

I. Study Area Background

Introduction

In most developing mountain areas, agricultural production, broadly speaking, is the main activity on which people depend for their livelihood. The population is closely affected by agricultural development which is closely related to the environmental conditions. The recent rapid population growth in mountain areas has resulted in increased competition for limited resources and, consequently, pressure on the physical, economic, and social environment. The paper deals with Lhasa District in Tibet as the focal area and discusses agricultural development, population growth, and their interactions.

This paper is a part of the long-term Mountain Farming Systems' programme at ICIMOD, focussing on the development of sustainable mountain agriculture in the Hindu Kush-Himalayan Region (Jodha et al. 1992). As per the broad typologies focussed on by ICIMOD studies, Lhasa District represents an area characterised by high mountain agro-pastoral farming systems. The purpose of the paper is to review past experiences, to identify the basic changes, and to raise some questions in the context of future development of the region in order to sensitise policy-makers, planners, researchers, and technicians to further considerations of sustainable agricultural development in mountain areas.

The former administrative area of Lhasa District covered 12 counties and Lhasa City. In 1984, during organisation of the new administrative area, four counties, namely Moto, Milin, Linzhi, and Gongbujiangda were formed out of it. The Lhasa District discussed in the paper is not the former but the new administrative area.

This review attempts to answer a number of questions by analysing data collected from the period from 1958 to 1984.

1. What have been the changes in the agricultural sector?
2. What have been the changes in population structure?

3. What factors contributed to these changes?
4. What are the interactions between agriculture and population?
5. What are the constraints to development?
6. What lessons can be learned from past experiences?

Physical and Environmental Features

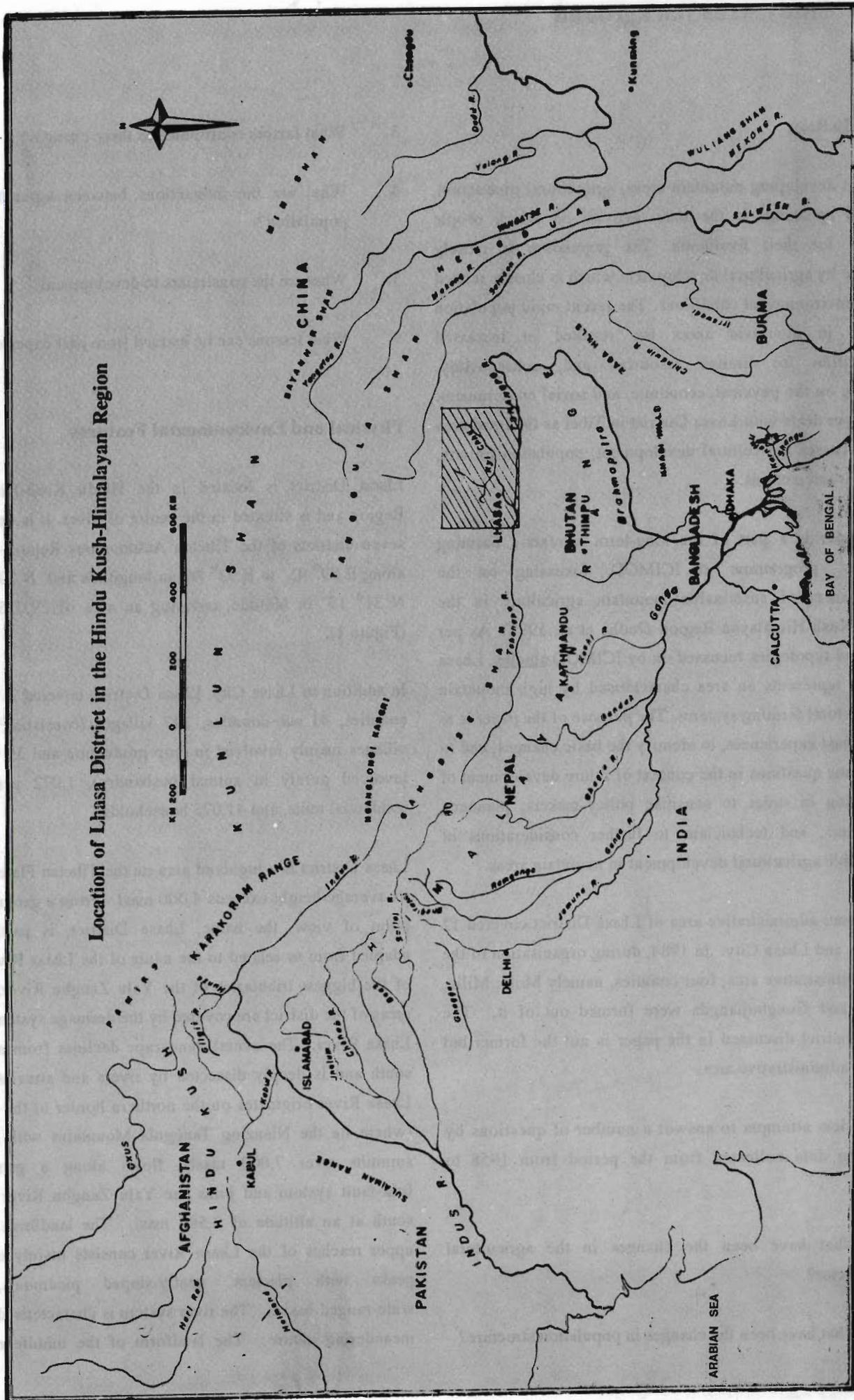
Lhasa District is located in the Hindu Kush-Himalayan Region and is situated in the centre of Tibet. It is one of the seven districts of the Tibetan Autonomous Region and lies along E 89° 45' to E 93° 26' in longitude and N 29° 08' to N 31° 15' in latitude, covering an area of 29,025 sq.km. (Figure 1).

In addition to Lhasa City, Lhasa District, covered in 1984, 8 counties, 41 sub-counties, 197 villages (consisting of 158 villages mainly involved in crop production and 39 villages involved purely in animal husbandry), 1,072 permanent residential units, and 41,075 households.

Lhasa District is a highland area on the Tibetan Plateau, and its average height exceeds 4,000 masl. From a geographical point of view, the name, Lhasa District, is particularly adapted from or related to the name of the Lhasa River, one of the biggest tributaries of the Yalu Zangbu River. Most areas of the district are covered by the drainage system of the Lhasa River. The overall landscape declines from north to south and is deeply dissected by rivers and streams. The Lhasa River originates on the northern border of the district (where lie the Nianzing Tanggula Mountains with several summits over 7,000 masl), flows along a geological fold-fault system and joins the Yalu Zangbu River in the south at an altitude of 3,580 masl. The landform of the upper reaches of the Lhasa River consists mainly of high peaks with glaciers, gently-sloped piedmonts, and wide-ranged basins. The river system is characterised by its meandering nature. The landform of the middle reaches

FIGURE 1

Location of Lhasa District in the Hindu Kush-Himalayan Region



(from Lhumzhub to Maizhu) of the Lhasa River is deeply dissected and the valleys are mostly V-shaped. Several old alluvial terraces (but very narrow) remain on the steep slopes of the valleys. In the lower reaches of the Lhasa River, broader valleys, both along the main river and along its tributaries, are distributed and alluvial plains, extending from six to eight kilometres in width, are formed. Old plateau surfaces, dispersed by dissected valleys, remain separately on the ridges of the Lhasa Valley.

The climate in Lhasa District is semi-arid and temperate (Zhang Rongzu et al. 1982), dominated by a highland monsoon pattern. According to the records of several climate stations (Figure 2), the mean annual temperature ranges between 1 to 8°C and the mean annual precipitation varies from 300 to 700mm. The "Golden Season", as the local people refer to it, is the period from June to September when the temperature is higher (8 to 16°C) and the rainfall is heavier (200 - 600mm, accounting for 80 per cent of the mean annual precipitation). The other seasons are generally a dry-windy spring, short autumns, and long cold winters. The climate in Lhasa District is characterised by vertical differences caused by the enormous variation in elevation between high ridges and valleys. According to former studies, it is recognised that the mean annual temperature decreases 0.57°C for every increase of 100m in elevation (Gao Youxi et al. 1984), and the mean annual precipitation increases by 15mm for every increase of 100m in elevation below 4,800 masl (Liu Yanhua et al. 1983). These differences influence the development of vegetation, soil, and land use patterns considerably.

Land Use

According to the official records, agricultural land occupied 92.6 per cent of the total land in Lhasa District. Out of the total agricultural land, 283.6 sq. km. were used for crop production and 26,600 sq. km. were used for animal husbandry.

Crop production and animal husbandry are the major land use activities in Lhasa District. Distinct differences in land use patterns occur as one moves upwards from the valley basins to the hills/mountains. Regarding agroclimatic

differences, two vertical zones, a cropland zone (below 4,200 masl) and a pastureland zone (between 4,200 and 5,400 masl) are identifiable.

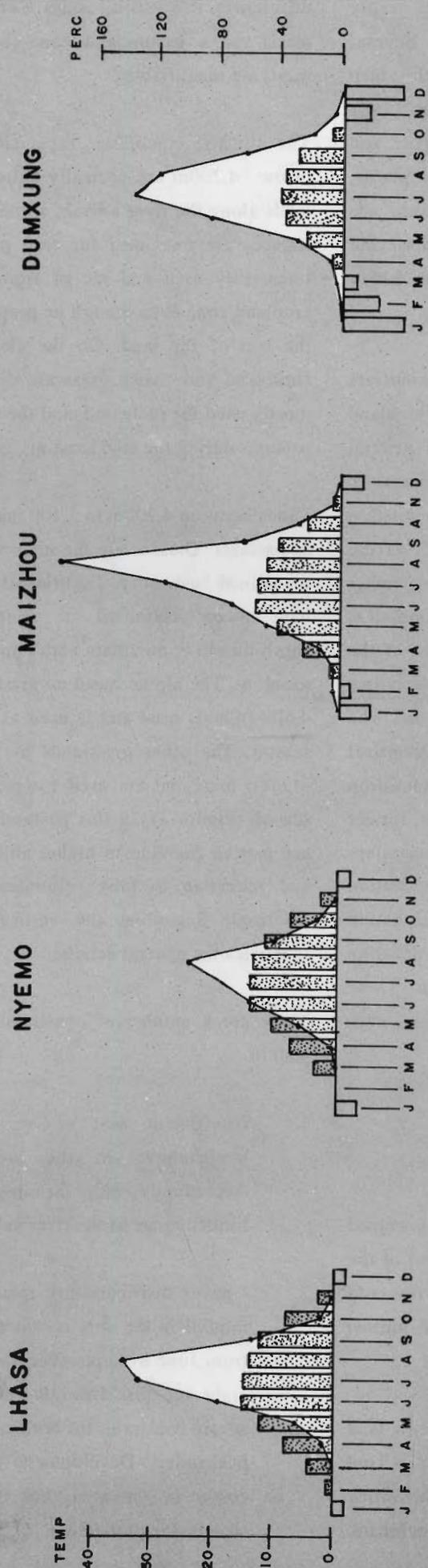
The climatic conditions, especially temperatures, in areas below 4,200m are normally suitable for crops. Therefore, lands along the river's bank, alluvial-diluvial fans, and river terraces are reclaimed for crop production. Croplands are intensively used and are of significant importance in the cropland zone even though its proportionate area is less than the rest of the land. On the slopes, semi-arid temperate shrubland and coarse grass are distributed. The shrubs are mostly used for fuelwood, and the coarse grasses are used as pastures during the cold season.

Lands between 4,200m to 5,400 masl are predominantly used as pastures. Grasses are the main valuable natural resources for animal husbandry. Traditionally, four types of grassland have been classified : alpine meadow, subalpine shrub-meadow, mountain shrub and coarse grasses, and wet meadow. The alpine meadow grassland is distributed above 4,600 (4,800) masl and is used as pasture during the warm season. The other grasslands are distributed below 4,600 (4,800) masl and are used for pasturing during the winter season (Figure 3). In this pastureland zone, a shifting land use pattern (moving to higher altitudes in the warm season and retreating to lower altitudes in the cold season) is practised. Regarding the vertical distribution, Figure 4 illustrates the general details.

There are a number of constraints confining the land use pattern.

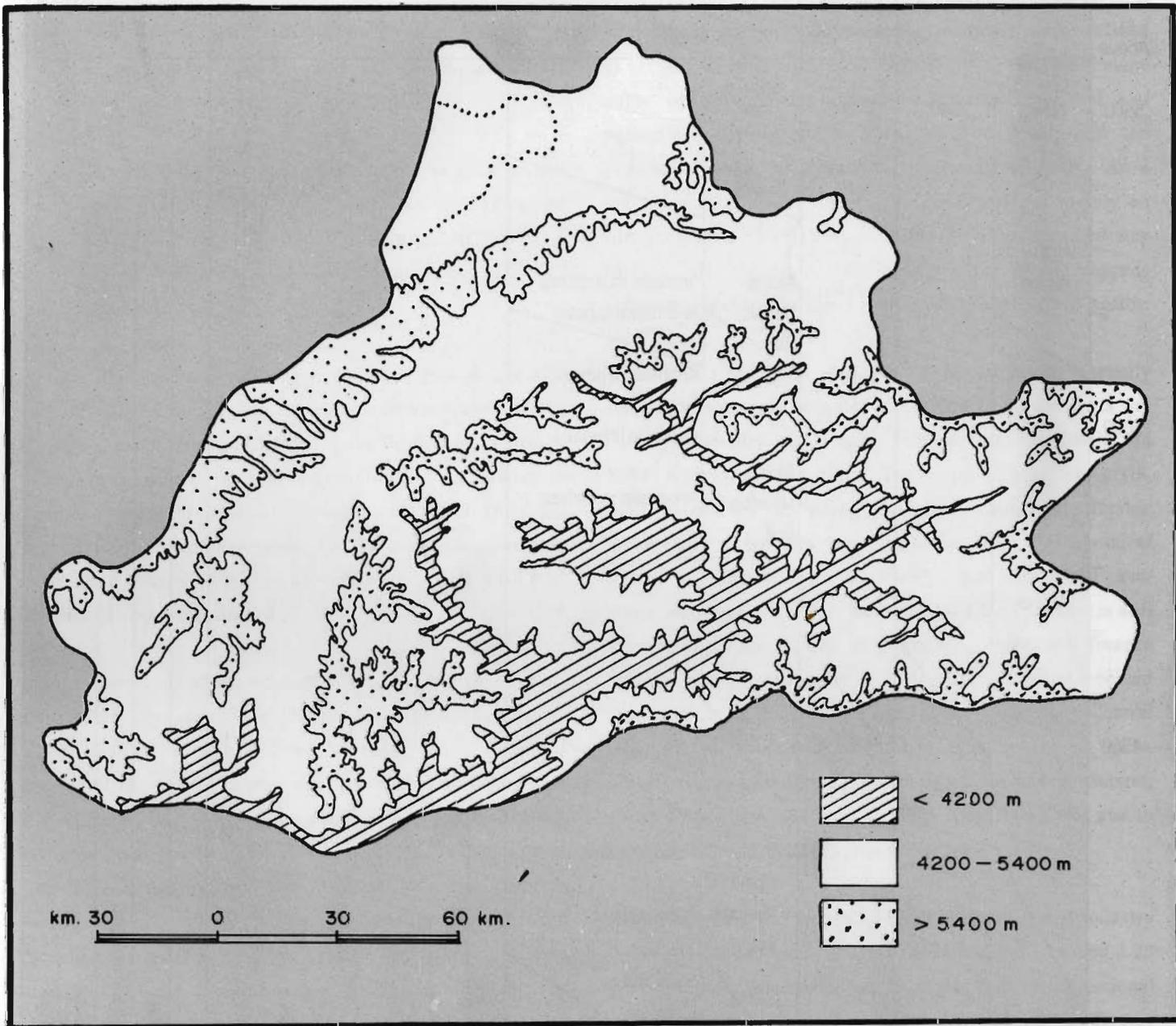
1. Insufficient heat - Due to the high elevation, temperatures in the area are relatively low. Accordingly, crop farming is only possible in the limited range of the river valleys below 4,200m.
2. Uneven distribution of rainfall - Due to the fact that rainfall in the area is concentrated during the period from June to September, the drought period lasts for eight months. Drought, especially in spring, is a severe constraint for both crop production and animal husbandry. Development of irrigation systems is costly in the area, but it is the basic need for sustainable production.

FIGURE 2: GRAPHS DEPICTING DIFFERENT CLIMATES



ALT. (m)	3648.7	3809.4	3824.0	4200.0
LAT.	29° 40'	29° 26'	29° 53'	30° 29'
LONG.	91° 08'	90° 10'	91° 47'	90° 06'
\bar{P} (mm)	448.1	324.2	542.1	480.9
\bar{T} (°C)	7.7°c	5.3°c	5.4°c	1.3°c
Exp. (mm)	2205.6	2268.2	2147.5	1920.2
Rec. (year)	1951-1980	1973-1980	1978-1980	1962-1980

Figure 3: Topographical Features of Lhasa District



3. Rugged topography - The mountain areas of Lhasa District are heavily dissected. The physical environment is very fragile; characterised by steep slopes, shallow soil layers, and scattered vegetation cover. In general, the thickness of the mountain soil is only about 10 to 15 cm. Once the soil erodes, it is hard to rehabilitate it.

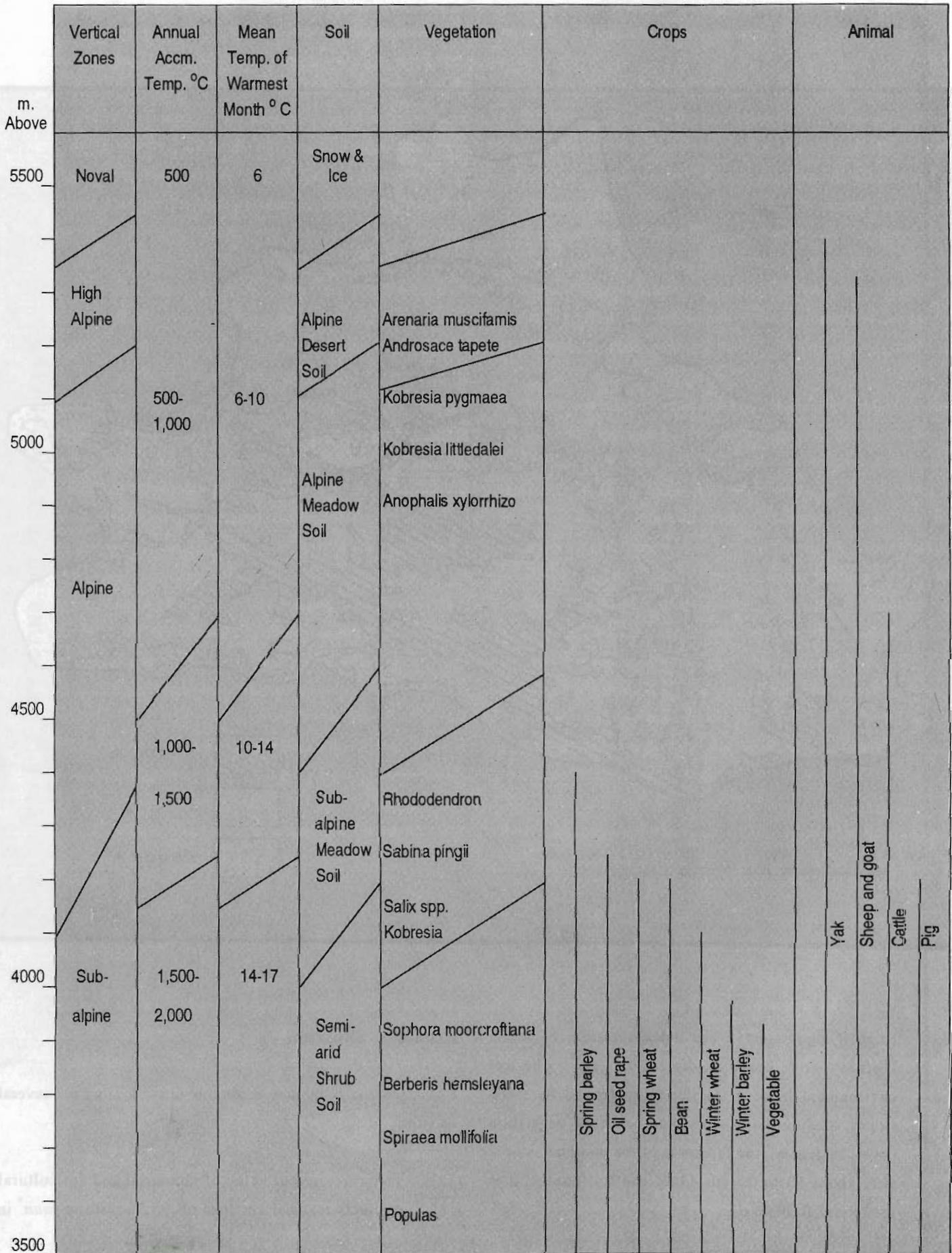
Economic Situation

Lhasa District is the key economic area of Tibet for several reasons.

1. The gross output value of industrial and agricultural products reached a record of 95.36 million *yuan** in

* In 1984 there were 4.5 *yuan* to one U.S. dollar.

Figure 4: Land Cover and Land Use in Lhasa District



1984 (at 1980 constant prices), accounting for 11.81 per cent of that of the Tibetan Autonomous Region as a whole, although the area of Lhasa District is only 2.42 per cent of the total area of Tibet.

2. The productive capabilities, in the context of technology, productivity, and management, are higher than average for Tibet.
3. The economy has developed faster (the gross output value of industrial and agricultural products increased 4.31 times from 1958 to 1984) than that of Tibet as a whole, which increased 3.16 times from 1958 to 1984.

Besides the environmental aspects, other factors are also equally important for the economic development of the district. Firstly, Lhasa District is the historical centre of Tibet, both politically and economically. According to historical records, regional exploitation started from the second or third century when the *Tu Fan* Kingdom was established. Since then, the central or key role of Lhasa District has been maintained.

Many technological innovations were created in or were introduced first into this district and from here were extended to other areas of Tibet. Secondly, Lhasa District is located at the hub of communications and is well-linked to the Sichuan and Qinghai provinces. Commercialisation, however, has partly stimulated economic development. Thirdly, Lhasa City, the capital of the Tibetan Autonomous Region, is located within the district. Because of this it has 37 per cent of the total population, resulting in mass consumption and creating a big demand for products. On the one hand, the citizens, who receive allowances for working in a remote region, have sufficient purchasing ability, and, on the other hand, the produce, particularly the basic food items, are in short supply. Until recently, the demand was greater than the supply.

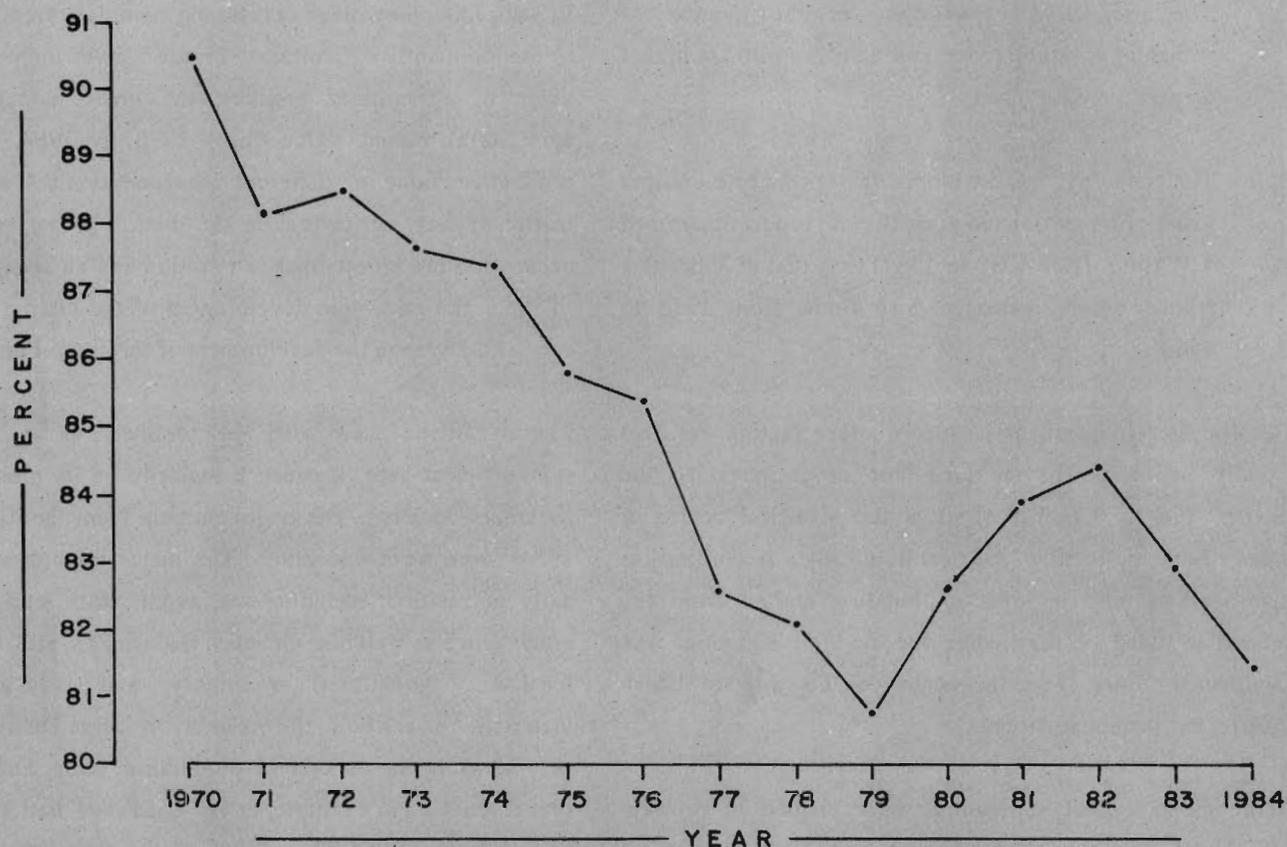
This situation could have acted as an incentive to produce more and could have become an important factor in economic development.

Although Lhasa District is the key economic area of Tibet, it is, still, like many other developing mountain areas, defined as predominantly agricultural. Figure 5 gives the percentage value of agricultural produce, the gross industrial and agricultural output value from 1970 to 1984, and the productive value of different components in 1984. As a matter of fact, agriculture in the district is not merely an occupation but an established tradition and an accepted way of life. The economic development of the district depends substantially upon the development of the agricultural sector.

Lhasa District can also be defined as a partially self-sufficient area, because a majority of its products are consumed locally. The major outputs from the district (in 1984) were wool and hide. The major imports are grain, daily necessities (including tea, sugar, cloth, etc), durable goods (such as watches, bicycles, radios, TVs, etc), chemical fertilisers, agricultural machinery, and industrial raw materials. As a whole, the economy of Lhasa District is still very weak in the aspects of production, trade, and finance (net revenue). For example, in 1984, Lhasa District received an amount of 51.79 million *yuan* from the Central Government, accounting for 54.31 per cent of its gross industrial and agricultural output value. From this amount, about 20 per cent was used for importing food grain and to support agricultural development.

Regarding the gross output value of agriculture and industry (GOVAI) per land area (1984), Lhasa District recorded 3.28 thousand *yuan* per km²; about four per cent of the national average of China. Regarding GOVAI per capita, the figures for Lhasa District were about 330 *yuan* (1984), 37.4 per cent of China's average. The above comparisons indicate, to a great extent, that the economic situation is behind the remainder of country.

Figure 5: Percentage of Output Value from Agriculture to the Gross Output Value in Lhasa District



Contribution from Different Sectors in 1984
(at 1980 constant prices)

(yuan x 10⁴)

	Value	Per cent
1. Agriculture: crop production	3033.20	39.0
2. Animal husbandry	3101.50	39.9
3. Forestry	52.16	0.7
4. Fisheries	6.54	..
5. Sidelines	1587.42	20.4
Total	7780.82	100.0

Source: Compiled by the author