

# Transition in Land-use Conditions of Marginal Farms in Mountain areas of Nepal

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## Introduction

Mountain farming is undergoing several stresses as a result of shrinking landholdings, increased farming on marginal lands, increasing soil erosion and declining farmland fertility, inadequate food production, and degradation of support lands. The scarcity of crop land has serious implications for food security. However, there are ample opportunities for using marginal and sloping lands in sustainable ways if appropriate technological and management choices are made. Mountain areas in the Himalayas have relatively abundant but under utilised marginal land that can be opened to certain types of mountain agriculture. A variety of potential niches and production systems can be developed to make such farming ecologically and economically sound. It is essential to assess the geography and people, particularly the land use patterns, to develop appropriate strategies for technological and management interventions.

This study seeks to identify various types of marginality and access to spatial infrastructure, and the processes of land use and land cover in the Madi watershed.

## Methodology

The study was conducted in the Madi watershed area, which forms one of the major tributaries of the Gandaki river in the central part of Nepal. The watershed was divided into three distinct regions based on topography, geology, land use, and accessibility. The upper region is a high mountain landscape characterised by higher precipitation and lower accessibility. The middle region is moderate in terms of topography, precipitation, and accessibility. The lower region has good accessibility. There are three sub-watersheds – Madi, Rudi, and Midim – in the upper region; five sub-watersheds in the middle region; and two sub-watersheds – Sange and Kalesti – in the lower region. At least 40 households from each village or landscape were surveyed.

Data were collected at the household level using a structured questionnaire that included socioeconomic aspects. In addition to the questionnaire, a checklist was prepared to collect information from group discussions.

## Results

### *Marginality and access to spatial structures*

Marginality is a complex concept that depends on the prevailing socioeconomic and political systems. Because it can be viewed from various perspectives, there is no widely applicable definition of marginality or marginal farmers. However, attempts have been made to review the classification of farm households and the definition of marginal farmers used to date in the context of Nepal.

Since this study sought to identify the spatial issues of marginal farmers, particularly regarding land use patterns, performance, and processes in the Madi watershed, rather than to define and determine the number of people below the poverty line, the size of landholding was used to define marginality. Farm households holding less than 0.5 ha were defined as marginal, those with 0.5-2 ha as small, and those with more than 2 ha as medium and large.

Of the 556 households surveyed, nearly 38% were classified as marginal, 51% as small, and less than 2% as large. The proportion of marginal farm households was comparatively high in the lower part of the watershed at 46%, but decreased to 37% in the middle and 33% in the upper part. However, even marginal farm households sometimes rent their land to other small farm households.

A large number of ethnic groups with different cultural backgrounds inhabit the Madi watershed. More than 45% of farmers in the Kami, Damai, Sarki, Darai, and Kumal ethnic groups had marginal landholdings, and this figure was consistent in all parts of the watershed. Traditionally, these occupational caste groups did not possess large landholdings. The percentage of marginal farm households among the Magar and Newar ethnic groups was also higher than the overall average. Newars were traditionally involved in trade and business, so they tend to have small landholdings.

## **Process of Land Use and Land Cover**

The assessment of existing land use and land cover conditions was confined to privately owned land.

### ***Types of land and landholding size***

The average size of 'khet' (irrigated) landholdings for the whole watershed was 0.4 ha; 0.3 ha in the lower, 0.4 ha in the middle, and 0.5 in the upper area; and 0.1 ha for marginal, 0.5 ha for small, and 1.1 ha for medium and large households.

The average size of 'bari' (rainfed) landholdings was around 0.4 ha in the lower, middle, and upper areas. Thus average khet holdings in the upper areas were more than bari, and in the lower region less. The lower area is drier, and most of the lower and middle parts of the watershed are rain fed, although the production potential of land in the lower part is higher than that of land in the upper part. Two to three crops a year can be grown in the lower region with provision of water and other agricultural inputs, whereas only one crop can be grown in the upper part because of temperature limits. A large labour force has been employed in converting rainfed bari land to khet land in the upper part, where the availability of water has made this feasible.

The average size of bari landholdings among marginal, small, and medium and large farm households was 0.2, 0.4, and 0.8 ha, respectively. The average size of bari landholdings among the marginal households was more than the average size of khet land in all eco-regions, showing the domination of rainfed crop land among marginal farm households.

'Kharbari' is open land used to grow thatch or to graze animals. The overall average amount of such land among marginal farm households was 0.004 ha; 0.005 ha in the lower, 0.006 ha in the middle, and 0.002 ha in the upper region.

'Korea' is land used for shifting cultivation. This type of land is confined to the upper region; the average size was 0.006 ha, and 0.008 ha among marginal farm households. In the past, this type of land was used to grow crops in three- or five-year rotations. However, this type of cultivation has stopped due to labour shortages resulting from migration of the economically active population and strict prohibition of such activities by the Annapurna Conservation Area Project. Such land could be utilised to grow permanent crops in the future.

Abandoned khet and bari lands, which were used to grow crops in the past, have been left fallow, particularly in the upper region and the ridge slope of the middle and lower regions. The reported average size of such landholdings in the watershed was 0.1 ha, 0.02 ha in the lower, 0.02 ha in the middle, and 0.18 ha in the upper region. Overall, the amount of abandoned land, particularly in the upper and middle regions, appeared to be higher than reported.

Wasteland occupied by landslide debris or sand and gravel brought by the river at flood times is also cultivable. The average size of such landholdings was 0.012 ha: 0.006 ha in the lower, 0.003 ha in the middle, and 0.02 ha in the upper region.

On average, each household owned 0.16 ha of wasteland, 21% of the average crop land area owned. Marginal farm households owned 0.3 ha wasteland on average, 33% of the average crop land area owned by these households.

## **Land Cover**

### ***Crop combination and cropping intensity***

Nepalese farmers generally grow more than one crop on each plot, but in this area nearly 28% of the plots owned were under a single crop system; 36% produced two crops, 6% three, and less than 2% more than three. Among marginal households, 26% of plots produce a single crop, among small 29%, and among medium and large households 25%. Marginal households have a higher percentage of plots producing more than one crop than small and medium and large households.

In terms of area, nearly 31% of all cropland was under a single crop system, 36% under a two-crop system, 9% under a three-crop system, and 3.5% under a more than three-crop system. The proportion under a one-crop system ranged from 24% in the lower, to 36.5% in the middle, and 32.2% in the upper area. Similarly, the percentage under a two-crop system ranges from 37.2% in the lower, 35% in the middle, and 35.8% in the upper. The percentage under more than a two crop system is 26.6% in the lower, 13.1% in the middle, and 5% in the upper. The area under a single-crop system among marginal farm households is 29.6%, followed by 43.4% for a two-crop system and 16% for more than a two-crop system. Nearly 10.8% of crop land is left fallow.

The average cropping intensity in the watershed was 140%, which is very low compared to the figures from the National Sample Census of Agriculture in 1991/92 of 177% for hill areas and 161% for mountain areas, but higher than the 123% for hill areas and the 125% for the mountain areas reported by the National Census of Agriculture in 1981/82. Cropping intensity ranges from 154% in the lower to 147.7% in the middle and 129.5% in the upper areas. Cropping intensity among marginal farm households was 154%. Cropping intensity on bari land (157%) was higher than on khet land (123%). Bari land is dominated by a two-crop system of maize and millet, whereas the khet was dominated by a single crop, paddy. In areas along the river valleys where irrigation is available, up to three crops – paddy-wheat-paddy or paddy-wheat-maize – are grown on khet land. But the overall percentage of area under two or more crops in khet land is very low, mainly due to the winter shortage of water for irrigation, particularly in the middle and lower regions.

## **Horticulture**

Commercial production of fruit is a recent phenomenon in this area. In some pockets of the watershed, oranges and other citrus fruits are now grown, but this activity has not yet developed in other parts of the watershed despite being economically and ecologically very sound. The average number of fruit trees or plants grown by each household was very low.

On average, each household in the watershed grew 3.3 orange trees, 12.3 banana trees, 15.3 pineapple plants, 0.3 mango trees, and 0.7 guava. The average number of orange trees ranges from 3.3 in the lower to 5 in the middle and 2.3 in the upper. For banana, the range is from 13.6 in the lower to 29 in the middle and 0.3 in the upper. For pineapple, it is 10.5 in the lower, 42.6 in the middle, and 0.4 in the upper. The average quantity of production is again very low among marginal farm households.

## **Conclusions**

The development problem in this area is not lack of capital but lack of technology and management skills. Future development efforts should be focused in this direction.

A large amount of cultivable wasteland is now under-utilised. If appropriate technology and management skills are provided, these lands could be utilised to improve the economic conditions of farm households. Though the volume of monsoon precipitation is quite high, water is scarce during winter in the upper slopes, particularly in the middle and lower part of the watershed. Rainwater harvesting and management could allow such cultivable wasteland to support permanent crops.

Landholdings are not only small; they are also highly fragmented. Poor farmers lack the right to use abandoned plots, so they encroach upon the forest area. This implies that the rules and regulations of land ownership rights should be reviewed and appropriate rules and regulations formulated to solve this problem.

The production of agricultural crops is not sufficient to provide food security, and the area is in food deficit. Abandoned terraces should be utilised in a sustainable way.

Increasing scarcity of cropland due to rapid population growth is a major challenge in Nepal. Diversities due to spatial variation in altitude, slope, climate, vegetation, and socioeconomic and cultural values and practices of the local people have created a variety of potential niches and production systems in mountain areas. The present level of food production can be raised through intensification and diversification based on the land's production potential. Large amounts of land such as 'kharbari', 'parti', 'bagar', 'gauchar' and 'butyan' exist outside the current area of crop land under different ownership rights – private, community, and government. These 'marginal lands' also have specific niches or comparative advantages that can be harnessed in a sustainable way for productive use, if appropriate technological and management choices are made.