overheads). With 89,000 farmers currently involved in supplying milk, it is estimated that each farmer receives, on an average, Rs 10,000 annually from milk. This also implies a daily income of Rs 2,369,000 accruing to milk-producing households. Considering that about two thirds of these dairy farmers reside in the highlands, the income generated from milk is substantial. The magnitude can also be judged from the distribution of milk in urban areas. As can be seen from Table 3.35, a total of 569.700,000 litres of milk was consumed in urban areas in 2053/54,

Table 3.35: Trend in the Distribution of Milk (litres)

Projects	2050	2051	2052	2053	2054	Price (litres)	2054 Value in Rs	%
Kathmandu	31955585	36422938	38860983	42902220	44921617	18	808589106	79.452
Biratnagar	2576771	1918494	2486671	2583675	3661911	17	62252487	6.117
Hetauda	316534	3286641	382628	3895815	4225362	17	71831154	7.058
Pokhara	2404853	2776561	3419097	3816201	4163256	18	74938608	7.363
Lumbini	32622	14075	17718	20050	5847	17	99399	0.010
Total	37288415	44420760	45169149	53220014	56980047		1017710754	100.000

Source: Dairy Development Corporation 1998

which is equivalent to Rs 1017.6 million based on the prevailing price of milk in the different regions. Note that private dairies have also emerged, but information on their collection and distribution is not available.

Milk Marketing and Distribution

Currently five dairy centres are operating in Kathmandu, Biratnagar, Hetauda, Pokhara, and Lumbini. Each of these centres has their own chilling plant. Milk is collected through a network of Milk Producer Cooperative Associations/ Cooperative Societies (MPCAs/CSs). MPCAs/CSs receive a fixed commission from the chilling centres based on the fat content in the milk supplied to them. The commission covers marketing costs involved in collecting milk from the farmers and transporting it to the centres and overheads for operation of the cooperatives. The number of chilling plants and their cooperative networks varies from centre to centre depending on the size of their catchment areas. So far, there are 43 chilling centres and 907 MPCAs/CSs operating throughout the country. The growth in number of chilling centres and producers' association/ cooperatives under each dairy centre over the last five-year period (2049/ 2050-2053/2054) is summarised in Tables 3.36 and 3.37. Figure 3.3 The Milk Marketing Channel in Nepal.

Dairy Products

Apart from milk, other dairy products are marketed by the five production centres. These products include cheese, butter, ghee, yogurt, and ice-

Table 3.36: Number of Chilling Centres by Dairy Project Region

Projects	049/50	050/51	051/52	052/53	053/54	Growth rate
Kathmandu	10	10	10	10	11	2.41
Biratnagar	7	8	8	9	8	3.39
Hetauda	8	9	9	11	11	8.29
Pokhara	5	5	5	6	6	4.66
Lumbini	6	6	6	7	7	3.93
Milk Products & Distri	1	1	1			
Total	37	39	39	43	43	3.83

Source: Dairy Development Corporation 1998

Table 3.37: Number of Cooperatives by Dairy Project Region						
Projects	**049/50**	**050/51**	**051/52**	**052/53**	**053/54**	**Growth rate**
Kathmandu	237	268	264	345	345	9.84
Biratnagar	101	105	105	119	116	3.52
Hetauda	184	201	205	229	231	5.85
Pokhara	93	96	104	95	100	1.83
Lumbini	73	77	84	89	90	5.37
Milk Products & Distri	8	8	10	28	25	32.96
Total	696	755	772	560	907	6.84

Source: Dairy Development Corporation 1998

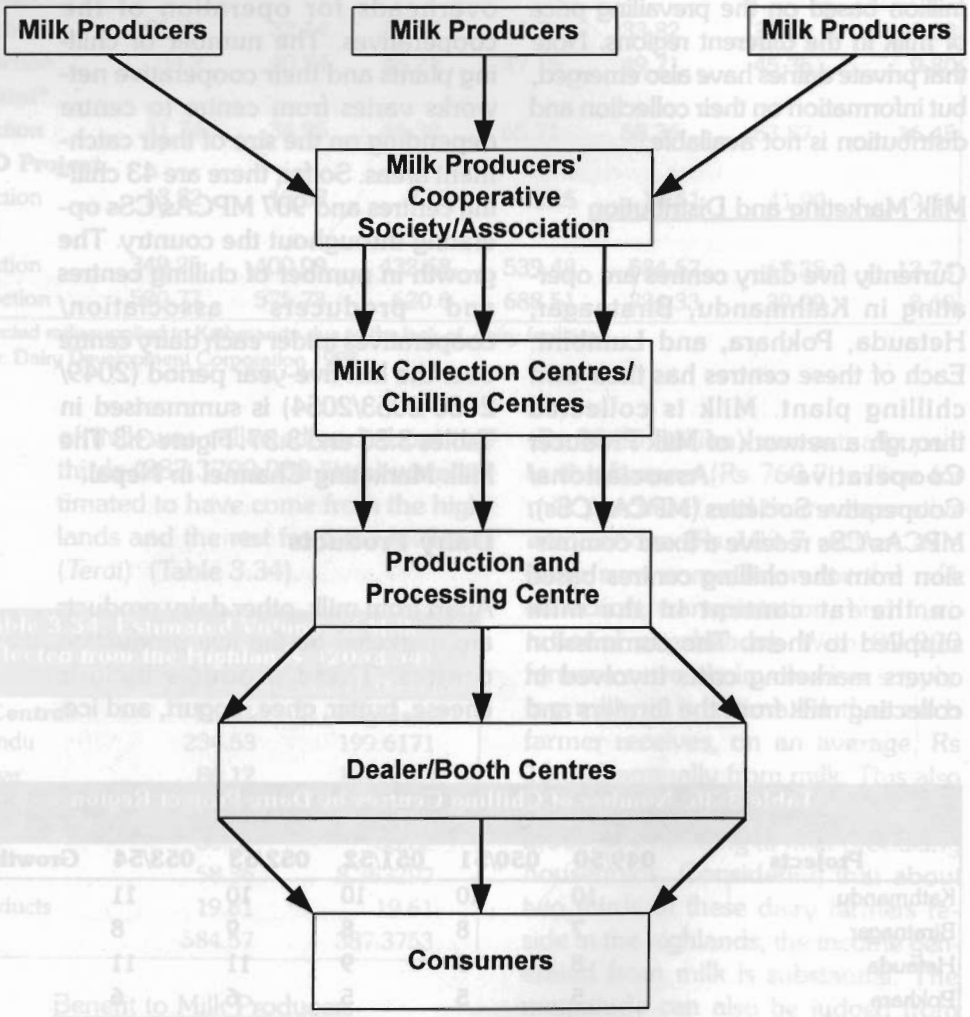


Figure 3.3: Marketing and Distribution Channel for Milk

cream. There are currently 12 cheese production centres (of which six are located in the high mountains) operating in different parts of the country. These cheese production centres collect milk from the network of 25 milk producer cooperative associations (Table 3.38). Table 3.39 summarises the trend in production of dairy products over the last five years.

Table 3.38: Number of Cheese Production Centres

	Cheese Factory	Sub-centre	Cooperative
Kavre	1	0	7
Rasuwa	2	8	0
Solukhumbu	1	4	0
Ramechhap	1	4	0
Dolakha	2	5	0
Illam	2	0	8
Panchthar	3	0	10
Total	12	21	25

Source: Dairy Development Corporation 1998

Table 3.39: Trends in Production of Dairy Products

Butter Production (kg)					
Dairy Distribution Projects	2050	2051	2052	2053	2054
Kathmandu	632746	743756	572889	667947	684125
Biratnagar	80292	57357	186149	329860	271494
Hetauda	134584	99042	129910	188804	204205
Pokhara	65295	83265	131527	123880	98759
Cheese centre	40704	32638	20796	22446	26436
Total	953621	1016058	1041271	1332937	1285019
Cheese Production(Kg)					
Biratnagar	69960	66740	67099		
Pokhara	10534	2153	2766	2166	2675
Milk product project	105285	96644	64144	134395	172088
Total	185779	165537	134009	136561	174763
Ghee Production(Kg)					
Biratnagar		76385	75637	128458	201062
Hetauda	58177	71772	81568	271077	223451
Pokhara	105586	94326	102384	153294	193998
Milk product project	44092	99317	37748	66849	111247
Total	162937	155662	110718	42559	96648
Ice-cream Production(litre)					
Biratnagar	2000	2302	3302	1799	1125
Hetauda	1031	1078	2170	5399	6812
Pokhara	4253	7732	12733	5618	4628
Lainchaur	20837	18281	20981	17575	12912
Total	162937	155662	110718	42559	96648

Source : Dairy Development Corporation 1998

Human Resources: Migration

Both seasonal and permanent migration taking place from the highlands to lowland and urban areas are believed to be substantial in Nepal. The NLSS data can be examined to provide a preliminary estimate of the scale of migration. The NLSS survey asked households heads if they had ever migrated for work or to settle land and if so where had they migrated from and age at migration.

In total 447,609 or about 12 per cent of all household heads indicated they had ever migrated. Of these 62 per cent reported they had migrated from the hills and 24 per cent reported they had migrated from the *Terai*. When the highlands are considered (hills and mountains), the percentage reporting migration is 71 per cent (Table 3.40). Additionally, about five per cent of all household heads reported they had migrated from India.

The inter-ecological belt migration flow is also provided in Table 3.40. It can be observed that about one per cent of household heads reported migration within the mountain region. There were no household heads reporting migration from the hills and *Terai* to the mountain region, although a small per cent of household heads in the mountains reported they had migrated from India/Others.

Table 3.40: Household Heads Reporting Place of Migration, Present Residence and Region

		Household Heads Migrated from				
		Mountains	Hills	*Terai*	India/ Others	Nepal
Household Heads Migrated To	Mountains	5567	0	0	1820	7387
	Hills	4190	88446	6362	0	98999
	Terai	31483	187698	99816	22227	341224
	Nepal	41240	276145	106178	24047	447609
		Percentage of Total				
	Mountains	1.24	0.00	0.00	0.41	1.65
	Hills	0.94	19.76	1.42	0.00	22.12
	Terai	7.03	41.93	22.30	4.97	76.23
	Nepal	9.21	61.69	23.72	5.37	100
		Percentage of Column Total				
	Mountains	13.50	0.00	0.00	7.57	1.65
	Hills	10.16	32.03	5.99	0.00	22.12
	Terai	76.34	67.97	94.01	92.43	76.23
	Nepal	100.00	100.00	100.00	100.00	100.00
		Percentage of Row Total				
	Mountains	13.50	0.00	0.00	24.63	100
	Hills	4.23	89.34	6.43	0.00	100
	Terai	9.23	55.01	29.25	6.51	100
	Nepal	9.21	61.69	23.72	5.37	100
Total Reporting		Migration Yes (%)		Migration No (%)		Total Cases
		12.28		87.72		3646018

Source: Computed from NLSS data

Migration from the mountains to the hills is also not very high (0.94%), while migration within the hills was reported by almost 20 per cent of household heads. Also migration does not appear to be significant from the *Terai* to the hills where only a small percentage reported such (1.42%).

Migration from the mountains and hills to the *Terai* is highest. From the mountains seven per cent of household heads reported having migrated to the *Terai*, while from the hills this was about 42 per cent. Households were also found migrating within the *Terai* as reported by 22 per cent of the household heads from the *Terai*. Households also reported some migration (5%) from India to the *Terai*. Other details may be observed in Table 3.40.

The migration reported by household heads is largely from the rural areas (89%) and a small percentage also reported (10%) migration from urban areas (Table 3.41). From the hills about 11 per cent reported migration to urban areas, and the remaining 89 per cent reported migration to rural areas. The distribution of migrating household heads within the ecological belt is largely dominated by hill household heads (61-67%), followed by those from the *Terai* (22-24%).

Among the migrating household heads, about 37 per cent were between 20-30 years of age, followed by those who were below 20 years of age. Then progressively the percentage migrating decreases with the age of the household head. Other details are provided in Table 3.42.

Table 3.41: Household Head Reporting Place of Migration by Present Residence and Urban- Rural

Household Heads Migrated To		Household Heads Migrated from				
		Mountains	Hills	*Terai*	India/ Others	Nepal
	Urban	4190	33024	10867	895	48976
	Rural	37050	243121	95311	23152	398634
	Nepal	41240	276145	106178	24047	447610
	Percentage of Total					
	Urban	0.94	7.38	2.43	0.20	10.94
	Rural	8.28	54.32	21.29	5.17	89.06
	Nepal	9.21	61.69	23.72	5.37	100
	Percentage of Column Total					
	Urban	10.16	11.96	10.23	3.72	10.94
	Rural	89.84	88.04	89.77	96.28	89.06
	Nepal	100.00	100.00	100.00	100.00	100.00
	Percentage of Row Total					
	Urban	8.56	67.43	22.19	1.83	100.00
	Rural	9.29	60.99	23.91	5.81	100.00
	Nepal	9.21	61.69	23.72	5.37	100.00

Source: Estimated from NLSS data

Financial Resources

Remittances

A substantial amount of income in the form of remittances flows in and out

Table 3.42: Distribution of Household Heads Reporting Migration by Age Group

		Age Group					
		Below 20 yrs	20-30 yrs	30-40 yrs	40-50 yrs	Above 50 yrs	Total
Mountains	Count	6443	15143	7339	8472	3843	41240
	% of Total	1.44	3.38	1.64	1.89	0.86	9.21
Hills	Count	74490	85580	65611	29707	20756	276144
	% of Total	16.64	19.12	14.66	6.64	4.64	61.69
Terai	Count	27301	56640	11251	6223	4763	106178
	% of Total	6.10	12.65	2.51	1.39	1.06	23.72
India/Others	Count	9589	6653	4858	2360	587	24047
	% of Total	2.14	1.49	1.09	0.53	0.13	5.37
Total	Count	117823	164016	89059	46762	29949	447609
	% of Total	26.32	36.64	19.90	10.45	6.69	100.00

Source: Estimated from NLSS data.

of the different regions of the country. The NLSS data were examined to estimate the flow of this income. The NLSS asked a specific question whether in the last 12 months anyone from the households had sent money or in kind supplies to someone who was away from home for more than six months. About 10 per cent or 458,264 households reported sending remittances, whereas over a million household heads reported receiving remittances (Tables 3.43 & 3.44).

Of those sending remittances, 33 per cent were in the hills, 61 per cent in the *Terai*, and six per cent in the mountains. In all of the highlands (hills and mountains) 39 per cent sent remittances. Likewise, among those receiving remittances, about 44 per cent were in the hills and 50 per cent in the *Terai*. In the mountains, the proportion of household heads reporting sending and receiving remittances was six per cent in both cases.

Table 3.43: Mean Remittance Sent (Rs), Number and Total Amount Sent by Recipient

Donor Lives in		Recipient Lives in				
		Mountains	Hills	*Terai*	India/Other	Total
Mountains	Mean (Rs)	2005	4599	4349	4000	3075
Hills	Mean (Rs)	2738	6408	9258	13545	7042
Terai	Mean (Rs)	0	10618	3672	2081	4201
Total	Mean (Rs)	2035	7159	4218	3228	5077
Mountains	Number	14555	6636	3797	671	25658
Hills	Number	614	123926	21985	5005	151530
Terai	Number	0	31821	203773	45482	281076
Total	Number	15168	162383	229555	51158	458264
Mountains	Sum (Rs)	29181554	30514534	16512270	2683960	78892318
Hills	Sum (Rs)	1680600	794092200	203532871	67797248	1067102919
Terai	Sum (Rs)	0	337863157	748177067	94669784	1180710008
Total	Sum (Rs)	30862154	1162469891	968222208	165150992	2326705245

Source: Estimated from NLSS data

Table 3.44: Mean Remittance Received (Rs), Number and Total Amount Received by Recipient

Recipient Lives in		Donor Lives in				
		Mountains	**Hills**	***Terai***	**India/Other**	**Total**
Mountains	Mean (Rs)	2877	7871	4674	10584	6519
Hills	Mean (Rs)	12770	13653	9050	21305	16963
Terai	Mean (Rs)	16515	7168	7142	11101	8710
Total	Mean (Rs)	5208	11240	7336	16227	12192
Mountains	Number	23788	19491	6277	17687	67243
Hills	Number	2369	206638	34588	222843	466438
Terai	Number	3321	106341	218716	201320	529698
Total	Number	29478	332470	259581	441850	1063379
Mountains	Sum (Rs)	68434135	153409581	29340320	187197210	438381245
Hills	Sum (Rs)	30250204	2821133336	313005413	4747787414	7912176367
Terai	Sum (Rs)	54850180	762267004	1561973819	2234818467	4613909470
Total	Sum (Rs)	153534519	3736809921	1904319551	7169803091	12964467082

Source: Estimated from NLSS data

The mean values of the remittances sent and received were Rs 5,077 and Rs 12,192 respectively. In other words, the mean value of remittances received was more than double the mean value of remittances sent by households.

The mean remittances sent and received were highest in the hills followed by the *Terai*. In both the mountains and *Terai*, the mean value of remittances received is more than double the mean value of remittances sent. In the hills, the mean value received (Rs 13,653) is about 2.13 times higher than the mean remittance sent (Rs 6,402).

It is also interesting to observe that 50 per cent of the remittances sent are to the *Terai*, followed by the hills (35%) and India/others (11%). In terms of remittances received, almost 42 per cent originate in India/Others, 31 per cent originate in the hills, 24 per cent in the *Terai*, and about three per cent in the mountains.

The total value of remittance transfer is also provided in the Table. In aggregate, the total value of remittances received is nearly six times more than the value of remittances sent, and, in all three regions, the remittances received are greater than the remittances sent.

Of the total households reporting sending remittances, 45,880 (10%) were in urban areas and 412,384 were in rural areas. The mean remittance sent by urban households was Rs 8,387 and that sent by rural households was Rs 4,709. The remittances sent from rural areas accounted for about 83 per cent of the total remittances sent.

Altogether 177,188 (39%) households from the highlands reported sending remittances. In the highlands the average remittance sent was Rs 6,468 and the total sent was Rs 1,145,995,237 or 49 per cent of the total remittance sent by all households. Urban highland households

accounted for 51 per cent of the total highland households sending remittances and the total remittances sent by urban highland households were 51 per cent of the remittances sent by all households. In other words, the remittances sent from highland areas are substantial, accounting for 39 per cent of households sending remittances and 49 per cent of the total remittances sent.

Food Expenditure

The recently completed National Living Standard Survey (NLSS) data provide information that can be used to address the value of different food items that flow from the highlands to urban areas and lowlands. Although it is not possible to say precisely what the exact value of the flow of food items from the highlands to urban and other areas from the highlands is, some idea can nevertheless be provided. At this stage, the data are being cleaned following acquisition from the Central Bureau of Statistics and hence the results are preliminary.

The NLSS provides information for 3,777 households collected from 74 districts. The district and the urban and rural status of the households can also be identified, and hence all households from the highlands can be separated from urban and lowland areas. The food section covers 13 food groups and within each group different food items are identified. Only food for which household reported expenditure is accounted for, food produced and consumed at home is not. In addition, the food expenditure does not account for expenditure on alcohol, tobacco, and tobacco products and items in the miscellaneous food group.

Not all types of food flow from one ecological belt. Some food originates entirely in the highlands, e.g., millet, apples, citrus. Large quantities of milk to most urban centres in east and central Nepal come from the hills. In other regions, the supply of milk from highland areas may be about 20 per cent of the total supply, with lowland areas supplying the bulk. Likewise, part of the supply of mutton to urban areas comes from goats exported from highland areas.

The food groups selected to assess value of food flow from the highlands are classified into three major groups as follow.

1. Food originating almost entirely in the highlands (mountain and hill districts). In this category the foods included are those that have a comparative advantage in the highlands and cannot be grown in the lowlands. The foods include millet, black pulse, citrus fruit, apples, and dried fruit (mostly apples).

2. Food originating partially in the highlands. Some foods in this group originate in the highlands as well as in the lowlands. In the past most of these food items were being supplied from the lowlands and India, but, in recent times, increasing amounts of the items in this category are also coming form the highlands. The foods included in this group include milk, ginger/garlic, green vegetables, cauliflower/cabbage, mutton, and cumin/pepper.

3. Food originating mostly in the lowlands (*Terai*). In this category the supply of food from the highlands is small or negligible, as generally highland areas are not conducive to the produc-

tion of such food groups (opposite of the first group) or, although production takes place currently, the supply from the highlands is small. The items included in this group are eggs, potatoes, tomatoes, other vegetables, buffalo meat, chicken, and chillies.

Table 3.45 provides the number of households reporting the different types of food identified above as percentages of the total. About nine per cent of the households reported consuming food items that originate primarily in the highlands About 19 per cent reported consuming food groups that originate partially in the highlands and 10 per cent reported consuming food groups that originated mostly in the lowlands. Note that, of the nearly 132 different food items, only seven were selected as originating primarily from the highlands.

Different shares have also been calculated for selected food items and are presented in Table 3.46 by ecological regions and the urban or rural status of the households. Of the selected food items about seven per cent of the expenditure occurs in the mountain areas and 51 per cent (urban 12 and rural 39) in the hill regions, giving a combined total share for the highlands of 58 per cent. Rural areas account for 81 per cent of the total expenditure for the selected food items, out of which the rural mountains, hills, and *Terai* account for 7,39, and 35 per cent respectively.

Tables 3.47 to 3.49 provide expenditure on the selected food items and shares of expenditure relative to total food expenditure. In terms of the expenditure shares, the first food group, namely, those originating primarily in the highlands account for three per cent of the total food expenditure by households. Although the shares do not account for large percentages of total food expenditure, in terms of the absolute value this expenditure is about 1.3 billion rupees. Likewise, six per cent of the food expenditure is accounted for by food that partially originates in the highland areas and 5.5 per cent by food that originates mostly in the lowlands.

Table 3.45: Percentage of Households Reporting Food Consumption by Origin of Food

Food Originating Mostly in the Highlands			Food Originating Partially in the Highlands			Food Originating Mostly in Lowlands		
Food Type	Frequency Reporting	% Reporting	Food Type	Frequency Reporting	% Reporting	Food Type	Frequency Reporting	% Reporting
Millet	1406693	1	Milk	2514145	2.4	Potatoes	3488387	3.4
Black Pulses	1569032	1.5	Ginger/garlic	3289886	3.2	Tomatoes	2513057	2.4
Citrus	1960018	1.9	Cauliflower	2320279	2.2	Chilies	3511809	3.4
Apples	907575	0.9	Cumin/pepper	3430551	3.3	Other Spices	891430	0.9
Dried Fruits	261219	0.3	Green Veg	3300414	3.2	Total	10404683	10
Turmeric	3529895	3.4	Other Veg	2619201	2.5			
Total	9634432	9	Mutton	2679406	2.6			
			Total	20153882	19.4			

Note: Food does not include alcoholic beverages, tobacco and tobacco products and miscellaneous food (meals eaten outside home and other food).
Source: Estimated from NLLS data

Table 3.46: Share of Total Food Expenditure across Ecological Belt, Urban Rural Status and Highland-Lowland-Nepal 1996

Ecological Belt	Status	Expenditure	Share of Expenditure across Ecological Belt and Urban-Rural Status					
		Total (Rs)	Within Belt	within status	%of Total	Rural	Urban	High-Low land
Mountain	Rural	2383269415	100.00	8.49	6.86	56.20	65.01	57.89
Mountain	Total	2383269415			6.86			
Hills	Urban	4336840538	24.47	65.01	12.49			
Hills	Rural	13384914045	75.53	47.71	38.54			
Hills	Total	17721754583			51.03			
Terai	Urban	2334551181	15.96	34.99	6.72	43.80	34.99	42.11
Terai	Rural	12289107931	84.04	43.80	35.39			
Terai	Total	14623659112			42.11			
Nepal	Urban	6671391719	19.21	100.00	19.21	100.00	100.00	100.00
Nepal	Rural	28057291391	80.79	100.00	80.79			
Nepal	Total	34728683110			100.00			

Note: Food does not include alcoholic beverages, tobacco and tobacco products and miscellaneous food (meals eaten outside home and other foods).
Source: Estimated from NLSS data

Table 3.47: Aggregate Household Expenditure on Food Originating Primarily in the Highlands

Ecological Belt	Urba/Rural Status	Millet	Citrus	Apples	Dried Fruits	Turmeric	Black Pulse	Total
Mountain	Rural	114036336	4829176	3584171	237795	24137	23765840	146477455
Hills	Urban	4660992	21673062	33168275	10167681	93460	80086064	149849533
Hills	Rural	470404902	50686240	23172494	2787409	92471	213356358	760499875
Hills	Total	475065894	72359302	56340769	12955091	185931	293442422	910349408
Terai	Urban	43124382	24294464	13011404	7237793	20883	31291608	118980533
Terai	Rural	43124382	34256288	34349422	3442793	102915	64047459	179323259
Terai	Total	0	58550752	47360826	10680585	123798	95339067	212055028
Nepal	Urban	4660992	45967526	46179679	17405474	114343	111377671	225705684
Nepal	Rural	627565621	89771705	61106087	6467997	219523	301169657	1086300589
Nepal	Total	632226612	135739231	107285766	23873471	333866	412547328	1312006274
Shares		Shares Are Based on Total Food Expenditure						
Highland	Urban	0.01	0.06	0.10	0.03	0.00	0.23	0.43
Highland	Rural	1.35	0.15	0.07	0.01	0.00	0.61	2.19
Highland	Total	1.37	0.21	0.16	0.04	0.00	0.84	2.62

Note: Total aggregate household expenditure for all foods except alcohol, tobacco, and miscellaneous was Rs 34,728,683,110.
Source: Estimated from NLSS data

Table 3.48: Aggregate Household Expenditure on Food Originating Partially in the Highlands

Ecological Belt	Urban/ Rural Status	Milk	Ginger/ Garlic	Green Vegetables	Cauliflower Cabbage	Mutton	Cumin/ Black Pepper	Total
Mountain	Rural	4021046	27782	2410313	2540051	162917200	86660	172003053
Hills	Urban	405609492	231684	100441386	37123343	252498583	322487	796226976
Hills	Rural	283423269	148179	41281667	46800791	963244258	344281	1335242445
Hills	Total	689032761	379863	141723053	83924134	1215742841	666768	2131469421
Terai	Urban	89876844	31380	22170457	31005186	101939231	61364	245084463
Terai	Rural	375430326	99185	68018929	95984429	636846087	227656	1176606612
Terai	Total	465307170	130565	90189386	126989615	738785318	289020	1421691075
Nepal	Urban	495486336	263064	122611844	68128529	354437814	383851	1041311438
Nepal	Rural	662874641	275146	111710909	145325271	1763007546	658597	2683852110
Nepal	Total	1158360977	538210	234322752	213453801	2117445360	1042448	3725163548
Shares		**Shares Are Based on Total Food Expenditure**						
Highland	Urban	1.17	0.00	0.29	0.11	0.73	0.00	2.29
Highland	Rural	0.82	0.00	0.12	0.13	2.77	0.00	3.84
Highland	Total	1.98	0.00	0.41	0.24	3.50	0.00	6.14

Source: Estimated from NLSS data

Table 3.49: Aggregate Household Expenditure on Food Originating Primarily in the Lowlands

Ecological Belt	Urban/ Rural Status	Eggs	Potatoes	Tomatoes	Other Vegetables	Buff	Chicken	Chilies	Total
Mountain	Rural	14157866	33631287	5834489	3035974	56039781	34180836	37220	146917453
Hills	Urban	102915519	140408353	50248322	80684477	154666130	127840139	125780	656888720
Hills	Rural	85040703	269621421	51459383	46820087	522985427	265327691	136729	1241391442
Hills	Total	187956222	410029774	101707705	127504565	677651557	393167830	262509	1898280162
Terai	Urban	16910864	100756781	17971900	59108119	8765986	15582703	32689	219129042
Terai	Rural	51997887	451855122	40862986	94800788	110768564	97542146	258201	848085694
Terai	Total	68908752	552611903	58834885	153908906	119534551	113124849	290890	1067214736
Nepal	Urban	119826383	241165134	68220221	139792596	163432116	143422842	158469	876017761
Nepal	Rural	151196457	755107830	98156858	144656849	689793773	397050674	432150	2236394590
Nepal	Total	271022840	996272964	166377079	284449445	853225889	540473516	590619	3112412351
Shares		**Shares are based on total food expenditure.**							
Highland	Urban	0.30	0.40	0.14	0.23	0.45	0.37	0.00	1.89
Highland	Rural	0.24	0.78	0.15	0.13	1.51	0.76	0.00	3.57
Highland	Total	0.54	1.18	0.29	0.37	1.95	1.13	0.00	5.47

Note: Total aggregate household expenditure for all foods except alcohol, tobacco and miscellaneous was Rs 34,728,683,110.
Source: Source: Estimated from NLSS data

The rough estimates above are sufficient to highlight the importance of economic links between the highlands and lowlands in terms of food consumption. With growing transport infrastructure and urbanisation, the demand for highland food is likely to increase. Moreover, many food items are not reported in the NLSS survey, and thus the estimates provided should be seen as indicative only.

From these results, it is possible to get an idea of the value of total flow of food from the highlands. Consumption in the highland areas is not taken into account. The values of the food flowing from the highlands for the three food groups are calculated as follow.

1. The expenditure on food throughout Nepal, originating primarily from the highlands minus highland consumption, is roughly the value of food that flows from the highland areas. Only 25 per cent of the value is assumed to be contributed by the highlands.
2. The expenditure on food throughout Nepal, originating primarily from the highlands minus highland consumption is roughly the value of food that flows from the highland areas. Only five per cent of the value is assumed to be the highland's contribution. The assumption on 25 per cent and five per cent of the highland contribution could be further refined by examining actual flows (if available) of food types and calculating the percentages.

The results are provided in Table 3.50. Food that originates partially in the highlands accounts for the largest share (53%) of total flow (Rs 1,046 million or about 3% of the total food expenditure by the households of Nepal), while food that originates primarily in the highlands accounts for 39 per cent. However, when viewed in terms of total food expenditure (all Nepal), the shares are small (1.6% partially originating from the highlands and 1.2% primarily originating from the highlands). It should be noted that not all food originates in Nepal and large amounts are imported as well; this cannot be derived from these data.

Table 3.50: Estimated Values and Shares of Food Contributed by the Highlands

	Food originating primarily in the highlands = Total Nepal-(rural mountain + rural hill)	Food originating partially in the highlands = Total Nepal-(rural mountain + rural hill)*.25	Food originating primarily in the lowland = Total Nepal-(rural mountain + rural hill)*.05
Flow from highlands (in Rs)	405,028,944	554,479,513	86,205,173
Percentage of total food expenditure	1.17	1.60	0.25
Total flow from the highlands (in Rs)	1,045,713,629.06		
Flow from highlands as % of total food expenditure	3.01		

Source: Estimated from NLSS data