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A SITE RECONNAISSANCE SURVEY

REPORT

for

FARMING SYSTEMS SITES

MUSTANG DISTRICT

BY

A. N. BHATTARAI, MAHESH PANTH,

D. B. TAMANG & KRISHNA K. C.

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FARMING SYSTEMS PROGRAM

Agricultural Research and Production Project

NEPAL

LIST OF CONTENTS

	<u>Page</u>
SUMMARY & CONCLUSIONS.....	1
CHAPTER I : LETE PANCHAYAT.....	3
CHAPTER II : KOBANG & TUKUCHE PANCHAYATS.....	6
CHAPTER III : MARTHA PANCHAYAT.....	9
CHAPTER IV : MUSTANG DISTRICT.....	14

LIST OF TABLES

<u>Table No.</u>		<u>Page</u>
1.	Cultivated Land in Six Panchayats of Mustang District	21
2.	Livestock Population in Seven Panchayats, Mustang (2041)	22
3.	Crops, Varieties, Average Inputs Use & Yields in Kobang & Tukuhe Panchayats	24
4.	Estimated Yield of Various Crops in Mustang	25

LIST OF APPENDICES

<u>Appendix No.</u>		<u>Page</u>
I.	Average Price of Foodgrains	26
II.	Program Description of SCWM, RCUP	27
III.	Program Description of Forest Component, RCUP	28
IV.	Program Description of Forest Component, Extension and Training, RCUP	29
V.	Program Description of Forest Survey and Research Office, RCUP	30
VI.	Program Description of Agriculture Component, Mustang District, RCUP	31
VII.	Program Description of Agriculture, Marpha Farm, RCUP	33
VIII.	Program Description of DLDAH, RCUP	34
IX.	Program Description of Irrigation Office, RCUP	36
X.	Program Description of MPLD, RCUP	37
XI.	Institutional Network to Agriculture	38

LIST OF FIGURES

<u>Figure No.</u>		<u>Page</u>
1.	Mustang District Map .....	39
2.	Mustang District in Nepal .....	40
3.	Location of Major Villages Along the Route of the Kaligandaki River .....	41
4.	Predominant Cropping Patterns, Mustang .....	42

LIST OF ACRONYMS

ADB	=	Agriculture Development Bank
ADO	=	Agriculture Development Office (Officer)
AIC	=	Agriculture Inputs Corporation
B	=	Barley
BW	=	Buckwheat
DLDAH	=	Department of Livestock Development & Animal Health
F	=	Fallow
FY	=	Fiscal Year
Ha	=	Hectare(s)
HMG	=	His Majesty's Government
J.T/J.T.A	=	Junior Technician/Junior Technical Assistant
Kg	=	Kilogram
Km	=	Kilometer(s)
M	=	Maize
MPLD	=	Ministry of Panchayat & Local Development
NB	=	Naked Barley
NFC	=	Nepal Food Corporation
P	=	Potato
RCUP	=	Resource Conservation & Utilization Project
SCWM	=	Soil Conservation & Water Management
T	=	Metric Ton
USAID	=	United States Agency for International Development
Veg.	=	Vegetable
W	=	Wheat

SUMMARY & CONCLUSIONS

In the first week of October 1985, a survey team consisting of a Chief Agronomist, two Agronomists and a socio-economist visited 6 Panchayats of Mustang district to select a site for running the 'Farming Systems Program' in the district. The team, at first, took some ideas about a few Panchayats from the ADO Office (Jomsom) and Agriculture Farm (Marpha) regarding cultivated area, land use, cropping pattern, irrigation facilities, livestock and horticulture farming, etc. Then, the team started from Lete through Muktinath Panchayats to carry out the site reconnaissance survey. The team spent one week in the site observation and also met the ADO, Farm Manager, Panchas, knowledgeable farmers, field J.T./J.T.A.s and some HMG/N staffs of concerned offices.

During the visit, the team could not find any Panchayat which has potential areas for launching Farming Systems Program (crop and livestock farming, together). The areas down from Jomsom, the district headquarters, are mainly devoted to minor crops and horticulture farming. The activities on horticulture, especially apple, apricot, peaches, walnut, almond, grapes, cauliflower, cabbage, radish and broad-leaf mustard are found very encouraging in the lower area. If the present trend continues, with no special disease and marketing problems, it seems that the available cultivated land, which is now being used for crop growing, may also be replaced by fruit trees and vegetables in the near future. Most of the people are business minded and do not involve much in crop cultivation. As labor is scarce (if available, very expensive: Rs. 25/day) for crop farming, they prefer planting fruit trees which do not need as regular involvement as cereal crops. From the survey it is also discovered that cereal crop cultivation (or cultivation practice) is more expensive in these areas than other parts of the country because buckwheat requires two times plowing, two times weeding and 2-3 times irrigation. The other more important crop (Naked barley), which generally follows buckwheat, also needs 3-4 plowings, two handweedings and three times irrigation.

On the upper parts from Jomsom, there are limited cultivated land having stone gravels and pebbles with light textured sandy soil for the crop farming; the performance of fruit crops is also poor due to temperature constraint. Since the area has vast open grazing, there seems some scope for livestock activities after improving grazing and pasture-land. But the pasturelands, now, are in poor condition due to over grazing. The farmers reported a scarcity of feed in the winter for the existing number of cattle.

In spite of these problems, there is good scope for fruit and vegetable seed production in Jomsom or any place down to Kobang (see Chapters I, II and III). If the Farming Systems Program is not confined only to crop and livestock activities and it aims to cover fruit and vegetable crops, Jomsom can be the best farming systems site. Jomsom Panchayat has some potential areas where horticulture based farming systems program can be launched. A Farming Systems Experiment Station can be established in the north of proper Jomsom, the district headquarters of Mustang district. Thus, the team recommends for carrying out a detailed farming systems baseline survey in Jomsom. It is also emphasized that Tuku be included in the survey as an extrapolation area.

CHAPTER I

LETE PANCHAYAT

(i) Location: The Panchayat is located 14 miles South from Jomsom, the district headquarters of Mustang district. It lies on both sides of the Mustang-Pokhara route, and also near the border of Myagdi district (see Fig. 1).

(ii) Climate: Mustang is, in general, considered as an arid, semi-desert zone with low precipitation and scarce vegetation, but Lete Panchayat does not fall in this category. The climate of the Panchayat is cool temperate having good vegetation as well as fair precipitation. The farmers in the area reported that the Panchayat receives sufficient rainfall needed for crops in summer. Thick vegetation in the hills and foothills also proves the fact. Wind velocities are also low in this Panchayat.

(iii) Land Area: The Panchayat has 224.54 ha. of cultivated land (Table - 1) and about 20-25 percent of the total receives irrigation from local Kulos (small canals).

Considering the plain terraces, bunds and irrigation facilities, all the land areas can be classified into Khet (lowland), but the farmers do not grow rice in these lands.

(iv) Major Crops & Cropping Patterns: Naked barley, generally sown in Mangsir (November) and harvested in Asadh (May), is the most important crop from the area coverage point of view. As the barley crop is mostly used for brewing and for animal feed, buckwheat and maize fulfil the major requirement of the daily diet.

'NB-BW' and 'NB-M' are the predominant cropping patterns in this area. According to Pradhan Pancha, about 40 and 27 percent areas

in the Panchayat are devoted to 'NB-BW' and 'NB (or W) - M' patterns, respectively. The rest are covered by 'B-BW', 'P-F' and 'F+Veg.' patterns.

The survey team also saw that almost all bunds were covered by Pennisetum, which is known as 'Dhimsi' grass locally. The farmers harvest the grass two times in a year. They store it as straw, which is very expensive in the winter (Rs. 7/kg.).

- (v) Crop Varieties and Yields: So far as the crop variety is concerned all (except wheat) are local. The Pradhan Pancha and a few other farmers have tried to grow improved wheat since last two years. The performance of Lerma Rojo-64 is promising. ADO Office at Jomsom sent a J.T., on the request of Lete Panchayat's farmers, with the survey group to Khumaltar in order to get 200 kgs. of Lerma Rojo-64 wheat seed for seed multiplication.

The average yields of major crops in this area are as follows:

NB = 1.5 T/ha.

B = 2.5 T/ha.

BW = 0.6 T/ha.

M = 1.0 T/ha.

W = 1.6 T/ha.

- (vi) Fruit Trees & Vegetables: The farmers have planted various types of fruit trees such as - apple, apricot, peaches, plums, walnut, almond, etc. However, the farmers reported that the performance of apple and apricot is not good; the apple fruit does not get good colour and yield is also not satisfactory.

The farmers are also growing vegetables (cabbage, cauliflower, radish, broadleaf mustard, etc.), intercropped in fruit cultivated area. But shortage of irrigation has limited the scope of vegetable development in this area.

- (vii) Livestock & Agro-forestry: The Panchayat has the highest number of Lulu cows, buffaloes and poultry in Mustang district. This is mainly due to the existence of the forest near by the villages. The population of sheep and hill goats is also not less (see Table - 2 for detailed information).

The survey team could not find the record of area under forest. There is, no doubt, good forest which can supply enough firewood and fodder grasses for the villages. However, the farmers pointed out feeding problem (grazing) for their livestock, especially during the months of winter.

- (viii) Population & Occupation: About 109 households, with an average 4.5 family members, are settled in Lete Panchayat. According to the Pradhan Pancha, the proportion of males and females is fifty-fifty.

As the Panchayat is dominated by Thakalis, from population as well as economic point of view, the main occupation of the people is trade (mainly hotel business). The second source of income is to provide mules and horses for the transportation of goods. Crop-livestock farming is considered as the third source of family income.

- (ix) Market & Transportation Facilities: If one is not biased of good market facilities in Kathmandu, Pokhara or other developed places in Nepal, he certainly appreciates the markets (or availability of goods) in Lete; the only concern is the high price due to transportation costs.

There is all-weather busy mule track from Jomsom to Pokhara. Mules, horses, Jhopa and some porters are the means of transportation which cost Rs. 7-10/kg. (from Jomsom to Pokhara). One can see the crossings of herds of loaded mules and horses everywhere enroute to Jomsom and Pokhara.

CHAPTER II

KOBANG & TUKUCHE PANCHAYATS

Both Panchayats lie on the same location and have same climate and socio-economic condition, so they are described in the same Chapter and same sub-headings.

- (i) Location: Kobang and Tukuche Panchayats are located at the North side of Kaligandaki river and on the main trail from Pokhara to Mustang (Fig. 1).
- (ii) Climate: The areas of the Panchayats fall in cool temperate to sub-alpine climate. Low rainfall and high wind velocities start from the southern border of Kobang Panchayat. The blasting force of the winds usually begins each morning after sunrise and lasts throughout the day until after nightfall.
- (iii) Land Area: According to the 'Land Area Chart' of Mustang District Maintenance Section, there are 187.15 and 140.55 hectares of cultivated land, respectively, in Kobang and Tukuche Panchayats. Of the total, about 40 percent receive reliable irrigation, 40 percent are partially irrigated and the rest 20 percent solely depends on rainfall.
- (iv) Major Crops & Cropping Patterns: Naked barley is by far the most important crop in these Panchayats, buckwheat being the second. The key informants estimated that fruit trees with vegetable intercropping covered 50 percent of the total cultivated land. About 30 percent was occupied by 'NB-BW' and 15 percent by 'NB (or W)-M' pattern. The rest 5 percent was devoted to potato monocropping.

Since the area has potential for fruit and vegetable seed production,

most of the good land may be replaced (if present trend of fruit trees plantation continues) by fruits and vegetable in the future.

- (v) Crop Varieties, Inputs Use & Yields: Improved varieties are grown only in wheat and potato crops. The knowledgeable farmers estimated that 15 percent of the wheat growing area was devoted to improved wheat (RR 21 and Lerma Rojo-64), and Kufri-jyoti covered about 20 percent of the total potato growing area in 1984/85.

Table 3 presents the detailed information about crops, varieties, average inputs and yields in Kobang and Tukuche Panchayats.

- (vi) Fruit Trees & Vegetables: The farmers could not estimate the area under fruit and vegetable cultivation, however, the climate of Kobang and Tukuche is much suited to apple, apricot, peaches, plums, walnut and almond fruits. The survey team was highly impressed by the performance of apple fruits on both sides of the way, and also in the fields. The area has also potential for vegetable seed production, especially for cabbage, cauliflower, radish, broadleaf mustard and tomato.

Both Panchayats are close in proximity to Marpha (Agriculture Development Farm) and Jomsom (District Headquarters), so there will be no difficulty in providing technical know-how and other necessary help to the area.

- (vii) Livestock & Agro-Forestry: Number of livestock in Kobang and Tukuche Panchayats is fair (see Table - 2) due to shortage of feeding or poor pasture condition. Vegetation is very poor, the hills look like desert with few thorny bushes. Wind erosion is severe in the area.

- (viii) Population & Occupation: According to the Panchayat Profile, there

are 518 and 310 households in Kobung and Tukuhe Panchayats, respectively. The average family size is 4.5.

Thakali caste has absolute majority in both Panchayats, who mainly run hotel business and some of them operate horse and mule for transportation of goods. Now-a-days, the farmers are also showing ample interest in planting fruit trees.

(ix) Market & Transportation: Same as Lete Panchayat.

CHAPTER III

MARPHA PANCHAYAT

- (i) Location: Marpha is situated in North-Western temperate region of Nepal at a distance of 7 miles South-West from Jomsom and on both sides of the Pokhara-Muktinath track.
- (ii) Climate: The altitude of Marpha, lowest portion of the Panchayat, is 8,300 ft. a.m.s.l. The area, being in rain shadow, has very little precipitation (200-400 m.m./year). Sunshine is very good in summer. Here, the minimum temperature drops to minus 9°C (average minimum 2.6°C) in January and July maximum temperature is 22°C. Frost occurs for about seven months of the year and snow fall in Paush thru Falgun.
- (iii) Land Area & Soil Type: The Panchayat has 36.45 ha. of Abal type of land, 56.95 ha. Doyam and 21.45 ha. Sim. The farmers estimate that about 65 percent of the total cultivated land receives abundant irrigation facilities throughout the year from local Kulos and remaining 35 percent are either partially irrigated or completely rainfed.

Most of the areas in Marpha Panchayat have upland colluvial type of soils, which have very low fertility due to their coarse texture sandy soils. However, soils in the foot-hills or river basin are alluvial with good fertility. Following results were obtained from soil analysis in 2034 (Marpha Agriculture Farm):

- PH = Moderately Alkaline (8.00).  
Organic Matter = Medium (3.29%).  
N = Medium (0.17%).  
 $P_2O_5$  = High (9.45 lbs./Acre).  
 $K_2O$  = Low (85.80 lbs./Acre).

- (iv) Predominant Cropping Patterns: The key informants of Ward No. 3 (Marpha Panchayat), who have 20-22 years of experience in agriculture and who generally do not leave their villages, estimated that about 70 percent of the total cultivated land was devoted to fruit cultivation, 15 percent to 'NB-BW (3% to NB-Veg.)', 10 percent to 'P-F' and 5 percent to 'W or B - BW' patterns.
- (v) Cultivation Practices: Cultivation practice in this area is different from the general practices being followed by the farmers of mid-hills and Tarai in Nepal, so it is described here briefly:

NAKED BARLEY (UWA): Generally sown in Mangsir (November) and harvested in Asadh (May). First the farmers apply enough farm yard manure (6-10 tons/ha.) and irrigate the land. After irrigation, they plow 3-4 times. Sowing of seed is generally being done by broadcasting method (some farmers put behind the furrow, also) before the last plowing. The crop needs 3-4 times irrigation and 2 times hand weeding (same procedures are followed for wheat and barley crops).

BUCKWHEAT: Two plowings, one before seed broadcasting and another after broadcasting. First hand weeding (intensively) in Shrawan and another 6 weeks after the first weeding. The second weeding is normally not intensive, only pickings of grown weeds. 3-4 times irrigation is provided throughout the entire period of the crop.

Seed broadcasting in Asadh (May-June) and harvesting in Kartic (October or just after 90 days).

The farmers reported that FYM is not applied in buckwheat since the effort is being made to raise the crop with the help of residual effect of the previously incorporated farmyard manures.

POTATO: The crop is planted two times, once in Mangsir (November-December) and next in Falgun (February-March). But the crop becomes ready to harvest together, in Shrawan (July-August). The farmers stated that germination of potato crop starts in Chaitra (March-April) whether planted in Mangsir or in Falgun. Some farmers plant potato in Mangsir only to finish the work in time or together with Uwa/Barley.

- (vi) Crop Varieties & Yield: Improved varieties are grown only in wheat (RR 21) and potato (KufriJyoti) crops. Kakani yellow and other improved maize did not show good performance in this area. There is no improved variety or recently very minor research works have been started in respect of naked barley and buckwheat whereas they are the major crops for this area.

Last year, crop yields averaged as follows:

NB	=	1.4 T/ha.
Improved W	=	2.0 T/ha.
Local W	=	1.36 T/ha.
Improved Potato	=	10.88 T/ha.
Local Potato	=	9.00 T/ha.
BW	=	1.63 T/ha.

- (vii) Fruit Trees and Vegetables: Cool weather, less rain, good sunshine and abundant irrigation facilities are the main four gifts for temperate vegetable crop production (specially vegetable seed) and fruit cultivation in Marpha area.<sup>1/</sup> The survey team could not obtain the number of fruit trees in Marpha Panchayat, however, one can imagine the figure from the information that 70 percent of the area of 114.85 ha. is covered by fruit trees with vegetable inter-cropping.

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<sup>1/</sup> Second Workshop Seminar on Vegetable Seed Production, January 31 - February 4, 1983, Kathmandu.

Agricultural Development Farm at Marpha reports following activities within the Farm:

a. Fruit Trees and Area Coverage:

Sr. No.	Name of Fruits	No. of Trees	Area (ha.)
1.	Apple	901	2.1
2.	Peaches	129	0.4
3.	Grapes	942	1.75
4.	Apricot	98	0.3
5.	Pears	33	0.1
6.	Almond	107	0.4
7.	Plum	20	0.05
8.	Walnut	40	0.2
Total		2270	5.3

b. Fruit Nursery (0.5 ha.).

c. Vegetable Production (1.45 ha.).

(viii) Livestock & Agro-Forestry: Detailed information about the number of livestock in Marpha Panchayat is presented in Table - 2. What is remarkable here is the number of hill-goats (1553), mules (649) and yaks (269), which give a large amount of cash income to the farmers.

Concerning agro-forestry, there is virtually no natural vegetation except thorny bushes. Pasture lands are on the plain top of the hills which are also in poor condition.

(ix) Population and Occupation: There are 991 people who are distributed to 198 households. Thakalis are the most dominant ethnic

group, who mainly engage in business. Almost all households in Marpha are involved in the hotel business with some other side business such as mule operation, fruit cultivation, goat-keeping, etc.

In the winter, most of the male population migrates southward for trading medicinal herbs, wool and finished woolen garments. In the summer, when snow is gone and crops gradually become ready for harvest, they return to home with food stuffs, cigarettes and other consumer goods.

- (x) Market & Transportation: Marpha village is itself a market center for this area. Most of the goods available in Marpha, come from Pokhara and Butwal on the back of mules and horses. Transportation by porters is also prevalent but it is decreasing every year, the farmers reported.

CHAPTER IV

MUSTANG DISTRICT

This Chapter is developed with a view to give the general picture of Mustang district as a whole. Brown's report<sup>1/</sup> and the team's observation are the main basis for generalizing various features of the district.

- (i) Location: Mustang district lies in the Dhaulagiri Zone immediately north of Myagdi district, extending along the Kaligandaki River from north of the Dhaulagiri-Annapurna himals to the Tibetan border (see Figures 2 and 3).
- (ii) Topography: Topographically Mustang is dominated by the Himalayan ranges and is characterised as a high elevation desert having a sparse cover of shrub-bunchgrass steppe vegetation similar to that of the Tibetan Plateau. Geologically, the region is extremely young (Hagen 1980, Chang 1981), hence slopes tend to be steep, soils are shallow, and undecomposed rock debris is common.
- (iii) Climate: The climate of this district is primarily controlled by strong desiccating winds that funnel northward up to the Kaligandaki gorge through the Himalaya Mountains, and by the rainshadow effect (Annual precipitation does not exceed 400 mm) created on the south slope of the Himalayas. Climates are quite variable, with monsoon influences being notable only in the far south and in the upper slopes of the higher Himalaya. Kaligandaki valley-bottom climates, in general, become increasingly drier and colder northward and with increasing altitude.
- (iv) Land Area: Out of 223,200 ha. of total geographic area, about 4733.70<sup>2/</sup> (or 2.3%) is cultivated. The number of farming households

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<sup>1/</sup> Brown, R.W., "Recommendation for Revegetation & Management of Denuded Lands in Mustang, Nepal", 1982.

<sup>2/</sup> District Maintenance Section, Mustang, 1985.

is 2,971 with an average land holding 1.72 ha. and 20-40% cultivated land being irrigated from the local Kulos (APROSC/RCUP). Most cropland is confined to alluvial terraces and fans along the Kaligandaki and its tributaries.

- (v) Crop and Cropping Patterns: The unique physiographic condition, climate and geography have led to the adoption of minor crops like buckwheat, naked barley and barley in the district (see Figure 4 for detailed information). Average crop yield of minor as well as major crops are also very low (see Table - 4) due to coarse texture sandy soils. Low precipitation and high evaporation rate has caused accumulation of crusted salts on the soil surface.

Besides the crops, farmers also grow grasses on the edges of the fields which is cut in late September to October and is stored as hay for winter feeding. Hay appears to be of good quality and is primarily Pennisetum sp. ('Dhimsi' in local language).

- (vi) Agro-Forestry: As one treks northward through the Kaligandaki gorge between Dhaulagiri and Annapurna, the vegetation types change with abrupt suddenness. In the course of a three hour walk the rapid transition from subtropical humid jungle to temperate coniferous forest, and ultimately to dry desert shrub is astonishing. North of this point the coniferous forests are primarily confined to the northern exposures and the very high slopes above the river and its side canyons. Further north, the forest zone fades to narrow bands of trees high above the valley floor, then eventually to isolated island stands restricted to the few mesic sites remaining, and ultimately disappearing altogether, giving way to the ubiquitous desert shrub and scattered juniper that so thoroughly typifies Mustang (Brown, 1982).

To-day, grazing is by far the primary land use of Mustang. Following

a system of continuous grazing, compounded by poor land management, virtually every accessible piece of range including the alpine pastures is severely overgrazed. Palatable shrubs and grasses receive 100 percent utilization in every grazing season, while extreme plant pedestaling and soil surface erosion by both water and wind are evident throughout the region.

- (vii) Transportation & Market: Major access to this region is via a foot trail along the Kaligandaki and seasonal air service at Jomsom. Six Panchayats are accessible throughout the year and the remaining 10 Panchayats are connected with a fair weather trail.

Mules and horses are the major means of transportation, which are easily available in every month except June and July. During these months, the trade caravan stops because of the monsoon and the mules are pastured in the alpine pastures of Mustang district. Mules have to be purchased from India at a cost of Rs. 10,000 to 12,000, which can usually be recovered in three years of using mules as pack animals.

Being a tourist route, there is good market facility, but price is the concern (see Appendix I). Well-equipped hotels and restaurants are common along the Kaligandaki northward to Kagbeni. Large settlements, such as Jomsom, Marpha, Lukuche, Kalapani and Ghasa are all limited to the Kaligandaki Valley and up some of the tributaries. Little or no permanent settlements exist away from the Kaligandaki, with the exception of the Muktinath Valley.

- (viii) Miscellaneous: Bearing in mind the dark picture of Mustang - especially land slides, gully formation, wind erosion, deforestation, poor land quality and irrigation - there seems no magic techniques that will chase away aridity, erase the wind or bring

rain when it is needed most. Decades of damage will not be repaired easily and quickly. A great deal of work and hard commitment of the local people is the only magic that will help Mustang the most.

HMG/N, in cooperation with some donor agencies, has started many activities to restore Mustang to a bright and plentiful future. The main activities, which are related to agriculture (crop and livestock), are briefly described here:

- a. RCUP Activities: RCUP, funded by USAID, is a multifaceted and integrated project that is attempting to halt the rapid degradation of Mustang district through its various components. The project area includes only the southern one-third of the district, that portion south of Kagbeni. The area is approximately 40 KM wide in the north, tapering to little over 10 KM in the south, and is about 30 KM in north-south extent. The major components covering the area are:

- a.01) Soil Conservation and Watershed Management (SCWM): The objective of the SCWM Section of RCUP is to integrate a range of activities to protect and rehabilitate watershed and initiate projects leading to better soil conservation practices.

Specific goals for FY 1985/86 include activities such as terrace improvement in 37 ha., source protection in 30 ha., major gully control 6, catchment pond 9, maintenance of climatological station 16, road slope stabilization 200 meter, landslide stabilization 3, seedling production for water source protection 155,000 and improved stove 400 (see Appendix II).

- a.02) Forest Management: The Forest Management component of RCUP, managed by Department of Forest, aims to help stabilize and enrich the physical environment while providing locally needed forestry products through creating new forests and fostering wise use of existing and future forest resources.

Specific goals for FY 1985/86 include establishment and handover of Panchayat protected forests 850 ha. (14 Nos.), Panchayat forest 190 ha. (6 Nos.), preparation of management plan for Panchayat protected forest 850 ha. and Panchayat forest 190 ha., implementation of management plan of Panchayat protected forest 1300 ha. and national forest 25670 ha. etc. (see Appendix III and IV).

- a.03) Forest Survey & Research: The objective of the Forest Survey and Research component of RCUP is to carry out detailed Inventory Survey of the existing forest for the preparation of management plan for national forests and establishment of Trial plots to determine which indigenous and exotic tree species provide high yield of timber, fuelwood and fodder in short time period. Specific activity and workplan target for FY 1985/86 is listed in Appendix V.

- a.04) Agriculture: Agriculture component of RCUP covers all programs concerning Agronomy, Extension, Research and Horticulture in the district. Agronomic and horticulture activities include introducing improved varieties and practices for production of paddy, maize, wheat, millet, potato, pulse, oilseeds, vegetables and fruits. Extension tools such as minikit distribution,

result and production demonstration method demonstration, orchard demonstration and exhibitions are being conducted.

Specific goals and work plan target for FY 1985/86, listed in Appendix VI and VII, also show the major activity being undertaken in the district and at the Marpha Farm.

- a.05) Community Livestock and Pasture Development: The objective of this component is to improve the breeding, feeding and management practices along with the development of range and pasture in the project area.

Community Livestock program aims at introducing the improved domestic animals and thereby developing the genetic and breed characteristics and performance. Similarly, the Range/Pasture program aims at developing forage crops and individual farmer levels. Detailed information about the activities done (or to be done) are listed in Appendix VIII.

- a.06) Irrigation: The objective of the irrigation component of RCUP, managed by Department of Irrigation, is to complement agriculture component by upgrading existing irrigation schemes and construction of new system. The survey team could not find the progress report of last few years, only 1985/86 work plan is listed in Appendix IX.

b. DLDAH Activities:

- b.01) Range/Pasture Development: The DLDAH has established

a Range/Pasture sub-center in Lete that is conducting studies on improved grass and legume varieties, namely, Cocks-foot, White Clover and Perennial Ryegrass.

b.02) Dipping: The DLDAH has also established Dipping Stations in Ghasa and Lete. These dipping tanks are used by flocks when passing through on their annual migrations. Sheep are usually dipped both in the spring and the fall.

b.03) Trainings: The DLDAH sponsors a large nela (or livestock fair) during the month of Jestha (May-June) to conduct training program for shepherds in animal husbandry techniques and veterinary practices.

DLDAH and the Sheep Herder's Association also have some exotic rams (Pollworth breed) that are distributed to the villager's flocks.

c. MPLD Activities: The Ministry involves in a wide range of Community Development activities such as Small Irrigation Schemes, Drinking Water Projects, and Wooden Bridge Construction. The Ministry has started three irrigation projects in Marpha, Kunjo and Tukuche; and three drinking water projects in Chhusang and Marpha which are supposed to be completed in FY 1985/86 (see Appendix X).

Besides these, sufficient manpower are assigned to achieve the target in the district (see Appendix XI for staffing).

Table - 1 : Cultivated Land in Six Panchayats of Mustang District

Sr. No.	Panchayat	AEAL LAND		DOYAM		SIN		CHAHAR		TOTAL		Remarks
		No. of Parcel	Area (ha.)									
1.	Lete	.....+	13.96	.....+	56.19	.....+	109.46	.....+	2.74	.....+	182.35	20-25% irrigated
2.	Kobang	518	56.80	813	110.60	138	19.70	0	0	1518	187.10	40% sufficient 40% partially
3.	Tukuche	310	39.85	315	58.00	149	42.70	23	0.60	878	141.15	40% sufficient 40% partially
4.	Merpha	810	36.47	1080	56.95	124	21.45	11	0.20	2180	115.07	65% sufficient
5.	Kagbeni	421	24.40	1696	83.25	899	44.65	67	10.65	3229	162.95	DK*
6.	Muktinath	0	0	2051	96.10	2887	129.88	297	32.70	5474	258.68	DK*

+ The farmers estimated that 60% cultivated area of the old Lete Panchayat was gone to Kunj Panchayat after Panchayat separation in 2038. So, we could not get information about how many parcels were gone in 60% of the area.

\* Do not know.

Source: District Maintenance Section, Jomsom, Mustang.

Table - 2 : Livestock Population in Seven Panchayats, Mustang (2041)

Sr. No.	Name of Panchayat	No. of HH.	Buffalces			Lulu			Jhopa		
			He-buff.	She-buff.	Total	Male	Female	Total	Male	Female	Total
1.	Lete	109	29	95	124	451	486	940	3	3	6
2.	Kotang	132	1	1	2	169	221	390	0	0	0
3.	Tukuche	87	0	0	0	174	153	327	18	11	29
4.	Marpha	198	0	0	0	125	219	344	113	14	126
5.	Jomsom	248	0	0	0	155	179	434	124	60	184
6.	Kagbeni	172	0	0	0	209	250	459	80	53	133
7.	Muktinath	165	0	0	0	138	380	518	100	83	183

(Continued)

Table - 2 : Livestock Population in Seven Panchayats, Mustang (2041)

Sr. No.	Name of Panchayat	Yak			Hill-goats			Sheep			Draft-animals			Poultry
		Male	Female	Total	He-goat	She-goat	Total	Male	Female	Total	Horse	Mule	Donkey	
1.	Lete	0	0	0	111	433	544	123	536	659	42	78	0	966
2.	Kobang	113	456	569	53	190	243	0	0	0	21	102	0	840
3.	Tukuche	31	59	90	54	154	208	0	0	0	15	67	0	469
4.	Marpha	79	190	269	273	1280	1553	0	0	0	25	649	0	430
5.	Jomson	19	38	57	536	1269	1805	0	0	0	111	417	49	643
6.	Kagbeni	15	60	75	589	757	1346	0	0	0	74	98	62	204
7.	Muktinath	16	46	62	388	659	1047	2	2	4	247	34	54	265

Table - 3 : Crops, Varieties, Average Inputs Use & Yields in Kobang & Tukuche Panchayats

Crop	Variety	Percent of Crop Area	Percent of farmers using fertilizer	Quantity Used (kg./ha.)			Percent of farmers using compost	Quantity used (T/ha)	Crop Yield (T/ha)
				N	P	K			
Wheat	Improved (RR 21)	15	20	40	40	-	100	7.000	1.700
	Local	85	20	40	40	-	100	7.000	0.950
Naked Barley	Local	100	15 (but only in irrigated land)	20	20	-	100	7.000	0.900
Barley	Local	100	-	-	-	-	100	6.000	1.356
Maize	Local	100	-	-	-	-	100	9.000	2.380
Buckwheat	Local	100	-	-	-	-	-	-	1.360
Potato	Improved (Kufrijyoti)	20	40	-	-	-	100	9.000	8.320
	Local	80	-	-	-	-	100	9.000	5.760

Table - 4 : Estimated Yield of Various Crops in Mustang

Crop Variety	Yield kg/ha	Crop Variety	Yield (kg/ha)
Maize (I)	X	Naked Barley (L)	1400
Maize (L)	600	Buckwheat (L)	800
Wheat (I) <sup>1/</sup>	1000	Barley (L)	765
Wheat (L) <sup>1/</sup>	835	Potato (L)	4500
Wheat (L) <sup>2/</sup>	800		

1/ - Irrigated

2/ - Rainfed

I - Improved

L - Local.

APPENDIX - 1

Average Price of Foodgrains

(Rs./kg.)

Months	Crop			
	Rice	Maize	Wheat	Pulses
Mid-July - Mid-August	14.30	7.90	8.50	17.63
Mid-August - Mid-September	14.60	7.90	8.50	17.63
Mid-September - Mid-October	15.15	8.50	9.12	19.80
Mid-October - Mid-November	15.15	8.80	9.12	19.80
Mid-November - Mid-December	15.15	8.80	9.12	19.80
Mid-December - Mid-January	15.15	8.80	9.12	19.80
Mid-January - Mid-February	15.70	8.80	9.12	19.80
Mid-February - Mid-March	17.15	9.12	10.64	19.80
Mid-March - Mid-April	17.15	10.64	10.64	19.80
Mid-April - Mid-May	17.45	10.64	12.15	19.80
Mid-May - Mid-June	17.15	9.12	10.64	19.80
Mid-June - Mid-July	17.15	9.12	10.64	19.80

Source: Statistics Section, ADO Office, Mustang, 1984/85.

APPENDIX - II

Resource Conservation and Utilization Project

Programme Description FY 2042/43 (1985/86)

Department of Soil Conservation & Watershed Management

Mustang District

Sr. No.	Activities	Unit	Unit Cost	Target	Estimated Amount (In NRs.)	Budget Head
1.	Terrace Improvement	Ha.	3,533	15	53,000	12.2
2.	Gully Control	No.		1	180,000	12.2
3.	Community Water Source Protection	Ha	6,000	10	60,000	12.2
4.	Catchment Pond	No.	12,000	2	24,000	12.2
5.	Landslide Stabilization	No.		1	200,000	12.2
6.	Renovation of different Structure	As per need			175,000	12.2
7.	Maintenance of Climatological Station	No.	2,000	3	6,000	12.2
8.	Seedling Production	No. of seed	.77	30,000	23,000	12.2
9.	Completion of Residual Work of Ghilling Canal Improvement				88,000	12.2
10.	Sub-centre construction (Residual) in Restricted Area				134,000	12
11.	Gully Control Restricted Area	No.			160,000	12.2
12.	Gully Control Residual				20,000	
13.	<u>Extension &amp; Training</u>					
	a) Ilaka Conservation Comm. Formation & Training	Times	1,500	4	6,000	3
	b) Pradhan Panch Tour	Times	4,500	2	9,000	3
	c) Newsletter publication	Times		1	3,600	4,7
	d) Exhibitions	Times		1	3,600	4
	e) Leader Farmer Training	Times	1,500	3	4,500	8
	f) Conservation Education in School & other Institution	Times	1,000	2	2,000	4,8

Note: 1.	Programme Cost (Budget Head 1-10)	715,000
2.	Land (Budget Head - 11)	-
3.	Construction (Budget Head 12.1 & 12.2)	1,123,000
	<b>Total:</b>	<b>1,838,000</b>

APPENDIX - III

Resource Conservation and Utilization Project  
Programme Description FY 2042/43 (1985/86)

Department of Forest  
Mustang District

Sr. No.	Activities	Unit	Unit Cost	Target	Estimated Amount (In NRs.)	Budget Head
1.	Maintenance of Central Nursery	No.		1	25,000	12.2
2.	Maintenance of Satellite Nursery	No.	15,000	8	120,000	12.2
3.	Maintenance of Panchayat Nursery	No.	15,000	8	120,000	12.2
4.	National Plantation with 25% Fencing only	Ha.	2,288	1/ 50	114,400	12.2
5.	Forest Demarcation	Km.	1,400	2/ 50	70,000	12.2
6.	Seedling Production	No.	-/55	300,000	165,000	12.2
7.	Establishment of Panchayat Protected Forest & Handover	Ha/No.	80	100/3	8,000	12.2
8.	Establishment of Panchayat Forest, Handover & Plantation	Ha/No.	1,800	3/40/2	72,000	12.2
9.	Maintenance of old plantation including weeding & casualty replacement, wherever necessary:					
	a) National Forest	Ha.	395	228	90,000	12.2
	b) Panchayat Forest	Ha.	204	98	20,000	12.2
	c) Plantation Irrigation	Ha.	1,000	326	326,000	12.2
10.	Preparation of Management Plan of PPF	Ha.	20	100	2,000	12.2
11.	Preparation of Management Plan of PF	Ha.	50	40	2,000	12.2
12.	Seedling Distribution		25	4,000	1,000	12.2
13.	Implementation of Management plan of:					
	a) Panchayat Protected Forest	Ha.	150	250	37,400	12.2
14.	Extension & Training*	-	-	-	-	
15.	Kowang Afforestation Fencing (Residual)	-	-	-	165,000	12.2
	Total:				1,337,800	

Note: 1. Programme Cost (Budget Head 1-10) 327,000  
 2. Land (Budget Head - 11) -  
 3. Construction (Budget Head 12.1 & 12.2) 1,337,800  
 Total: 1,664,800

1/ National Plant<sup>n</sup> 10 Ha in restricted area = 22,880  
 2/ Forest Demarcation 15 km in restricted area = 21,000  
 3/ Panchayat Forest Plant<sup>n</sup> 5 Ha. in restricted area = 9,000  
 \* Amount incorporated in different Budget Head (1 to 10) Extension and Training Program Sheet attached herewith.

APPENDIX - IV

Resource Conservation and Utilization Project

Department of Forest

Extension and Training Program FY 042/43 (85/86)

Mustang District

Sr. No.	Activities	Unit	Unit Cost	Target	Estimated Amount (In NRs.)	Budget Head
1.	Forest Guards Trg. (Refresher) - 5 persons	Trg.	440	1	2,200	3
2.	Nursery Naik Trg. (Refresher) - 5 persons	Trg.	440	1	2,200	8.1
3.	Asst. Rangers PF/PPF Mgmt. Trg. - 2 persons	Trg.	750	1	1,500	3
4.	DFC Community Forestry Orientation Workshop - 1 person	Workshop		1	1,000	3
5.	Field Tour for village leader - 8 persons	Tour	1,500	1	12,000	8.1
6.	Exhibitions	No.		1	1,500	4.2
7.	Forest Protection Competition (Panchayat-wise)	Prizes	1,000	3	3,000	8.1
8.	Publications (Leaflets/Pamphlets)	Pcs.	4	600	2,500	4.2
9.	Reprinting of CFAD Materials	Pcs.	10	500	5,000	4.2
10.	Documentary Films Show	Times	375	4	1,500	4.2
11.	Forest Guards Trg. (New) a) No. of Participant - 5 b) Duration of Trg.-90 days c) Place of Trg. - Lumle d) Training Cost: i) Food Rs. 20/day/person Rs. 9,000 ii) Clothing Rs.1000/person Rs. 5,000 iii) Training Allowance - Rs. 1,240 iv) Contingency 5% - Rs. 760				16,000	8.1

APPENDIX - V

Resource Conservation and Utilization Project

Programme Description FY 2042/43 (1985/86)

Department of Forest

Forest Survey and Research Office

Kathmandu

Sr. No.	Activities	Unit	Unit Cost	Target	Estimated Amount (In NRs.)	Budget Head
1.	Maintenance of Old Trial plots including pruning and measurement	-	-	-	80,000	12.2

Note:	1. Programme Cost (Budget Head 1-10)	132,000
	2. Land (Budget Head - 11)	-
	3. Construction (Budget Head 12.1 & 12.2)	80,000
	<b>Total:</b>	<b>212,000</b>

APPENDIX - VI

Resource Conservation and Utilization Project

Programme Description FY 2042/43 (1985/86)

Department of Agriculture

Mustang District

Sr. No.	Activities	Unit	Unit Cost	Target	Estimated Amount (In NRs.)	Budget Head
1.	<u>Improved Varieties &amp; Practices:</u>					
	a) Paddy	Ha.				
	b) Wheat	Ha.		130		
	c) Maize	Ha.		25		
	d) Vegetables	Ha.		50		
	e) Potato	Ha.	150	100	15,000	8.1
	f) Fruits	Ha.	1,250	20	25,000	8.1
	g) Millet	Ha.		-		
	h) Barley	Ha.		120		
	i) Oilseeds	Ha.		-		
2.	<u>Minikit Distribution:</u>					
	a) Cereals	No.	100	100	10,000	8.1
	b) Vegetables	No.	75	150	11,250	8.1
3.	<u>Production Verification Trail</u>	No.	4,000	5	20,000	8.1
4.	<u>Varietal Trials</u>	No.	400	5	2,000	8.1
5.	<u>Farmer's Training (within dist.)</u>	Person	100	200	20,000	8.1
6.	<u>JT/JTA In-service Training</u>	Person	1,200	10	12,000	8.1
7.	<u>Farmer's Day</u>	Times		1	2,000	8.1
8.	<u>Farmer's Discussion</u>	Times	75	16	1,200	8.1
9.	<u>Farmer's Exhibitions</u>	No.	4,000	2	8,000	8.1

(Continued)

APPENDIX - VI (Cont.)

Sr. No.	Activities	Unit	Unit Cost	Target	Estimated Amount (In NRs.)	Budget Head
10.	Orchard Demonstration	No.	5,000	5	25,000	8.1
11.	Establishment of Veg. Nursery	No.	2,000	6	12,000	8.1
12.	Rustic Storage Trial (on potato)	No.	-	-	-	
13.	Seed Multiplication Program (Wheat, Rice, Maize, F. Millet)	Ha.	-	-	-	
14.	Maintenance & Improvement of Nurseries	No.	-	-	-	
15.	Publication Distribution	No.	2.5	1,000	2,500	8.1
16.	Posters Publicity	No.	10	200	2,000	8.1
17.	AA's Training (New)	No.	1,000	5	5,000	8.1
18.	Maintenance of old orchard demonstration	No.	1,250	4	5,000	8.1
19.	Establishment of Nursery (New) in restricted area	No.		1	30,000	12.2
20.	Retaining wall construction at Chhusang sub-centre	No.		1	30,000	12.1
21.	Chhusang sub-centre (residual)	No.		1	70,000	12.1
22.	Fruit Plant Production	Ha.				
23.	Vegetable Saplings Production	No.				

Note: 1. Programme Cost (Budget Head 1-10)	682,000
2. Land (Budget Head - 11)	-
3. Construction (Budget Head 12.1 & 12.2)	130,000
<b>Total:</b>	<b>812,000</b>

APPENDIX - VII

Resource Conservation and Utilization Project

Programme Description FY 2042/43 (1985/86)

Department of Agriculture

Marpha Farm

Sr. No.	Activities	Unit	Unit Cost	Target	Estimated Amount (In NRs.)	Budget Head
1.	Fruit Sapling Production	No.	2	4,000	8,000	1
2.	Vegetable Seed Production	Kg.	3.33	300	1,000	1
3.	Fruit Brandy Production	Litres	7.5	1,000	7,500	1
4.	Fruit Jam Production	Kg.	25	100	2,500	1
5.	Dried Fruits	Kg.	20	50	1,000	1
6.	Root Stock Seedling Production	No.	6.25	4,000	25,000	1
7.	Farmer's Training (Vegetables)	No.	75	20	1,500	3
8.	Farmer's Training (Fruit Production)	No.	150	20	3,000	3
9.	Maintenance of Nursery	No.	-	1	16,000	12.2
10.	Ghasa Nursery Irrigation	-	-	-	100,000	12.2

Note: 1.	Programme Cost (Budget Head 1-10)	408,000
2.	Land (Budget Head - 11)	-
3.	Construction (Budget Head 12.1 & 12.2)	116,000
	<b>Total:</b>	<b>524,000</b>

APPENDIX - VIII

Resource Conservation and Utilization Project

Programme Description FY 2042/43 (1985/86)

Department of Livestock Development and Animal Health

Mustang District

Sr. No.	Activities	Unit	Unit Cost	Target	Estimated Amount (In NRs.)	Budget Head
1.	<u>Animal Health Activities:</u>					
	a) Livestock Treatment	No.	4	5,000	20,000	7.5.2
	b) Vaccination	No.	1	3,000	3,000	7.5.2
	c) Drenching	No.	3.33	15,000	50,000	7.5.2
	d) Dipping & Dusting	No.	2	2,000	4,000	7.5.2
	e) Salt Mineral Block	Kg.	23	400	9,200	7.5.2
	f) Dipping Tank (Portable)	No.		1	20,000	12.2
2.	<u>Range &amp; Pasture Improvement:</u>					
	a) Forage Crop Development	Ha.	1,000	10	10,000	8.1
	b) Pasture Development	Ha.	1,500	30	45,000	12.2
	c) Range Management	Ha.	100	30	3,000	3
	d) Fodder Tree Sapling Distribution	No.	1	8,000	8,000	8.1
	e) Minikit Distribution (Forage)	No.	20	100	2,000	8.1
	f) Nursery Establishment	No.		1	12,000	12.2
3.	<u>Training Programme:</u>					
	a) Leader Farmer's Training (7 days - Mgmt. Training)	No.	200	15	3,000	8.1
	b) Farmer's Training (1 day)	No.	60	50	3,000	8.1
	c) Farmer's Discussion (Sub-centre Level)	Times	1,200	5	6,000	8.1
	d) Farmer's Seminar (1 day)	Times	5,000	1	5,000	8.1
	e) Farmer Tour (15 days)	Person	1,334	15	20,000	8.1

(Continued)

APPENDIX - VIII (Cont.)

Sr. No.	Activities	Unit	Unit Cost	Target	Estimated Amount (In NRs.)	Budget Head
4.	<u>Exhibitions:</u>					
	a) Animals Fair (Sub-centre Level)	No.	1,500	5	7,500	8.1
	b) Animals Fair (District Level)	No.	15,000	1	15,000	8.1
5.	Fodder Tree Sapling Production	No.		10,000		
6.	Seed Production Private Farm	Kg.	10	100	1,000	8.1
7.	<u>Restricted Area:</u>					
	Sub-centre (Residual)	No.	25,000	2	50,000	12.1

Note: 1. Programme Cost (Budget Head 1-10)	808,500
2. Land (Budget Head - 11)	-
3. Construction (Budget Head 12.1 & 12.2)	127,000
<b>Total:</b>	<b>935,000</b>

APPENDIX - IX

Resource Conservation and Utilization Project

Programme Description FY 2042/43 (1985/86)

Department of Irrigation, Hydrology & Meteorology

Mustang District

Sr. No.	Activities	Unit	Unit Cost	Target	Estimated Amount (In NRs.)	Budget Head
1.	Ghami Dhakamar Irrigation (Residual)	-	-	-	893,000	12.2
2.	Chhonup Irrigation Maintenance Stabilization	-	-	-	55,000	12.2

Note: 1.	Programme Cost (Budget Head - 1-10)	327,000
2.	Land (Budget Head - 11)	-
3.	Construction (Budget Head 12.1 & 12.2)	948,000
	<b>Total:</b>	<b>1,275,000</b>

APPENDIX - X

Resource Conservation and Utilization Project

Programme Description FY 2042/43 (1985/86)

Ministry of Panchayat & Local Development

Mustang District

Sr. No.	Activities	Unit	Unit Cost	Target	Estimated Amount (In NRs.)	Budget Head
1.	Marpha Irrigation (Residual)	-	-	-	348,000	12.2
2.	Kunjo Irrigation (Residual)	-	-	-	218,500	12.2
3.	Tukuche Irrigation (Residual)	-	-	-	616,000	12.2
4.	Chhusang Drinking Water (Residual)	-	-	-	314,000	12.2
5.	Chhusang Drinking Water (Residual) Ward No. 8	-	-	-	197,500	12.2
6.	Marpha Drinking Water (Residual)	-	-	-	108,000	12.2

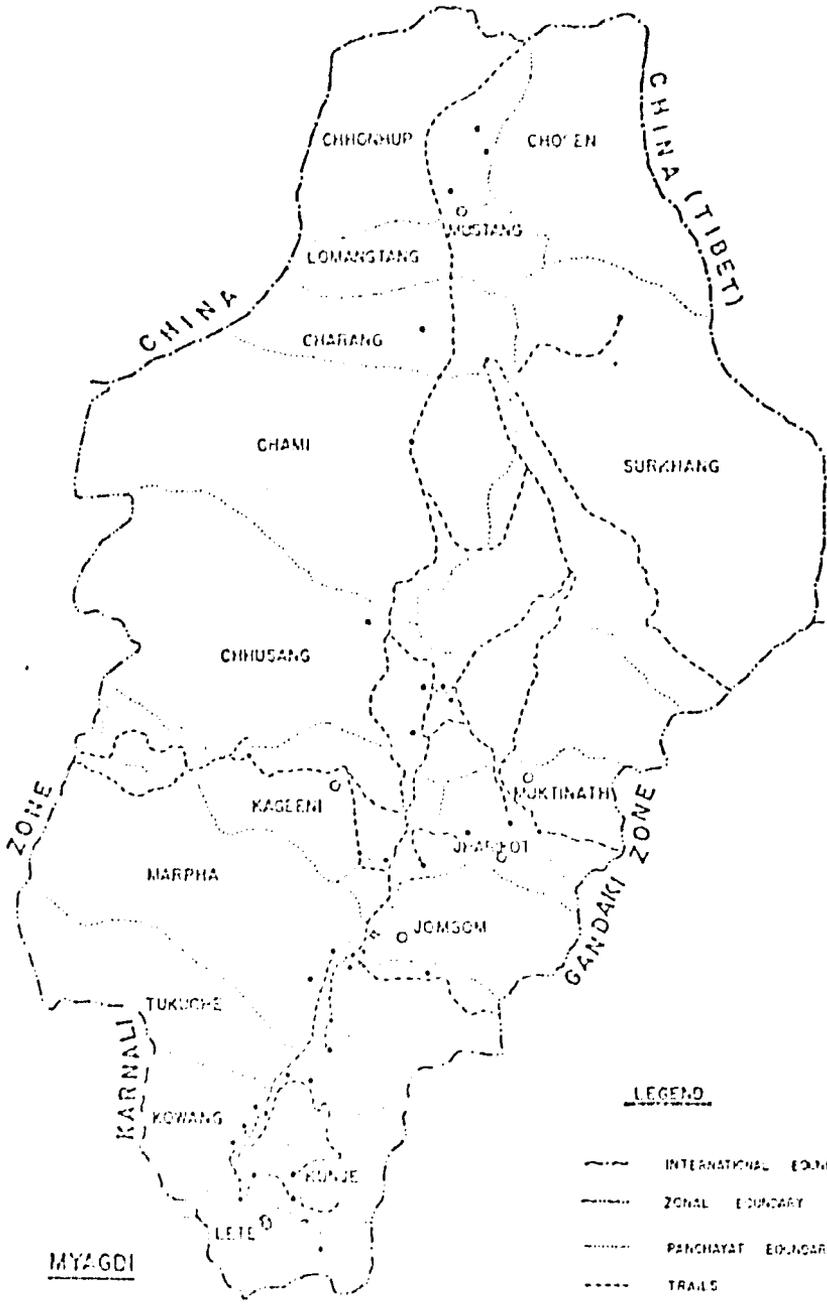
Note: 1.	Programme Cost (Budget Head 1-10)	398,500
2.	Land (Budget Head - 11)	-
3.	Construction (Budget Head 12.1 & 12.2)	1,802,000
	<b>Total:</b>	<b>2,200,500</b>

APPENDIX - XI

Institutional Network to Agriculture

Agencies	No. of Branches (Unit)	Manpower (No.)			
		Technical		Non-technical	
		Officer	Non-Officer	Officer	Non-Officer
ADO	1	2	19	-	4
ADB	1	1	1	-	2
AIC	1	1	1	-	1
NFC	1	-	-	-	3
Agriculture Farm	1	6	38	-	4
Agriculture	6	-	6	-	-
Irrigation Office	1	1	3	-	3
Veterinary	1	3	39	-	6

# MUSTANG



### LEGEND

- INTERNATIONAL BOUNDARY
- ZONAL BOUNDARY
- PANCHAYAT BOUNDARY
- TRAILS
- DISTRICT HEADQUARTERS
- AIRSTRIP

FIG - 1. MUSTANG DISTRICT

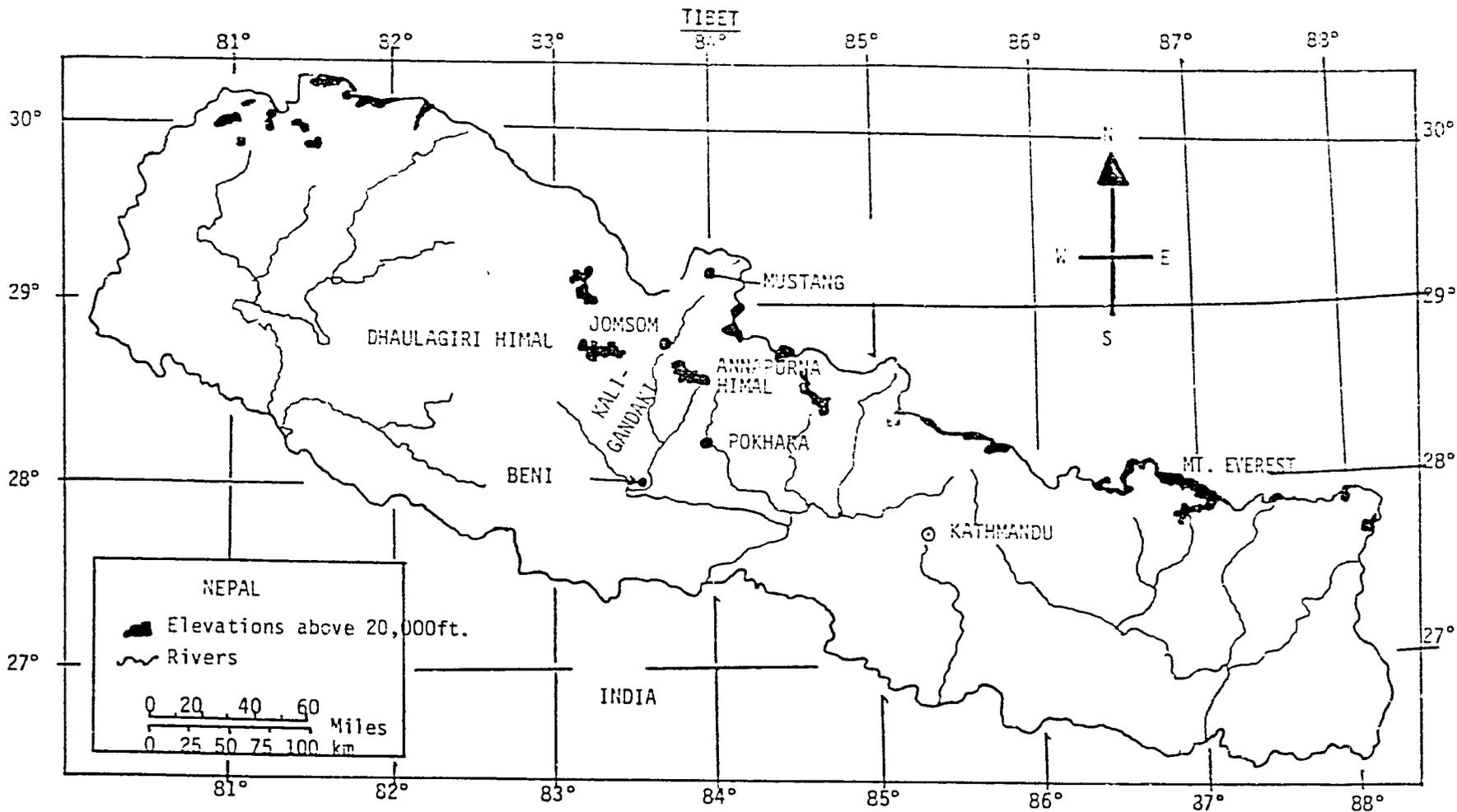


Figure 2: Map of Nepal showing the general location of the Mustang District north of Dhaulagiri and Annapurna along the Kali Gandaki River.

40

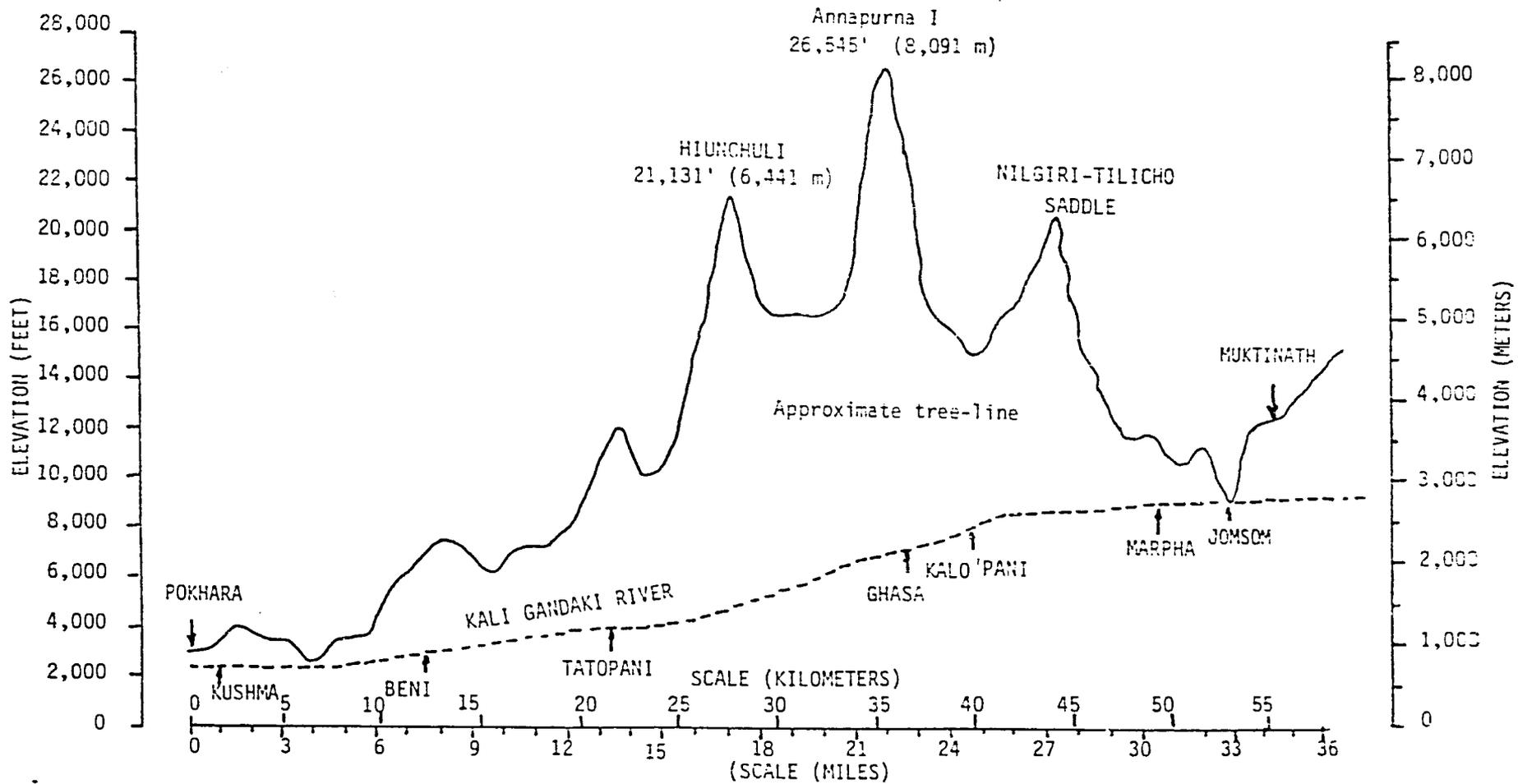


Figure 3: A cross-sectional projection from Pokhara (south) to Jomsom (north) showing the massive topographic relief created by the Himalaya Mountains. Also shown are the locations of major villages along the route of the Kali Gandaki River.

Figure 4: Predominant Cropping Patterns, Mustang

												Elevation (m.a.s.l.)	Area, ha
P or Onion												3961 - 4570	?
W or O. S. or Peas												3961 - 4570	1760
W or N. B. or B or O. S.												3050 - 3960	986
/			B. W. or O. S.			/			N. B. or W			2440 - 3050	1947
Maize					/					W or P or B or O. S.		1830 - 2440	410
Maize					/					W or B		1220 - 1830	10
A	M	J	J	A	S	O	N	D	J	F	M		

B.W. = Buck Wheat; N. B. = Naked Barley  
 O.S. = Oil Seed  
 W = Wheat  
 P = Potato  
 B = Barley

Source: RCUP/APROSC, Vol. IV, Annex, J - K, 1979.