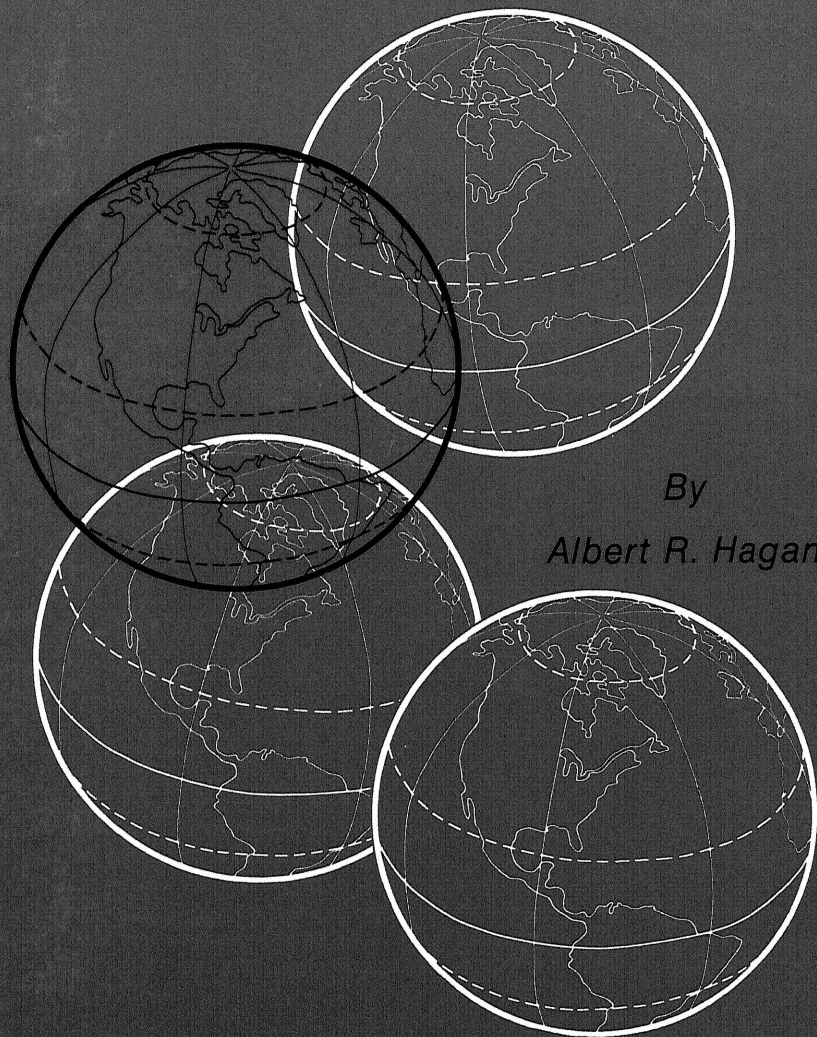


# the agricultural development of nepal



By  
*Albert R. Hagan*

## analysis of the agricultural sector

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# PREFACE

## Introduction

This evaluation of the agricultural sector in Nepal resulted from a special study sponsored and financed by USAID/Washington and USAID/Nepal through Personal Service Contract No. AID/ASIA-C-1082 (Nepal) and conducted during April and May of 1974. During the same time period, Dr. Fran LeBeau served as a USAID consultant to review and evaluate past USAID administrative and training programs in Nepal.

Information and impressions for this study were gained by the author from an extensive review of government reports and agricultural development projects in Nepal since 1951, both those sponsored and supported by USAID and by numerous other external donors. Personal assistance also was given with a nation-wide farm management study in Nepal in the late spring and summer of 1971. During the two assignments, opportunity was provided for visiting research stations, villages, and individual farms throughout the country, as well as several development projects sponsored by other countries. Most of the agriculture research stations and farms were included in these visits. The seven stations include Jumla, Bhairawa, Rampur, Parwanipur, Jiri, Dhankuta, and Terahara. Research farms consist of Janakpur, Hardinath, Khumaltar, Kakani, Nepalganj, and Doti. Approximate locations are shown on the map in Figure 1 (page iii).

## Nepal's Fifth Plan

During the time of this study in the spring of 1974, formulation of the fifth five-year plan (1975-80) for Nepal was in the process of development. In 1975, the Fifth Plan was finalized and salient features are summarized in a recent publication prepared by the National Planning Commission.<sup>1</sup> Basic guidelines for developing the Plan were derived from the country's constitution which "aims to establish a democratic, just, dynamic and egalitarian society" and from a directive of His Majesty the King "to make development people-oriented on the basis of regional balance."<sup>2</sup>

Several characteristics of the Fifth Plan are closely related to the content of this publication and emphasize the necessity for regional balance and the predominant role of agriculture in long-run development. This relationship is highlighted by brief references to a few key features of the plan.

Integrated regional development is emphasized in the Fifth Plan. North-South growth axes, earlier suggested by Harka Gurung<sup>3</sup> and included in the Fourth Plan, are projected as development corridors to connect the geographic regions. The location and extent of these four growth axes are shown in Figure 2 and in Appendix Table XXIX. The plan also will strengthen the planning and administration of development programs and projects through four National Development Regions—the Eastern (Dhankuta), Central (Kathmandu), Western (Pokhara), and Far Western (Surkhet). These regions are illustrated in Figure 1 which also shows the location of research stations established to help support and accelerate agricultural development.

Allocation of resources for development in the Fifth Plan includes departures from earlier plans. One new feature is the predominance of internal resources in

<sup>1</sup>NEPAL, The Fifth Plan (1975-80), in Brief. National Planning Commission, His Majesty's Government, Nepal, September 1975.

<sup>2</sup>Ibid., page 1.

<sup>3</sup>Harka Gurung, Regional Development Planning for Nepal. National Planning Commission, His Majesty's Government, Kathmandu, 1969.

development expenditure outlays, 55 percent of the total. Another is the provision of maximum and minimum levels of financial resources and physical targets. Three major sectors are recognized for projected budgetary allocations—Government (Public), Panchayat, and Private—and each includes distribution among four major categories of expenditures. These projected allocations are indicated in Appendix Tables XXX, XXXI, XXXII, and XXXIII.

In the Fifth Plan, the agricultural sector will play a leading role, with special emphasis on irrigation developments; on increased production of cash crops and food grains; on expanded output of fruits, fish, meat, and milk; and on stimulating increased participation of farmers at the village level in all Government sponsored development programs. Allocations of 29.8 to 30.2 percent of Government expenditures and 34.4 to 34.8 percent of the total outlays indicate the high priority assigned to agricultural development (Appendix Tables XXXI and XXXII).

## **Acknowledgements**

The author wishes to acknowledge with appreciation the suggestions and assistance provided by the following individuals:

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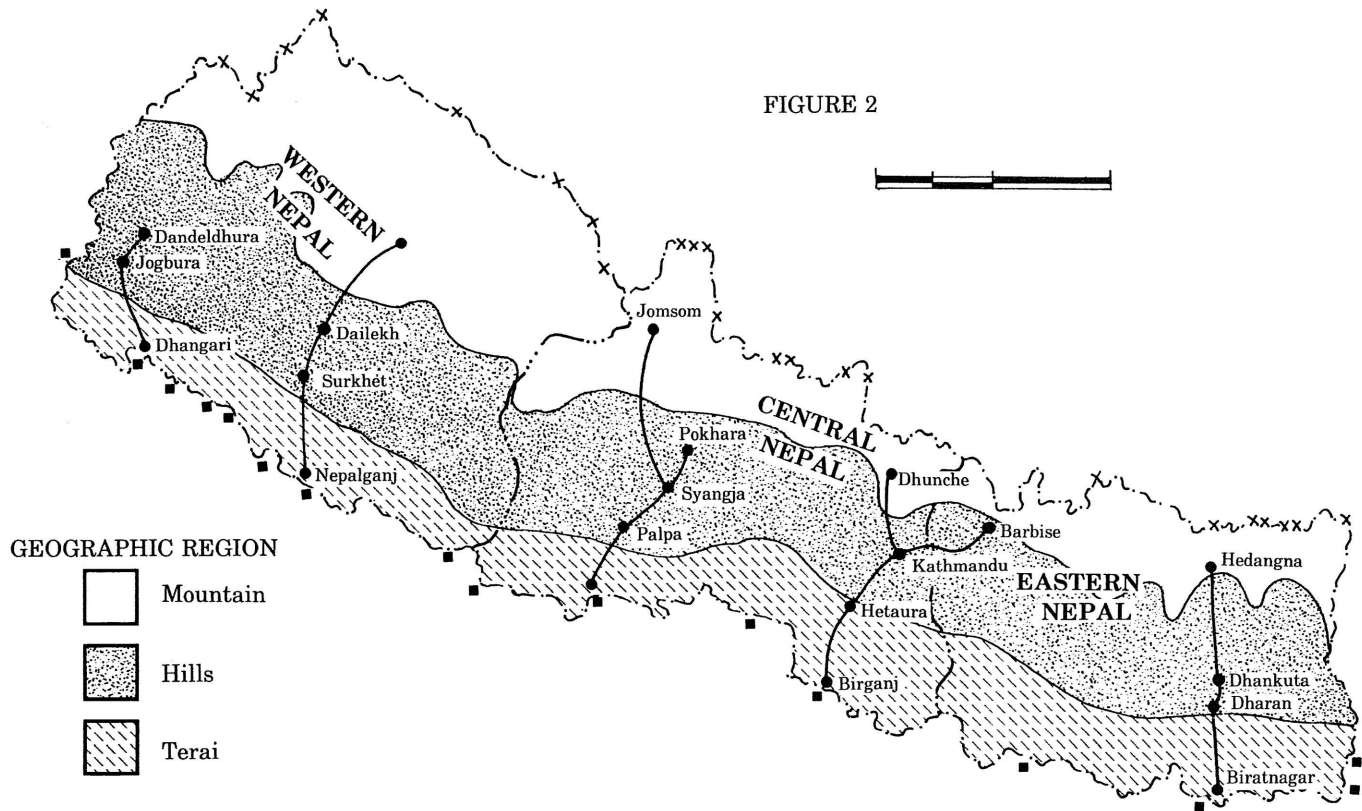
Agricultural Economics

FIGURE 1




III



FIGURE 2



GEOGRAPHIC REGION

-  Mountain
-  Hills
-  Terai

Source: Harka Gurung, Regional Development Planning for Nepal. National Planning Commission, His Majesty's Government, Kathmandu. 1969. (Page 10-11)

# SUMMARY AND GENERAL OBSERVATIONS

## Summary

The first step in developing this evaluation was to review the basic agricultural resources in Nepal and to project goals for their longrun development and use, drawing upon public expressions by government officials.

The second step was an attempt to classify and itemize major constraints to achieving the expressed goals. Six broad categories of constraints were considered to be physical; technological; economic; manpower; demographic, social, and cultural; and institutional, including those of a political and administrative nature.

A major premise was that longrun economic development of a major sector of the economy, such as agriculture, could proceed in an orderly and effective manner only through the choice of some overall development strategy to serve as a guide in the selection of programs and projects, in establishing priorities for development, and in allocating funds and other resources.

Five different strategies were conceptualized for evaluation and comparisons. These included 1) a project-oriented strategy; 2) a Terai-First Strategy; 3) an Hills-Emphasis Strategy; 4) a Terai-Hills Strategy; and 5) an Integrated Regional Development Strategy. After a brief description of each strategy, some arguments "for" and "against" adoption of each were summarized.

After considering and comparing some of the consequences hypothesized for each strategy, the first three were rejected on the basis of efficiency and equity considerations. The project-oriented strategy seemed to lead to haphazard, fragmented, and piece-meal efforts with little direction for coordinated longrun development.

The next two strategies — involving the allocation of most development resources either to the Terai or to the Hills — seemed to be divisive in nature and to generate even wider disparities between regions. With a primary goal of achieving rapid increases in total food grain production in Nepal, strong arguments could be made for the Terai-First Strategy because of much greater potential for higher agricultural production. Current use of resources seemed far below their potential, and easy accessibility to improved agricultural inputs gives the area a decided locational and economic advantage.

However, if the primary national goal is more equitable distribution of the fruits of increased productivity among all people, and especially to the disadvantaged small farmers, the Hills-Emphasis strategy might seem a wiser choice — at least in the shortrun. Most of the people (over 60 percent) live in the Hills. Pressure on land resources is greatest with only 0.1 ha of cultivated land available per capita and 0.3 to 0.4 ha. per household. Annual income per person also is low, with estimates in the \$30 to \$40 range. While population in the Hills continues to grow at a rate of approximately 2.0 percent per year, production of major food grains has been declining at the rate of 2.1 percent annually for the eight-year period ending in 1972.

From the standpoint of increasing total food grain production, limitations in the Hills are formidable. Land use already is approaching the limits of crop production. The extensive margin already may have been passed as substantial acreages of steep mountain-side fields should be retired from cultivation because of extreme erosion and landslide hazards. Intensity of land use is much higher than in the Terai — ranging from 150 percent to as high as 250 to 300 percent in some irrigated valleys. One must conclude that the possibility of any rapid and dramatic increases in food grain production in the Hills is quite remote — despite recent government proposals for massive inputs of fertilizers and improved seeds in a "three-year crash program."

The recommended strategy for development is a dual strategy — a combination of strategies 4) and 5) — geared to shortrun and longrun development problems and opportunities peculiar to the Terai and Hill areas.

The Integrated Regional Development Strategy seems most desirable for longrun agricultural development. It offers greater opportunity for coordinated and unified development of Terai, Hills, and Mountain areas within each of the four development regions. Complementarities in the use of widely diverse resources in each region can be achieved more readily. And, this strategy seems to be in accord with government development plans since four north-south development regions already have been established.

For the shortrun (such as the next five-year plan), some arguments are given for following a Terai-Hills Strategy. The shortrun needs in each area seem to differ because of disparities in the current stages of development.

In the Hills, time is needed for getting regional staff members assigned and programs organized for development. Also, little information is available at present on the adaptability of improved varieties of seeds and fertilizers to the numerous micro-climatic conditions which characterize Hill agriculture. Hence, several proposals are made for intensive preparatory work in the Hills during the next 5 years to build a foundation for sound longrun development under the Integrated Regional Development Strategy. In the intervening time, suggestions are made for public works programs and special emergency efforts to alleviate acute economic stresses which arise.

In the Terai, numerous development projects are just now approaching the stage where they can make substantial contributions to the nation's longrun agricultural development. For example, the research stations and farms serving each region now have the land, facilities, and a nucleus of young research scientists to direct the work. However, reorganization of food grain research into commodity-oriented groups is just now in initial stages. Time is needed to adjust to the new structure and to take advantage of the assistance of highly trained researchers from external sources in mapping out a sound research program for longrun development. Time also is needed for establishing additional sub-stations and field trials in selected Hill locations for testing varieties, soil treatments, and other technologies for local adaptation. The next five-year period will provide the time needed for consolidating the progress with this research project, and with several others, in preparation for the future regional integrated programs.

Proposals for implementing the suggested strategies include a summation of roles which might be assumed by central government, by regional staff members, and by external donors — along with their inter-relationships. Specific suggestions are offered for projects and programs which may be helpful in implementing each phase of the two-pronged development program within the next five years.

Procedures for evaluating programs and projects need to be formulated within a logical and systematic framework. A suggested 10-step procedure for planning, implementing, and evaluating programs and projects is included in appendix section B. Meaningful evaluations are possible only in relation to goals established, to constraints identified, and to benchmark data assembled at the time projects are started. Also, some system of on-going record programs and data-gathering procedures is essential for evaluations over time. Suggestions are offered for acquiring such information.

## **General Observations**

A few concluding observations will reveal some of the key factors which influence longrun development programs for the agricultural sector of Nepal. They result from rather intensive review of numerous reports, papers, and other publications; from consultations with government officials, USAID staff members



in Nepal, regional and district research and extension workers, industrial and cooperative leaders, with other external donors and with individual farmers; and, from personal observations in various Terai, Hills, and Mountain areas of Nepal in 1971 and 1974.

1. Nepal is a small country of spectacular scenic beauty, rugged terrain, limited agricultural resources, and unique problems of isolation — both within the country and from the outside world.

2. The economy of Nepal is predominantly agricultural despite the fact that only 14 percent of the land area is under cultivation. Over 90 percent of the population is dependent upon agriculture, and agricultural products account for 75 percent of the country's exports. But farms are small, production methods primitive, and the levels of income and standards of living low—despite the diligence and ingenuity of farm families. This is particularly true in the Hills where population pressures on land resources are greatest, approximately 0.1 hectare of cultivated land and \$30 to \$40 annual income per capita. In terms of agricultural output, land use efficiency is quite high; labor efficiency extremely low.

3. Nepal is a late-comer in economic development. After 100 years of repressive government and economic stagnation under the Rana regimes, prior to 1951, remarkable progress has been made in structuring the government, building the infrastructure, and training the manpower needed for economic progress.

Even so, much remains to be done and the country is still only on the threshold of making substantial progress.

4. The future welfare of Nepal, perhaps its economic survival, depends upon rapid development and full use of all agricultural resources: first of all, for producing increasing amounts of cereal grains and other food products for a rapidly growing population; and, secondly, for providing the raw materials for expanding agro-based industries which are essential for providing additional employment and income opportunities.

5. Realism, rather than idealism, should be the primary "guiding hand" in agricultural development. Neither the time nor the resource base has sufficient margins for too many false starts and misallocations of capital and other resources. Hard-nosed evaluation, from the stand point of physical practicability and economic feasibility, should precede — not follow — the implementation of policy, program, and project proposals. A few examples will illustrate.

Theoretically, rapid modernization of agriculture in Nepal, as has occurred in some other countries, should include broad-scale mechanization to free labor for other sectors of the economy. In practice, this is neither physically possible nor economically feasible. The small, fragmented farm units, the rugged terrain in the Hills, the present dearth of non-farm employment opportunities, and other factors preclude such a policy.

In theory, agricultural development should include commercializing farm production, with specialization and exchange among areas. One proposal for development in Nepal suggests such a program with grain production in the Terai, fruit and vegetable production in the Hills, and livestock production in the mountain areas, with an exchange among areas for the necessities of life. Obviously, such a program is unworkable without the roads and other communication and marketing facilities for rapid exchange of perishable products. Such may be decades away in Nepal.

Ideally, from the standpoint of social equity and political expediency, total development funds should be dispersed almost equally among all the regions, districts and individuals in Nepal. From a practical standpoint, such a policy might jeopardize the kind of specialized efforts necessary for enhancing the total

food supply for the nation in the longrun.

6. Factual data are needed for planning and evaluating development programs and projects, and for supporting recommendations for the adoption of new technologies. Further expansion of research station efforts to include widespread testing and adapting of technologies to Hill farming conditions is an urgent need, along with rapid development of a nation-wide data gathering system.

7. General education and specialized manpower training are crucial for longrun progress in improving agricultural production. Extension is expected to serve a vital role in helping farmers adopt new technologies. The "missing link" in the extension system seems to be a lack of well-trained subject matter specialists for "back-stopping" the work of local Junior Technical Assistants (JTA's) and for serving as connecting links with the research stations and outside sources of information.

Since 1951, development efforts by the Nepal Government, USAID, and other external donors have made substantial progress. The rapidity of future progress will be influenced greatly by the degree of coordination and integration of all efforts in implementing well-designed and economically-feasible programs and projects.

# the agricultural development of nepal: an analysis of the agricultural sector

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Agricultural Economics

## THE AGRICULTURAL SITUATION

### INTRODUCTION

Nepal is a land of spectacular scenic beauty but with limited agricultural resources. This is unfortunate because the country is, first and foremost, an agricultural economy.

Recent estimates indicate that 94 percent of the population is dependent upon agriculture and that 75 percent of total exports originate from production in the agricultural sector. But the land base for agriculture is small - both in terms of acreage and as a percent of the total land area.

Latest statistical reports indicate that only 1,980,000 hectares of land are under cultivation, approximately 14 percent of the total land area of over 14,000,000 hectares.<sup>1</sup> Another 32 percent is forest land, 15 percent is under perpetual snow and 26 percent is in unreclaimable waste land and non-agricultural uses. This leaves 13 percent which might be reclaimable for agricultural purposes, along with acreages which might accrue from shifts from other uses such as forestry.

### Production Regions

For a better understanding of the agricultural resources and programs for development, the country may be divided into three distinct regions - the Terai along the southern border with India, the Hills throughout the central area, and the mountain area including the high Himalayas along the northern border with the Tibetan area of China. The characteristics of each largely govern development potential.

The Terai is a narrow strip of flat lands (an extension of the Indo-Gangetic plain) which extends up in to the foothills of the lower Swalik range. Much of the Terai is only a few meters above sea-level and temperatures range from 4° to 21°C in December and January to 21° to 96°C in May and June. Paddy production is the predominant land use. Other food grains include maize, wheat and some barley

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<sup>1</sup>Agricultural Statistics of Nepal. His Majesty's Government, Ministry of Food and Agriculture, Economic Analysis and Planning Division, Nepal. 1972. page 1 - Land use, 1970/71.

and millet. Major cash crops are jute, tobacco, sugarcane, and oilseeds. It is a surplus food producing area.

The Hills comprise a broad strip of land extending throughout the central part of the country from east to west. This area consists of a series of clusters of mountain ranges, deep canyons, inter-mountain valleys, and terraced mountain slopes. The valleys, of which Kathmandu and Pokhara are largest, are fertile and, like the mountain slopes, are intensively farmed. Maize and paddy are the major crops but wheat, finger millet, barley, and rape also are important. Livestock play an important role in the economy of the Hills which consists of a finely-drawn ecological balance. Cattle, buffalo and goats provide milk and meat but, almost as importantly, manure to enrich the compost for fertility maintenance. Farms in the Hills are small, averaging less than 0.6 hectares of cultivated holdings per family, approximately 0.1 ha. per capita. Most farms also are isolated from markets and motorable roads, frequently by several days of trekking time. In total, the Hills is a food deficit area.

Farms in the mountain region have only limited agricultural potential because of high altitudes (6,000 to 10,000 feet in elevation and above) low temperatures, short growing seasons, limited rainfall, and a shortage of productive land. Livestock production is the main source of livelihood, with Yak, chauri (a cross between cattle and Yak), sheep, and goats as the major enterprises. They are handled in a semi-nomadic fashion - moving southward to the lower mountains and valleys for mid-winter grazing and northward to alpine areas during the summer. Crop production is limited to a few short-season crops such as potatoes, barley, and a few vegetables. Ghee (a semifluid, clarified butter made from the milk of buffalo, cows, yak, and chauri) is one of the principal export commodities. The Mountain region is a deficit area in food grain production with little potential for increases.

This is a very condensed summary of some of the basic agricultural resources in the three major regions in Nepal.\* Other resources which contribute to total agricultural productivity include the human resources (labor and management), capital in various forms, and the institutional structures for mobilizing and implementing effective resource use. Still greater detail may be found in numerous government and USAID reports, country background papers, and other publications. Many were reviewed in the development of this evaluation and some of the more relevant ones are referenced in the bibliography section.

## **The Food Grain - Population Balance**

One of the major concerns in Nepal is to produce an adequate food supply for a growing population and to maintain, or to increase, the current level of agricultural exports. Since food grains account for almost 90 percent of the total food supply, any significant strides toward achieving total food production goals must come from higher output of these crops.

A disturbing situation is emerging from a study of available statistics for recent years. Population appears to be growing at the rate of 2 percent per year, perhaps even faster, while food grain production is increasing at a slower rate, about 1.2 percent annually from 1966-69 to 1970-73.<sup>2</sup> This is far less than the 3 percent increase annually projected for the current five-year plan.

In more recent comparisons, statistical data for 1972-73 are even more discouraging. They show an actual decline in paddy production from the previous

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\*More detailed descriptive data of Nepal and its resources are included in Appendix A. Readers unfamiliar with the country may wish to read that section before proceeding.

<sup>2</sup>C.H. Antholt, unpublished working paper *Agricultural Sector Assessment for Nepal*, March, 1974. Table XVI.

year (1971-72) of more than 330,000 metric tons and over 230,000 M.T. below that of 1969-70, the first year of the current five-year plan. Modest increases in the production of maize, wheat, and millets failed to offset the shortage in paddy output during these periods, resulting in a net decline in total food grain production.<sup>3</sup>

What was responsible for the food grain shortages? This is the real question of concern. Was unfavorable weather alone the cause? Or, did failure to achieve expected increases in the use of irrigation water, fertilizers, pesticides, better seed, and other improved technologies contribute to reduced yields? Perhaps all factors had some influence, but data are not available for pinpointing the relative significance of each. Such "ups and downs" in crop production from year to year may represent the "normal" situation in a country which depends so greatly upon the timing and intensity of monsoon rains. But, regardless of weather and the rate of adoption of new technologies, the population continues to grow.

During 1974, government officials were working on development programs and projects for the next five-year plan, 1975-80, with some projections to 1985 and later. At the same time, USAID personnel and other external donors were evaluating alternative projects for development assistance in Nepal during the next five years. Preliminary plans for the next five-year period seem to recognize agriculture as the main occupation and the primary source of income for the Nepalese people and to place the agricultural sector at the top of the list in development planning.

With this planning underway, attention might be given to a few questions of special relevance to the planning process:

- 1) What are the specific goals to be achieved through the development efforts? And, are they, and associated production targets, realistic and attainable?
- 2) What are the key production constraints to be overcome in reaching the goals established?
- 3) What overall strategies should be formulated to guide longrun development and the choice of individual programs and projects?
- 4) How can the selected strategy and associated projects be implemented most effectively? and,
- 5) How can on-going development programs be evaluated as a basis for measuring progress and making needed adjustments?

Some aspects of these questions will be considered in order.

## **GOALS FOR DEVELOPMENT IN THE AGRICULTURAL SECTOR**

After a realistic appraisal of the resources of a country and of the current situation with respect to their development and use, the most important step in planning for development is to clearly specify the goals to be attained. (A traveler cannot get somewhere in an expeditious manner if the destination is unknown.) Without such, goals, programs and activities often are aimless, sometimes fruitless.

Setting appropriate goals, and targets for achievement, is a challenging task. If set too low, they fail to motivate people to greater efforts. If set too high - or if too idealistic, nebulous, and irrelevant for prevailing conditions - they, and the programs for implementing them, may be ignored completely. Or, they may result

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<sup>3</sup>*Economic Data Papers* - Nepal. Economic Planning Section, Program Office. USAID/Nepal. Vol. XIV, October, 1973. p. 13.

in failures which, at best, lead to discouragement and lack of confidence in the leadership and, at the worst, to outright rebellion.

Many goals and production targets have been established for the agricultural sector within the departments and divisions of the Ministry of Agriculture. These are recorded in various documents and are too numerous to itemize in detail. However, a few overall development goals seem rather clearly defined and generally accepted for the planning periods under consideration. They are as follows:

- 1) to achieve sustained increases in the production of improved quality of food grains, and other agricultural products, in sufficient quantity to keep pace with the rate of growth of the population;
- 2) to improve the income and standard of living of the people and to bring about a more equitable distribution of these improvements among all individuals and segments of the population, especially for the small farmers in the Hill, Terai and Mountain areas;
- 3) to provide opportunities for gainful employment for those who are currently unemployed and underemployed and for the increasing numbers of young people who will be entering the labor force;
- 4) to lessen regional economic disparities and to encourage specialization of agricultural production within regions in accordance with prevailing comparative advantages, needs, priorities, and economic feasibilities; and
- 5) to encourage the development of agro-based, rural industries to enhance the sale value and marketability of agricultural products, to provide more convenient and economical sources of agricultural inputs, and to provide additional employment opportunities.

These general goals may well serve as an overall guide for development but must be supplemented with more specific sub-goals, objectives, and production targets for specific projects and time periods.

## **CONSTRAINTS TO ACHIEVING AGRICULTURAL PRODUCTION GOALS**

Many constraints must be overcome in order to increase the productivity of the agricultural sector in Nepal. Identifying and understanding the nature and magnitude of individual constraints will aid in formulating overall development strategies and in designing, and setting priorities for, individual programs and projects.

Constraints may be grouped into six categories: physical; technological; economic; manpower; demographic, social, and cultural; and institutional, including political and administrative problems.

### **A. PHYSICAL CONSTRAINTS**

These constraints which have special significance in agricultural production include the following:

1. **Topography of the land**—expansion and intensification in land use for crop production are definitely limited by the terrain. For example, further expansion of the cultivated acreage in the Hills is hardly feasible because of steep slopes, (often 30 to 40% and steeper) and substantial areas of cropland should be retired to other uses because of severe erosion.
2. **Climatic Conditions**—such as the amount and seasonal distribution of rainfall, the temperature variations, the prevalence of wind and hail

storms, and other such factors - often determine the feasibility of particular crops and cropping systems in an area.

For example, at higher elevations with cooler temperatures, plant growth is slower and maturity dates later. This necessitates variety selections of earlier maturity to harmonize with rotation systems. Also, in some mountain valleys and hill areas, violent hailstorms frequently occur and may preclude successful commercial fruit production, even though given primary emphasis by HMG and UNDP.<sup>1</sup>

3. **Land Clearing and Land Improvement**—the labor, time, and cost involved in clearing forest land and preparing it for irrigation (in some cases) and for crop production is a major constraint in bringing new land areas under cultivation.
4. **Lack of Roads and Communications**—perhaps the greatest constraint to some degree of modernizing and commercializing the small, traditional farming operations in the Hills is the inaccessibility to markets for purchasing inputs and for marketing surplus products. Little progress can be expected until motorable roads, improved trails, bridges, and other such facilities can be made available.
5. **The Man-Land Ratio**—a lack of tillable land in relation to population pressures is another serious constraint to increasing food production, to improving labor efficiency, and to changing systems of Hill farming to include the production of more forage and livestock and the substitution of specialty crops for food grains.

## B. TECHNOLOGICAL CONSTRAINTS

A wide variety of technological constraints hamper the adoption of new farming methods and practices, especially in the Hills.

1. **Lack of Knowledge**—about the adaptability of improved varieties, soil treatments, new crops, storage facilities, and a host of other methods and practices greatly impedes the improvement of agricultural production on the Hill farms and, to a lesser degree, on those in the Terai and Mountain Areas.
2. **Lack of Improved Inputs**—another major constraint in the Hill areas is the inability to get improved seeds, fertilizers, pesticides, and other inputs at the time needed, in sufficient quantities, and at reasonable cost. Many feel that the failure to achieve more widespread use of such technologies is more a problem of logistics than the lack of interest and the purchasing power of the farmer.
3. **Lack of Irrigation Water**—while the supply of water in Nepal is abundant in many areas - from lakes, streams, ponds, and ground water - its use in the expansion of agricultural production is greatly restricted by a lack of facilities for delivering water to farms and individual fields; by a lack of knowledge about effective organizational patterns for group efforts in irrigation developments; and by a lack of knowledge by individual farmers for the proper management of water for year-round, multiple-cropping systems.
4. **Lack of Land Use Intensity in Terai Area**—the Terai is the "Bread Basket" of Nepal but land resources are currently used far below capacity.

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<sup>1</sup>*Country Background Paper*. UNDP, Nepal. May, 1972, p. 32.

Quotes: "Nepal has very varied topography and agro-climatic conditions ranging from the temperate to the tropical, which suggests very good prospects for commercial horticulture (fruits and vegetables). Several sub-regions generally at elevations of 5,000 to 7,000 ft. offer good prospects for the production of apple, peach, cherry, and pear."

A major constraint to increasing total agricultural output is the failure to develop more fully the use of irrigation water and other improved technologies for double and triple cropping in the Terai.

5. **Lack of Adequate Grain Storage Facilities**—one of the great tragedies in food grain production and use in Nepal is the tremendous loss each year after harvest. Losses to rodents, insects, molds, etc. while grains are in storage may range from 10 to 30 percent according to some estimates - and perhaps even higher for wheat. Losses probably are highest in on-the-farm storage but also are substantial in public and commercial facilities. Perhaps the wisest use of investments to increase the usable supply of food grains, for domestic use and export, is to get widespread adoption of improved storage facilities and their management.

## C. ECONOMIC CONSTRAINTS

1. **Lack of General Economic Information**—a major constraint, typical of most underdeveloped countries, is the lack of reliable factual data on which to base longrun development strategies, policy decisions, program and project plans, and timely adjustments in program emphasis. Also, the lack of a continuing inflow of production and economic data precludes timely measurement of progress with production programs and the overall evaluation of performance in the agricultural sector.
2. **Lack of Farm Management Data**—another serious constraint in achieving more rapid acceptance of new technologies and farming systems is the general lack of knowledge about the economic consequences of their adoption. This includes a lack of data about input requirements, cost-return relationships, and the relative profitability of different enterprises, farming systems and individual practices.
3. **Lack of Farm Credit at Reasonable Rates**—many small farmers, especially in the Hills, do not have access to adequate credit from institutional sources, such as the Agricultural Development Bank, the cooperative societies, village ward committees, commercial banks, etc. A recent study indicates that average farm borrowing for the country included about 21 percent from institutional sources and 79 percent from private sources, primarily from moneylenders, friends and relatives.<sup>2</sup> (See Appendix Table XVIII) Another report indicates substantial differences between Hill and Terai areas, with only 10 percent of Hill farmers' loans from institutional sources and 51 percent of those for Terai farmers.<sup>3</sup>

Another constraint to adequate farm financing has been the failure, up to now, of commercial banks to offer funds for crop loans and agricultural infrastructure. And, as shown in appendix table XVIII, the ADB and other institutional lenders have played an insignificant role in supplying farm credit, thus far.

4. **Budgetary Constraints**—allocation of HMG budget expenditures to the agricultural sector during a six-year period, 1966 through 1971-72, has remained almost constant at 10.5 to 12.5 percent of total expenditures.<sup>4</sup>

Planned public sector investment outlays for four development plans, 1956 through 1975, show an increasing percentage allocation to the agricultural sector throughout plans II, III, and IV - approximately 19.5, 21.5, and

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<sup>2</sup>Report on Agriculture Credit Survey, Rastra Bank of Nepal. 1972.

<sup>3</sup>Report No. 125a - NEP. *Economic Situation and Prospects in Nepal*. Document of International Bank for Reconstruction and Development, International Development Association. August 15, 1973. page 15.

<sup>4</sup>OP. Cit. *Economic Data Papers*, Nepal. 1973. page 43.



28.0 percentages, respectively. Plan I showed about a 28.5 percent allocation. Actual amounts have increased sharply throughout all plan periods - ranging from Rs. 94.5 million in plan I to Rs. 716.6 million in plan IV.<sup>5</sup>

However, these "planned" investments are only indications of intent, as shown in appendix table XX. Actual expenditures have fallen far below these percentages in recent years, ranging from 5.84 percent to 10.42 percent through a five-year period, 1967/68 through 1971/72. Further evidence of these recurring disparities between budgeted and actual expenditures in agriculture are shown in appendix table XXVIII for 1972/73. Only in a few segments have actual expenditures approached amounts budgeted — such as fisheries, horticulture, irrigation (minor) veterinary research, and allocations by the Agricultural Marketing Corporation (AMC)<sup>6</sup>, the Agricultural Development Bank (ADB), and the Dairy Development Corporation (DDC) within Nepal.

Biggest constraints in effective use of funds seems to be delays in allocations and uncertainties on the part of individual divisions and departments, and in regional and district offices, about the time when allocations will be made known, and the amounts available. This sometimes causes delays in making essential operational decisions. The central Government and the Ministry are making concerted efforts to streamline these operations for greater efficiency.

5. **Marketing and Pricing Policies**—some physical constraints to efficient marketing tend to hamper increased production of foodgrains, as earlier mentioned.

Other major constraints relate to overall pricing policies and their effect on product marketing. Nepal prices for cereal grains, especially paddy, often are afflicted with unrealistic differentials from prices in bordering India markets. These inequities lead to illegal marketing, loss of government revenue, and disincentives for increased production efforts by Nepalese farmers. While Nepal is a landlocked country with markets and prices intimately related to those of India, this should not justify a "do-nothing" attitude toward establishing realistic and aggressive marketing and pricing policies within the country.

A thorough analysis and evaluation of current Nepalese pricing and marketing policies and strategies, their effects on consumer prices and producer incentives, and recommendations for improvements is an urgent need. Preferably, such a study should be made by highly trained and qualified economists from external sources, in order to help assure an unbiased and objective evaluation.

## D. MANPOWER CONSTRAINTS

The achievement of rapid increases in agricultural output is hampered by manpower constraints at several different levels - the farm laborer, the semi-skilled technician, the professional worker, and the manager-entrepreneur.

1. **Lack of Labor Efficiency**—while most Nepalese farmers and their families appear to be diligent and resourceful workers with a great deal of ingenuity, their labor efficiency is extremely low, in terms of output per hour of labor. Much labor is required for the tasks of every day living - carrying water, cutting wood, attending festivals, and other tasks and activities which contribute little to production.

<sup>5</sup>OP. Cit. Agricultural Statistics for Nepal. 1972. page 144.

<sup>6</sup>The AMC recently has been divided into two corporations: (1) the Agricultural Input Corporation; and (2) the Food Management Corporation.

The prevailing illiteracy of Nepalese farmers, especially the older ones, also hinders educational efforts and retards the adoption of improved technologies.

2. **Lack of Semi-skilled Technicians**—a general lack of semi-skilled technicians to assume responsibilities for service jobs in agri-businesses and cooperative endeavors also tends to retard overall agricultural development. A growing number of young men will be needed to operate more complicated irrigation facilities, milling equipment, village water systems and other such jobs.
3. **Lack of Trained Professional Workers**—a lack of more highly trained individuals to assume responsibilities in research, extension, teaching in Agricultural Colleges and Institutes, government positions, and in agricultural institutions - such as the Agricultural Development Bank, the Agricultural Marketing Corporation, Cooperative Unions and Societies, etc. - is a serious impediment to more rapid development of the agricultural sector.
4. **Lack of Competent Managers and Entrepreneurs**—a lack of managerial ability seems to be one of the most serious constraints to the efficient operation of government divisions and departments, agri-businesses operations, cooperative societies, and even individual farm businesses.

## **E. DEMOGRAPHIC, SOCIAL & CULTURAL CONSTRAINTS**

1. **Population Pressures on Land Resources**—rapid growth of population in relation to available cropland seriously constrains needed adjustments in resource use. In the Hills, limited cropland per person (0.1 hectare/capita) precludes shifts away from food grain production for family survival, even though severe erosion and soil depletion in some marginal areas indicate an acute need to convert much land to less intensive use. Out migration of farm families from the Hills to new farming areas in the Terai (a longrun necessity) through various kinds of resettlement schemes always disrupts production during the adjustment years.

Increases in population among the farm people in the Hills also may lead to further fragmentation of land holdings through inter-generation transfers, to further exploitation of marginal land areas, to even more intensive grain production, to further reductions in labor efficiency, and to continuing declines in average family earnings and living standards.

2. **Lack of Homogeneous Social and Cultural Groups**—the Hill districts include a multitude of small micro-settlements with different cultural, religious and social backgrounds - even within village panchayats. Extension workers and others report that this often creates a serious constraint to the cooperative efforts needed for improvements in agricultural production, storage and marketing facilities, as well as improvement in living accommodations, such as public water systems.
3. **Prevalence of the Caste System and Language Barriers**—widespread dissemination of information about new technologies often is retarded by the variety of languages used in different areas within a district and, sometimes, within local panchayats.
4. **Reluctance to Change From Traditional Farming Methods**—in some areas, especially in the Hills, farm units are operated about as they were many centuries ago (long before Columbus discovered America). A strong constraint to accomplishing major changes in production systems and practices is the reluctance to change from the time-tested traditional ways of operation. A strong aversion to risk prevails and the farmer seems to place a much higher value on assurance of family survival than on the

questionable opportunity (in his view) of earning a little higher income with some new practice.

## F. INSTITUTIONAL CONSTRAINTS

Perhaps some of the greatest impediments to more rapid progress in achieving higher output of agricultural products are the political pressures and administrative incompetencies which hamper the establishment of priorities and allocation of resources for development projects; the assignment and promotion of field personnel (both from the standpoint of compensation and tenure); the orderly and timely flow of agricultural supplies to the producer; the establishment of equitable and production-incentive pricing policies; and the delegation of operational responsibility and decision-making authority to the Regional and District Agricultural Development Officers.

This does not mean that the top-level people in government and other agricultural institutions are incompetent and unsympathetic with the problems of agriculture. Actually, the reverse seems to be true, from His Majesty, the King, to the top officials in government and agricultural corporations. It does indicate a persistent shortage of highly trained technical people for the specialized and complex duties they are expected to perform in advising on policy matters and in making operational decisions.

1. **Land Reform and Tenure Systems**—a lack of ownership patterns and rental arrangements which provide incentives for investment in improved technologies is a major constraint to achieving higher yields and total output of paddy and other grain crops, especially in the Terai. While major legislation for land reforms has been enacted within the past decade and substantial improvements have been made, current rental practices seem to favor absentee landlords and provide few incentives for the tenant to increase production.
2. **Lack of Commercial and Private Enterprise Involvements in Agricultural Development**—one serious constraint to more rapid economic development in agriculture is the general lack of commercial investments and private initiative for bringing about increases in production. More rapid development of irrigation facilities, farm mechanization where appropriate, agricultural transport facilities, and other services to agriculture might be stimulated greatly by widespread involvement by commercial interests and private entrepreneurs.

For example, private contractors might be encouraged to drill irrigation wells, and even provide a "turn-key" job of installing complete irrigation systems, for organized groups of farmers on a fee basis. And, custom operators might acquire complete sets of appropriate power equipment for heavy plowing and other farm jobs on a custom rate basis.

Recent government action to defer taxes for a number of years for private investors in industrial developments, such as agro-industries, may be a start toward stimulating greater activity by commercial interests.

3. **Lack of Effective Extension System**—while an organizational structure exists for a nation-wide agricultural extension system, many shortcomings persist. Along with Regional and District Agricultural Development Officers, about 600 JT's (Junior technicians) and JTA's (Junior technical assistants) are assigned to village panchayats to work directly with farmers. Many, however, lack farm background experience, education, and training to work effectively. Also, they lack adequate "backstopping" support for keeping up to date with improved technologies which are tested and proven in the localities where they work. The work of JTA's could be strengthened greatly by providing district subject matter specialists to

train, advise, and assist them in adapting new technologies to local conditions.

4. **Lack of Adequate Research Facilities**—excellent progress has been made in establishing research stations, farms, and substations in a few Hill locations. While basic facilities have been constructed and a nucleus of trained researchers assigned, much remains to be done in improving and expanding the output of research data and in arranging more widespread facilities for field testing and adapting to the needs of different areas.
5. **Inadequate Regional Staffing**—separation of the country into four development regions - Dhankuta, Kathmandu, Pokhara, and Surkhet - is a very recent development and time is required for implementing the new organizational structure. Regional directors contacted appear to be competent and dedicated. During the next few years attention should be given to developing adequate supporting staff and to attaining basic resource data essential for longrun integrated development.

## G. CONSTRAINTS SUMMARY

This array of constraints seems to suggest a formidable barrier to progress in agricultural development in Nepal. Such is the case. But realistic planning for future programs and projects requires careful attention to these existing problems.

A concise summary of some of the most crucial constraints is embraced in the following quote:

The constraints are serious. The topography in the Hills is such that most of the residents are isolated from the outside world. A shortage of manpower skills inhibits the planning and implementation of development activities. Few, if any, known raw materials exist for chemical fertilizer, which is a necessary but not sufficient ingredient for a Green Revolution, and imported fertilizer is unusually costly because the country is landlocked. Data on which to plan are either non-existent or of questionable quality.<sup>7</sup>

## ALTERNATIVE STRATEGIES FOR DEVELOPMENT

Several different kinds of approaches and strategies might be chosen to guide longrun economic development, either for the entire economy of a country or for a particular segment such as the agricultural sector.

One approach might be labeled as a "no-strategy" effort. Development efforts would be on a completely "loose" and flexible basis. The commitment of investment capital, personnel, and other resources to programs and projects would be completely arbitrary and unstructured. Each separate project would "stand on its own" and could be initiated to meet specific problems, political pressures, and other such factors as the need became apparent.

Such an approach is appealing in a number of ways. First of all, longrun planning on a comprehensive basis is a rather complex and very laborious task. This could be avoided. The troublesome inter-actions among projects, and the

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<sup>7</sup>Leon F. Hesser. *Agricultural Programming for Nepal*. Memorandum to Director William C. Ide, USAID/Nepal, December 13, 1973.

complementary and supplementary relationships involved, could be ignored. Administrative organization and procedures for the conduct of projects could be independent, simple, and direct. Programs and projects could be initiated and discontinued without concern for the consequences on other development efforts. Other "advantages" could be noted.

Such an approach, however, is considered unacceptable and untenable for the development of a country with a multitude of problems and with various degrees of urgency and magnitude. This is true for a number of reasons. First, inefficient use of capital and other resources would surely result, with duplication and overlapping of efforts. Budgetary planning for setting priorities and the allocation of funds would be complex and almost impossible from the standpoint of efficiency and equity. It would lead to wasteful and ineffective use of trained manpower, a scarce resource in most all developing countries and especially in Nepal. Administration of development would become parcelized, frustrating, and, perhaps, rather hopeless. With the concentration of substantial resources and efforts on special "pet" projects, rapid and showy progress might be made, but perhaps in the wrong direction from the standpoint of overall development.

It is the premise of this evaluation that formulation of some kind of overall strategy is feasible and essential for longrun development in an efficient, effective and equitable manner - either for an entire country or for some subsector thereof.

Many different kinds of strategies might be conceptualized. For purposes of longrun development of the agricultural sector of Nepal, five alternative strategies have been formulated for evaluation. Each may be appropriate and relevant in relation to particular goals, constraints, and stages of development. In the following sector, each strategy will be described briefly and evaluated from the standpoint of the advantages and disadvantages which seem apparent. These strategies include: 1) a Project-Oriented Strategy; 2) a Terai-First Strategy; 3) an Hills-Emphasis Strategy; 4) a Terai-Hills Strategy; and 5) an Integrated Regional Development Strategy.

## A. PROJECT-ORIENTED STRATEGY

This strategy is just a step above the no-strategy approach earlier described. It has some of the same characteristics and shortcomings.

1. **Description of Strategy**—this strategy would involve some superficial appraisal of the resources of the agricultural sector of Nepal; a formulation of particular goals to be achieved in the shortrun (such as a Five-Year Plan or project span); a recognition of most obvious problems and constraints; and the design of specific projects to attack these problems.

Most projects would be independent. Each would have its own administrative structure - directors, supervisors, project leaders, technicians, laborers, etc. . . Each would have a separate budget and allocation of funds. Each would devise its own system of record keeping and procedures for project evaluation over time, if any. And, understandably, each project administrator or leader would strive to get the most favorable allocation possible of funds, facilities, and well-trained, competent personnel to staff his own project.

Based upon a review of past project plans and reports, this strategy seems to characterize many of the agricultural development efforts in Nepal during the past two decades - especially during the first two or three five-year plans. Some of the reasons for this are obvious. The Ministry of Agriculture did not have available a comprehensive inventory of the country's agricultural resources. Ministry officials lacked manpower with experience and training for integrated longrun planning of an entire sector of the economy. Factual production and economic data for major crop and

livestock enterprises in different areas of the country simply were not available for such planning in a realistic manner.

Coupled with these internal situations and pressures were the policies and operating procedures of external donors. Many countries, foundations, and other agencies were anxious to lend a helping hand to Nepal as it started to emerge from more than 100 years of repression and stagnation. In doing so, each donor wished to concentrate its capital and technical assistance on those projects for which it had particular interest and competence and which offered potential for rather spectacular and visible progress in the short run. Each donor, in view of substantial commitments of investment capital and other resources, felt justified in requesting the most capable young men available to help staff his project.

During the first twenty years of development (1951-70) - embracing the first three development plans - external donors included 13 different countries, three multilateral agencies, and several private institutions. (See Appendix Table XXIV) Altogether, capital contributions by these donors amounted to more than \$58,000,000 (U.S.) during this time period. U.S. assistance alone totaled over \$15,000,000 to support a dozen different projects, and almost seven million more for food assistance and emergency relief funds. (See Appendix Table XXVI)

Brief attention will be given to a few of the consequences - the advantages and disadvantages - of pursuing this development strategy.

2. **Advantages of Strategy**—given the circumstances prevailing, a few advantages of this strategy might be summarized.
  - 1) It may have been the only feasible approach in view of the resource information at hand, the status of governmental organization and experience, and the time pressures “to get something started.”
  - 2) Administration was less complicated; primary responsibilities could be allocated to the donors and assigned personnel.
  - 3) External funds probably could be acquired in a more expeditious manner.
  - 4) A quicker “showing”, or impression upon the Nepalese population, was possible since much of the early capital was invested in tangible, physical improvements and other infrastructure.
3. **Disadvantages of Strategy**—on the negative side, disadvantages of the strategy may be noted.
  - 1) Very little overall direction of development toward the achievement of most important goals could be given.
  - 2) Assignment of resources to highest priority projects in relation to most crucial problems and needs was not always possible. (For example, donor funds sometimes were made available *only* for use in a specific project).
  - 3) Trained manpower resources were “spread too thin” and, in many cases, misallocated. Some competent young men with advanced training might have rendered greater service in helping improve the organization and operation of the Ministry of Agriculture, related agricultural corporations, and cooperatives instead of being committed to a specific development project for an extended time period.
  - 4) Too many projects seem to have been developed too rapidly, and too elaborately in some cases, to permit an effective “take over” by Nepalese managers at the end of development periods.
  - 5) Some donor funds could not be used effectively and completely because of the inability of limited Nepalese manpower to keep up with all projects.

Despite these, and other shortcomings, the project approach may

have been the only feasible way in the early years of development. It does not seem adequate and appropriate for the development years which lie ahead, so other strategies will be investigated.

## B. TERAI - FIRST STRATEGY

1. **Description of Strategy**—This strategy places primary emphasis upon more intensive development of the Terai area of Nepal. Hopefully, such a strategy would include comprehensive, longrun planning for the entire area prior to initiation of individual development projects. On the other hand, development of the area could proceed on a project-oriented basis as described above.

This strategy would involve the concentration of most of the available investment capital, technical assistance, manpower, and other resources in the Terai area in designing programs and projects for the agricultural sector. Admittedly, such a strategy would result in either the neglect or postponement of development projects for other geographic regions, such as the Hill and Mountain areas.

Whether by intent or by happenstance, this strategy also seems to characterize many of the agricultural development efforts in Nepal during the past two decades. The Terai area, along with Kathmandu Valley, seems to have received the "lion's share" of development projects during the 15-year period, 1956-70. According to a paper by Dr. Gurung, allocation of development projects during this period on a percentage basis included 28 percent in the Terai, 34 percent in Kathmandu Valley, and only 14 percent in the combined Hill and mountain areas. Another 22 percent were nation-wide projects which, presumably, were of some help to all areas.<sup>8</sup>

Whether or not this strategy is appropriate depends upon the primary goals to be addressed in development efforts. As earlier stated, Nepal is an agricultural country and its economic development and the welfare of the people are closely allied with the productivity of the agricultural resources. If the primary goal of development efforts is to attain higher production of food grains (as well as other food and cash crops), both for domestic consumption and for export, the adoption of this strategy can be strongly defended. A few of the pros and cons will be presented.

2. **Advantages of Strategy**—Some arguments for adopting this strategy are as follows:

- 1) The potential for increasing total crop production above present levels is much greater in the Terai than in other areas. Present output seems to be far below both the extensive and intensive margins of land use.<sup>9</sup>

According to various reports, substantial acreages of good agricultural land in the Terai, presently forest and brush covered, can be converted to

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<sup>8</sup>Harka Gurung, *Rationale for Hill Areas Development*. Nepal Industrial Digest, 1971, P. 17-24. p. 6.

<sup>9</sup>Explanatory Note:

In assessing the potential for increasing crop production in an area, land economists often refer to the extensive and intensive margins of land use. The extensive margin is reached when no more land can be brought into production in a profitable way - when the cost of bringing the last unit of land into production is just equal to the value of the added production therefrom. (In theoretical terms, it is reached when the marginal factor cost (MFC) is just equal to the marginal value product (MVP).

The intensive margin of land use is reached when no additional inputs can be added to a given land area at a profit—when the cost of adding the last input unit is just equal to the value of the added output gained thereby—or, when the MFC is equal to the MVP.

crop production. Estimates vary from 200,000 to 1,000,000 hectares, but 400,000 hectares seems to be a more generally accepted figure. If fully developed, crop production from this new land would support 2,000,000 more people at 0.2 hectare per person — double the acreage per capita currently available in the Hills. At 0.5 hectares per farm laborer (considered to be the current national average in agriculture), the new cropland would provide employment for an additional 800,000 workers.

Opportunity to move closer to the intensive margin, further above the current intensity of crop use, also seems considerably greater in the Terai than in the Hills. First of all, the present intensity of use is considerably lower in the Terai than in the Hills — variously estimated from 110 percent in the eastern Terai to 150 percent in the western part, an approximate average of 120 percent. This contrasts with an estimated intensity of 150 percent in the Hills, as a present average, but ranging upward to 200 percent in some areas with irrigation and even up to 300 percent in Kathmandu Valley.

More intensive land use, higher production per unit of land area (eg.-per hectare), can be achieved in two principal ways — by getting more crops produced per hectare per year and by increasing the yield per hectare. Great potential exists for both in the Terai.

Irrigation water, available on a year-round basis, is essential for double and triple cropping. This resource hardly has been tapped in the Terai. While 200,000 hectares are reported to have access to irrigation water at present, it is not efficiently used — some estimates at 50 percent efficiency, others as low as 7 percent. Apparently, it is used in most cases to supplement monsoon rains and not for facilitating multiple cropping.

Recent surveys and feasibility studies indicate an opportunity to greatly expand the irrigated acreage in the Terai — through stream diversions, storage reservoirs, and from groundwater sources. With U.S. assistance, 184 test wells have been drilled in Western Terai areas (99 in the Lumbini Zone, 45 in Bardia and Banke Districts, and 40 in the Dhangari area.) Water supplies in sufficient quantity and quality for irrigation, at reasonable pumping depths, were discovered in all areas. Artesian wells resulted from some drillings in the Bhairawa, Nepalgunj, and Dhangari areas. Similar explorations are under way with Japanese assistance in central Terai areas.

Higher yields per hectare can be accomplished by expanding the use of improved technologies — fertilizers, pesticides, higher yielding varieties, etc. . The Terai has an advantage over the Hills for such expansion because of the accessibility of inputs and at lower costs. For example, in many hill areas the cost of transporting fertilizer may exceed the purchase price.

In summary, food grain production in the Terai may be increased substantially over time — through clearing new land, through multiple cropping, and through the more widespread use of improved technologies. Approximately 1,300,000 hectares of land are used at present for food grain crops in the Terai. By adding 400,000 hectares of new land, this total could be increased to 1,700,000 hectares. Increasing the intensity of land use to 200 percent in both the Eastern and Western Terai, the production equivalent of adding another 1,227,000 hectares of land could be realized. Altogether, this could accumulate to a total acreage of 2,927,000 food grain crops per year, more than double the present acreage. And, higher yields from this expanded acreage could increase total output of food grains tremendously.

These rough calculations represent the theoretical maximum potential. But, even if only 50% achieved in some reasonable time span, the



influence on the total food grain supply for a growing population and for higher exports, and on the additional employment opportunities in agriculture would be striking indeed.

Other advantages of a Terai-first strategy, associated with and in addition to the above, might be noted.

2) In economic terms, the efficiency in use of investment capital probably would be substantially higher in the Terai than in the Hills. The dollar value of added output per dollar of investment capital probably would be greater. Stated another way, the investment necessary to achieve an additional unit of output would be higher in the Hills. This is obvious from the fact that constructing roads, supplying inputs, expanding irrigation, etc., per unit of cropland served in the Hills would be tremendously greater.

3) More rapid and complete development of the Terai (with widespread use of irrigation water for year-round crop production) would more nearly assure a stable supply of food grains, year after year, for the Nation's needs for domestic and export uses. This would be true especially in years of adverse weather conditions, such as widespread drought.

This higher and more dependable production, coupled with a wise storage reserve program, might alleviate suffering (perhaps even starvation) in the heavily populated Hill areas in case of very adverse weather such as that experienced within the past two years. With the dwindling reserves of food grains world-wide, external sources for meeting emergency needs might not be available at all or, if available, at prices which would place a heavy burden upon the country's financial reserves.

4) The longrun potential for supplying large quantities of raw materials for agro-based industries is much greater in the Terai. And, such industries offer the greatest hope for providing employment opportunities outside of farming for the growing surplus of workers in the Hills.

5) Out-migration from the Hills will be a continuing necessity to alleviate population pressures on land resources. Further development of the Terai at a rapid pace seems to offer greatest hope for accommodating this exodus of people from the Hills.

3. **Disadvantages of Strategy**—While additional advantages might be conceived, a few arguments against the strategy will be noted.

1) The primary one is based upon equity considerations. From a national viewpoint, it would seem grossly unfair to either neglect or to postpone the assignment of at least some development efforts to the Hill and Mountain areas where land resources are most limited, the population pressures greatest, and the current levels of income and living conditions lowest.

2) Such a strategy is not politically expedient. Political unrest, and even revolt, might result from pursuing such a policy over an extended period of time.

3) Neglect, or delay, in exploration and development of more effective ways of utilizing some of the unique resources of the Hill and mountain areas would be a short-sighted policy for a small country with need to develop all resources for better-balanced progress.

## C. HILL-EMPHASIS STRATEGY

1. **Description of Strategy**—This strategy would be just the reverse of the Terai-first strategy. Primary emphasis in future development efforts would be shifted from the Terai to the Hills. In a sense, a moratorium would be declared on Terai development to give the Hills a chance to “catch up” in the overall development process.

This shift in emphasis would recognize the neglect of Hill areas in past development projects. This is suggested by Dr. Harka Gurung, a member of the National Planning Commission: “If the Terai contributes nearly 60 percent of Nepal’s G.D.P. and 75 percent of the government revenue, it is because our present development is ‘plain’ oriented. Nepalese planning effort indicates a heavy emphasis on the capital region (consumptive investment) and the Terai (export-oriented) and only residual investment in the Hills.”<sup>10</sup> Presumably, Kathmandu district is the capital region mentioned.

Because of the alarming decline in food grain production in the Hills, government planners are giving increasing attention to the woes of Hill agriculture. As shown in Appendix Table X, food grain production in the Hills has been declining at an average rate of 2.06 percent per year through a 7-year period, 1965/66 through 1972/73.<sup>11</sup> Further data from the same source, indicate that per caput major food grains locally available has been reduced annually by about 3.9 percent. (This reflects the declining food grain production and the increasing rate of population growth.)

The plight of the agricultural situation in the Hills was highlighted further in another paper.<sup>12</sup> It was estimated that per person income in 1970/71 in the Hills was about \$40 as compared to \$100 in the Terai. The situation was intensified for individual farm families by the decline in size of holdings to probably 0.3 to 0.4 ha. per household. And, this was coupled with a widening expanse of deforestation, erosion, and insignificant public capital and technical backstopping.<sup>13</sup>

Further documentation is not necessary to indicate a growing concern by government officials about the worsening condition in the Hills and their resolve to shift development efforts to the Hills region.

A few pros and cons for pursuing an Hills-emphasis strategy will be noted.

### 2. Advantages of Strategy

- 1) In the short run, at least, the public conscience would be eased and the hopes of the Hill people enlivened by the sudden infusion of huge public assistance as described in the “Crash Programme” proposal earlier referenced.<sup>14</sup> This proposal for a 3-year intensive program would involve massive inflow of improved inputs — primarily chemical fertilizers, improved seeds, and irrigation developments and improvements — for the purpose of increasing the total production of cereal

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<sup>10</sup>Ibid. - Harka Gurung, P. 6. Note: In this quotation, Dr. Gurung makes reference to the following paper by Gaige: Frederick Gaige, *The Role of Terai in Nepal's Economic Development*, Vasudha, Vol. XI, 1968, p. 53-61.

<sup>11</sup>Draft proposal. *A Crash Programme for Increased Grain Production the Hills*. (For the period 1973/74 through 1975/76). Planning-Evaluation Division, Ministry of Food, Agriculture and Irrigation. HMG, Nepal. July 15, 1973.

<sup>12</sup>Draft plan. *Hill Agriculture Development Project*. 1973/74 - 1974/75. Planning Division, Ministry of Food, Agriculture and Irrigation, HMG, Nepal. April, 1973.

<sup>13</sup>Ibid. Pages 1 & 2.

<sup>14</sup>Op. Cit. - *A Crash Programme for Increased Grain Production in the Hills*.

grains in 51 Hill districts. The ambitious targets established would reverse the downward trend in production of 2.06 percent annually for the past 7 years to an annual increase of 2.0 percent in year one, 3.0 percent in year two, and 4.0 percent in year three. This is to "pave the way" for targets for the entire Fifth Development Plan of 4.0 to 6.0 percent annual increases in total output of these cereal grains — paddy, wheat, maize, and millet.

Public investments for supporting this crash programme would total 19 million rupees in year one, 36 million in year two, and 69 million in year three. A breakdown of these proposed allocations is shown in appendix table XXX.

If the goals and targets for increases were achieved, the income and living standards of a substantial number of Hill families would be enhanced greatly. But, the feasibility and possibility of such accomplishments may be questioned on at least two counts:

- a) The adaptability of available improved seeds to the great number of small micro-climate areas in the Hills and the response of both these and local varieties to various kinds of chemical fertilizers is largely unknown; and
- b) The economic feasibility and desirability of such investments in "unkowns" are highly questionable and may not have had careful consideration. For example, the in-country transportation costs alone for fertilizers — for truck fares and porter wages — are estimated to total over 1,550,000 rupees during the first year. This would average over 1,100 rupees (almost \$105 U.S.) per metric ton, with a cost of over 2,690 rupees per M.T. delivered in Jajarkot district. Seed transportation costs were estimated to total almost 1,066,000 rupees, an average of over 2,840 rupees per M.T. delivered.

When the rapidly increasing prices of imported fertilizers are added to these high in-country transportation costs, the wisdom of such fund allocations certainly should be questioned until further economic evaluations are made.

- 2) Another argument for emphasizing Hill development is related to population density — more people live there and development dollars would reach more families.
  - 3) The potential for adjusting Hill farming to include new technologies — cropping systems, soil treatments, etc. - and the production of specialized commodities with low bulk and higher acre values are largely unknown. Without greater allocation of development resources, such possibilities cannot be explored and evaluated.
  - 4) The potential for developing marketing centers; small-scale, labor-intensive agro-industries; community and village cooperative efforts in improving living conditions; and other such adjustments may be substantial, but concealed, without development investigations.
3. **Disadvantages of Strategy**—Some arguments against allocating all new development resources to the Hills are as follows:
- 1) Further development in the Terai might be stymied, to the detriment of the longrun welfare of Hill people, as earlier indicated. It might "kill the goose that laid the golden egg."
  - 2) Farming in the Hills already is approaching both the extensive and intensive margins of land use. Perhaps the extensive margin already has been passed, as substantial acreages of marginal lands are severely depleted and eroded and probably should be converted to forestry and forage production from the standpoint of good land use.

Cropping intensity also is much closer to the intensive margin in the Hills than in the Terai — estimated to range from 150 to 300 percent, depending upon the availability of irrigation water for year-round production. Without such, further intensification has limited possibilities.

Since a high percentage of Hill farms consist of terraced slopes, some quite steep, the possibility of great expansion in irrigated acreage seems quite unlikely. Even if water could be made available for year-round irrigation in hillside farms, the increased hazards from erosion and landslides might become intolerable.

Hence, the possibility of dramatic increases in food grain production in the Hills seems quite remote, despite good intensions and heroic inputs of new resources.

- 3) If total output of foodgrains remains an important goal, the heavy commitment of resources to the Hills would become an inefficient use of resources.
- 4) Such all-out emphasis on Hill development might distort desirable longrun developments and create even further imbalance in the wise and effective use of all resources.

#### D. TERAHI-HILLS STRATEGY

1. **Description of Strategy**—In view of discussions under strategies A, B, and C, the nature of this strategy becomes rather obvious.

Resources for development would be divided between the hill and Terai areas upon some basis of establishing priorities and allocations. With this strategy, development would be somewhat independent in early stages. This probably could be justified by the present disparity in stages of development between the regions.

In the Terai, research stations and farms have been established long enough to give considerable assurance of adjustments in cropping systems and technologies which will give increases in production, and some knowledge about the magnitude of such increases. Numerous surveys and feasibility studies reveal the potential for irrigation, multiple-cropping, and other adjustments in overall farming systems. Experience gained over a period of years show the potential for growing, and increasing the yields, of special cash crops — such as tobacco, sugarcane, jute, potatoes, and oilseeds. The cadastral survey is much further advanced in Terai districts, providing a sounder basis for adjustments in land holdings, rental arrangements, and other land reform measures. Information such as this has accumulated over a period of development of many years in the Terai.

Data such as the above simply are not available for each of the many diverse areas in the Hill region. This does not mean that dedicated efforts should not be made to acquire such information. But it does mean that the types of programs and projects needed at this time are quite different from those most appropriate for the Terai.

An overall goal for this strategy might consist of preparatory efforts for moving as rapidly as possible into strategy E.

A few pros and cons for this strategy will be summarized.

2. **Advantages of Strategy**—The dual-development efforts in the Terai and Hill regions seem to offer some distinct advantages in the shortrun.
  - 1) The Nepal Government and external donors could pinpoint their development efforts more directly upon the *current* needs of each area.
  - 2) Time would be available for appraising the real potentials for each region before making hasty decisions about expending scarce resources

on spur-of-the-moment proposals without carefully evaluating both the physical and economic feasibilities of such.

- 3) More effective use probably could be made of the limited number of highly trained professional and technical people in Nepal. An urgent need seems to exist for keeping trained personnel at their assigned tasks over a period of years in order to gain experience and confidence, rather than the frequent shifting from one project to another.

As shown in Appendix Table XXII, a growing number of trained people will become available throughout the next 5-year plan. This should allow time gradually to match such individuals with some of the special development needs peculiar to each region and to pave the way for more effective assignments of personnel on a more permanent basis.

3. **Disadvantages of Strategy**—Disadvantages of this strategy probably would be found in the choice of policies and administrative procedures rather than in the soundness of the approach.
  - 1) One contingency is that neglect of the Hills area still might prevail in the assignment of resources.
  - 2) Central government may lack the will, and the technical staff, to evaluate each separate project carefully in advance of resource allocations.
  - 3) External donors may still give primary attention to individual projects of their own choosing without giving serious attention to the impact each might have upon most expeditious use of the country's resources for balanced longrun development.

## **E. INTEGRATED REGIONAL DEVELOPMENT STRATEGY**

1. **Description of Strategy**—This strategy is conceptualized on the basis of recent organization of the country into 4 major development regions, each embracing Terai, Hills, and Mountain areas. These are the Surkhet Development Region in the far west, The Pokhara Development Region adjoining it on the east, The Kathmandu Development Region in the central area, and the Dhankuta Development Region in the far east.

The choice of these four regions and the initial administrative arrangements for separate staffing in each, indicate the intent of the government to pursue longrun development in accord with this strategy — the coordinated, integrated development of the resources available within each region.

The arbitrary choice of separating the country into 4 north-to-south development regions, rather than attempting a country-wide integrated development program, probably can be justified for several reasons:

- 1) Administration of development can be dispersed for more effective planning and implementing of programs and projects, provided central government is willing to assign highly competent personnel to regional positions and to delegate both responsibility and authority to them for carrying out the plans selected. Strong leadership and capable supporting staff, along with stability of tenure, will be essential for longrun success with this strategy.
- 2) More active involvement of local leadership — in zones, districts, and local panchayats — should be possible with this regional arrangement. In fact, without such involvement in the development of plans and projects and in their execution, this type of strategy cannot succeed over time.
- 3) External donors can contribute to Nepal's development efforts more effectively by giving their support to well-designed regional development plans and programs already established by Nepalese people.

2. **Advantages of Strategy**—Some advantages of this strategy, in addition to those implied in the above comments, are as follows:
  - 1) Complementarities in developing the diverse resources in the Terai, Hills, and Mountain areas within each region probably can be achieved more effectively.
  - 2) Planning and design of access roads, trails and bridges; of marketing centres and institutions, such as cooperative societies; of local industries to suit the total resources of the region; of public works which will hasten development, provide employment opportunities, and contribute to longrun growth and stability; of resettlement procedures which will lead to more effective use of all resources of the region and to improved welfare for all the people; and of other such adjustments probably can be achieved in a more effective manner with this approach.
3. **Disadvantages of Strategy**—Any disadvantages of this strategy, or elements which could contribute to failure rather than success over time, are likely to be administrative and personal in nature. Factors on which successful regional development seems to hinge may be expressed by summarizing a few abilities and "willingnesses."
  - 1) The ability to develop and follow a systematic and logical procedure for planning development programs. (See appendix B)
  - 2) The ability of central government to maintain control and to exert sound judgment in evaluating and approving the funding for plans and projects submitted by regional staffs and by external donors and in allocating resources for their implementations.
  - 3) The willingness of central government to delegate responsibility and authority for regional staffs to prepare long-range plans for development and to make the operational decisions for implementing them.
  - 4) The ability of regional staff members to display vision and foresight in perceiving the real problems of the region and the broad development programs necessary for their solution, rather than initiating a conglomeration of little separate, unrelated projects in a haphazard manner.
  - 5) The willingness of regional personnel to accept the great challenges and opportunities for longtime regional development and to dedicate their professional careers to the task, rather than seeking opportunities to move on to something else.
  - 6) The willingness of external donors to accept the regional concept for development and to design their assistance proposals in a manner to support and strengthen the on-going regional programs.

## **A RECOMMENDED STRATEGY FOR DEVELOPMENT**

The strategy which seems most appropriate for agricultural development in Nepal is a dual one — a combination of strategies D and E. Strategies A, B, and C are rejected on the basis of their piecemeal, fragmented approaches and their inability to stimulate coordinated and unified development country-wide.

Strategy E is considered most desirable for longrun agricultural development and should be the ultimate goal toward which to strive. However, for the shortrun period — such as the next 5-year plan — pressing separate needs seem to exist for the Terai and Hill areas within each region.

The four newly-formed development regions have neither the staff

capabilities nor the necessary background information with which to launch into an integrated development program immediately. Concentrating on somewhat separate activities seems most feasible and desirable in order to have time for accumulating essential benchmark or base data for each different area and to allow regional staff personnel time to become adjusted and to get thoroughly acquainted with the leadership and with the major problems of each area.

The primary need in the Hills is to explore and to test the adaptability of a wide variety of farming systems, practices, technologies, new crops, and other adjustments which offer promise. These should be tried in carefully selected areas to represent different micro-climatic conditions, as well as social and cultural variations, to be described later in connection with an "adaptive research" proposal. During the next 5-year plan, this preparatory work might be supplemented with public works programs and other "crash efforts" which the central government and regional staffs feel are essential for relieving economic pressures affecting the Hill families.

The Terai areas need more time to consolidate past achievements and to expand on the further field testing and adaptation of proven technologies. The research stations and farms in each development region have made excellent progress. They have the basic facilities and well-trained personnel on which to base an expanding agricultural research program. But the staff members are young and inexperienced and continued external technical assistance of a specialized nature seems highly desirable for a few more years.

In both the Terai and Hill areas in each region, an urgent need exists for continuation and expansion of surveys, feasibility studies, and data gathering procedures to provide a foundation for longrun planning.

## **SUGGESTIONS FOR STRATEGY IMPLEMENTATION AND EVALUATION**

Since the strategy recommended has both shortrun and longrun implications, attention must be directed to the needs for both time spans in order to make acceptable progress.

One pressing overall need for both longrun and shortrun planning is the development of a logical, systematic framework of analysis to aid in evaluating alternative plans and projects and in implementing and evaluating progress over time. A suggested 10-step procedure for doing this is included in appendix B.

### **A. THE ROLE OF GOVERNMENT IN IMPLEMENTING DEVELOPMENT PLANS**

Both central and regional governmental units will be involved in regional development programs. It is essential that the roles of each be clearly defined and understood. While this will be a Nepalese responsibility, a few suggestions for allocating responsibilities will be offered.

1. **Central Government Responsibilities**—These might include the following:
  - 1) Establishing overall, national policies and regulations to guide development programs;
  - 2) Acquiring development capital from various sources;

- 3) Allocating funds to regions on the basis of regional plans and priorities submitted, and on the availability of capital;
  - 4) Arranging with external donors for the types of assistance needed;
  - 5) Developing guidelines to assist regional staffs in planning and budgeting;
  - 6) Initiating a nationwide data gathering system to provide basic data for planning and for on-going evaluation;
  - 7) Arranging for assessing special problems with inter-regional implications in order to minimize duplication and overlapping of efforts; and
  - 8) Helping regional officials acquire adequate trained personnel for staff positions and giving assistance as needed with on-going staff training.
2. **Regional Staff Responsibilities**—These might include activities as follows:
- 1) Developing as complete an inventory as possible of regional resources available;
  - 2) Establishing primary goals for regional development;
  - 3) Identifying major constraints to which programs and projects will be addressed;
  - 4) Mobilizing the local leadership in districts and village panchayats for assisting in developing plans and projects and in carrying them out;
  - 5) Preparing budgets and priorities for various development projects;
  - 6) Specifying the types of technical and capital assistance which would be most helpful from external donors;
  - 7) Cooperating with central government in establishing and conducting the nation-wide data gathering and reporting services;
  - 8) Pooling and coordinating the efforts of public and private organizations and agencies in joint development efforts; and
  - 9) Relaying to the central government information about emergency situations which may arise.

## **B. THE ROLE OF EXTERNAL DONORS**

The role of external donors seems rather clearly defined, and might comprise such activities as follows:

- 1) Providing capital assistance to supplement funds available within the country — especially for large-scale, capital-intensive projects;
- 2) Furnishing technical assistance for highly specialized jobs for which Nepal lacks trained personnel and for training Nepalese technicians to take over such functions;
- 3) Assisting with surveys and feasibility studies to aid in development planning and choice of projects;
- 4) Helping with the design and implementation of a nation-wide data system and with procedures for evaluating the economic consequences of project proposals and on-going programs;
- 5) Suggesting types of assistance projects which will supplement and assist with Nepalese development plans, instead of proposing "special projects" which compete for limited trained Nepalese personnel and other resources; and
- 6) Continuing to assist with numerous manpower training efforts, one of the greatest needs for longrun development programs.

## **C. LONGRUN AND SHORTRUN IMPLEMENTATION**

In view of the dual nature of the proposed strategy, the Nepal government and external donors might give attention to two lines of activity during



the coming 5-year plan for development:

- 1) Preparatory work to provide a sound base for longrun, integrated regional development, and
- 2) Actions designed to expand and strengthen development projects already under way. While a sharp line of distinction cannot be drawn between the two, a few suggestions for implementing each type of activity will be summarized.

**1. Preparatory Work for Longrun Regional Development—**

- 1) Establish and perfect a nation-wide data gathering and reporting system to provide information on agricultural production and related data on a regular basis — an urgent need for long-range planning and evaluation;
- 2) Conduct land use surveys to map out in each region the land areas best suited for specific purposes in longrun development — such as cropland, forage production, forestry, national parks, game reserves, industrial and village sites, etc. . Of particular importance for future resettlement efforts, is the identification of Terai forest land suitable for conversion to cropland.
- 3) Continue with the cadastral survey to support the implementation of land reform measures which are essential in protecting the rights and improving the welfare of small farmers, both tenants and owners. Two excellent publications outline the development of land reform measures and progress made to date.<sup>15,16</sup>
- 4) Conduct feasibility studies to evaluate the economic justification for alternative development projects in agriculture and in supporting improvements — such as irrigation development, production of new crops (such as cotton in the Terai and tree fruits in the Hills), new roads and other communication facilities, etc.
- 5) Continue and expand groundwater surveys to aid in rapidly increasing the use of irrigation for multiple cropping in Terai areas.
- 6) Develop special feasibility studies to explore the potential for various kinds of agro-based industries, in the Terai, Hill, and Mountain areas in each region. Attention should be given to the types of industries in which different areas have comparative advantage, to suitable sites for location, to capital requirements, to the employment potential, and to other such factors.
- 7) Conduct exploratory research — a kind of “Adaptive Research” activity — to investigate the adaptability of various kinds of technology and farming systems to the widely diverse conditions which prevail on Hill farms. This would be done on a sampling basis by selecting, within chosen districts, small areas with different types of farming with respect to elevation, soil types, climatic conditions, traditional methods, etc. . Stress should be given to simple kinds of practices and adjustments which can be made largely from local resources with low cash requirements and high returns in terms of increased production, cash income, and employment. Such practices as the following might be investigated:
  - a) The adaptability of improved varieties of cereal grains developed at

<sup>15</sup>M.A. Zaman, *Evaluation of Land Reform in Nepal*. Ministry of Land Reforms. HMG of Nepal. 1973.

<sup>16</sup>B.P. Dhital, *The Impact of Agrarian Reforms on Employment and Productivity in Nepal*. Prepared for “Expert Consultation on Land Reform”, organized by FAO, Bangkok. December, 1973.

- the Regional Research stations — through establishing sub-stations and field trials for testing;
- b) The performance of new crops under different micro-climatic conditions — such as fruits, vegetables, mulberry trees for silk worms, mushrooms, herbs, seed potatoes, etc.;
  - c) The production potential for crops with superior nutritive values — such as high lysine maize, soybeans, pulses, and other high protein crops — to help improve diets of subsistence farm families;
  - d) The suitability of new cropping systems, such as intercropping and special rotations of crop sequences;
  - e) Improved methods of composting and manure management to increase fertility with a minimum investment in high-priced commercial fertilizers; and
  - f) The potential for processing locally raised products for greater economic returns and lower risks in marketing.

These are only a few of many possible ways of selecting and testing the adaptability of new technologies to agricultural production in the Hills.

2. **Further Development of Current Activities**—Only a few efforts most directly related to Nepal's No. 1 production problem — the increased output of cereal grains — will be mentioned.

- 1) Continue to improve and consolidate the research underway at the Regional Research Stations and Farms and to expand the areas served by establishing sub-stations, field trials, farmers' trials, and demonstrations in carefully selected locations, especially in the Hills areas;
- 2) Further develop the facilities and management abilities for the production, processing, storage, and distribution of improved seeds — an urgent requirement for rapid expansion in the use of higher yielding varieties of major grain crops;
- 3) Develop and test different patterns of organization for the production, storage, distribution, and on-farm management of irrigation water for multiple cropping;
- 4) At the research stations, accelerate the search for varieties and types of food grain crops with high nutritive value — such as high lysine maize — and adapt to local conditions; and
- 5) Continue to give high priority to manpower training efforts in order to serve a growing need for more highly trained workers in research, extension, regional development administration, financial and marketing institutions, agro-industries, etc.;

## D. PROCEDURES FOR EVALUATION

Effective evaluation of progress is possible only in relation to goals established and to the problems and constraints to which efforts are addressed.

The first step in evaluating projects and programs is to follow a logical and systematic procedure in formulating plans for them. A suggested framework for planning programs and evaluating progress is included in Appendix B in the form of a Ten-Step process. This analytical procedure has proven effective in various types of planning over a period of years.

Another step in evaluation is to establish rather tangible benchmarks — initial base-line data — to give the current situation at the time projects and programs are started. It is difficult to measure progress from an unknown starting point. The type of basic information needed is related to the scope of the program. For district, regional and national programs for overall agricul-

tural development, a broad data base is needed. This can be acquired, even in general quantitative terms, only through some kind of nation-wide data gathering system as earlier proposed.

If the project is to develop improved farming systems in an area, information first must be acquired to determine the physical and economic performance of existing systems with which comparisons are to be made over time. This can be done through surveys and various types of farm management studies.

Finally, evaluation is possible only with some system of records to provide factual data about performance over time. Again, for broad-based projects, a comprehensive system of on-going data collection, analysis and reporting is preferable. If such is not available, various kinds of "before" and "after" surveys are sometimes used.

For small-scale projects, such as the study of improved farming systems or some community development projects, actual year-by-year records may be compared with the initial bench-mark data for on-going evaluations. Surveys at selected time intervals provide an alternative method.

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## APPENDIX - SECTION A

### AN APPRAISAL OF THE RESOURCES OF THE AGRICULTURAL SECTOR OF NEPAL

Nepal is a small country with a great diversity of resources which conditions and limits the pace of economic development. This is particularly true in the field of agriculture. Plans and programs for expediting the application of improved technologies for increased food production are influenced greatly by the size and location of the country, by the nature of the physical and human resources, and by the governmental and institutional structures.

In size, Nepal is scarcely larger than the state of Arkansas, consisting of about 140,798 square kilometers or 14 million hectares. It is approximately 500 miles (800 kilometers) in length from northwest to southeast and varies in width from north to south from approximately 100 miles (160 kilometers) to 150 miles (240 kilometers) at the widest point.

Locationwise, Nepal is a landlocked country. It is surrounded by the Tibetan region of China on the north, by Sikkim on the northeast, and by India on the west, south, and southeast. Kathmandu, the capital city, is located at 85.25 degrees east longitude and 27.45 degrees north latitude.

#### PHYSICAL RESOURCES

Topographically, Nepal is a country of extremes, consisting of rugged, snow-covered mountains, deep canyons, inter-mountain valleys, and broad plains. Elevations rise abruptly from a few meters above sea level in parts of the Terai to an altitude in excess of 29,000 feet at the top of Mt. Everest, the highest point on earth.

For descriptive purposes, the country may be separated into three rather distinct geographic regions. The Terai area along the southern border is a narrow extension of the broad Gangetic Plain in northern India. It includes the level plains and the lower slopes of the hilly area to the north. The central region, the Hills, consists of clusters of rugged mountains ranging in elevation from 1,200 to 3,600 meters and intersected by the deep valleys and gorges of the major north-south river systems. The northern region includes the main ranges of the Himalayan Mountains with a succession of peaks rising from 3,000 to 8,840 meters above sea level. Just below the Himalayas and to the south is the Mahabharat Lekh range of mountains and farther to the south lies the lower Swalik range. Between these two ranges lies a series of fertile valleys, of which Kathmandu and Pokhara are largest.

The land and water resources, as well as climatic conditions, will be examined somewhat more closely because of their direct influence on agricultural production.

#### Land Resources and Land Use

Detailed inventories of the land resources of Nepal are not available at present. Several cooperative studies are in progress to assess some of the natural resources and potential uses in parts of the Terai area. These include the following:

Type of Survey	Agencies Cooperating
Inventory of Forest Resources	Indian Cooperation Mission, USAID
Survey of Surface & Groundwater Resources	UNDP/FAO, ADB, USAID
Land Use Survey	UNDP/FAO
Soil Survey	UNDP/FAO, USAID
Combined Land Use & Water Survey	British Nawal Parasi Project

Very little work has been done to appraise the natural resources in the Hills and the Mountain Areas. While time consuming and expensive, comprehensive surveys of the physical resources of the country are essential for effective longrun development programs. Such surveys might provide information on land capabilities, soil types, natural vegetative cover, hydrological and meteorological data, soil erosion, etc.

Data are available from several sources on the current use of land resources. One source indicates a 1970-71 breakdown as follows (in rounded numbers): 14 percent under cultivation (1,980,000 ha); 32 percent under forest; 15 percent under perpetual snow; 13 percent waste land reclaimable; 18 percent wasteland not reclaimable; and 8 percent other uses;<sup>1</sup>

Another source classifies the use of land resources somewhat differently. Based upon 1968-69 data from the Ministry of Food and Agriculture, the breakdown is as follows:<sup>2</sup>

Classification	Total Area (ha.)	Percent of Total
Cultivated	1,845,000	13.10
Forest covered	4,532,000	32.19
Permanent meadows & Pastures	2,000,000	14.20
Cultivable but not cultivated	2,928,000	20.80
Built-on & other wasteland	<u>2,775,000</u>	<u>19.71</u>
Total	14,080,000	100.00

More relevant for a study of the agricultural sector is the distribution of cultivated land among different geographic regions. One such breakdown, which also shows the number of districts and the population distribution, is as follows:<sup>3</sup>

Region	No. of Districts	Population	Percent of Total	
			Land Area	Cultivated Area
Mountain	16	9.6	33.0	4.8
Hill	36	47.2	43.5	27.3
Terai	20	38.0	23.0	65.5
Kathmandu Valley	3	5.2	0.5	2.4

While the mountain districts account for one-third of the total land area, they have less than 5 percent of the cultivated land. Much of this land is unproductive and not well suited for cropping because of high altitudes, steep slopes, short growing seasons, and other adverse conditions.

<sup>1</sup>Agricultural Statistics of Nepal. HMG Ministry of Food, Agriculture and Irrigation, Economic Analysis and Planning Division, July, 1972 P. 1.

<sup>2</sup>Farm Management Study of selected regions of Nepal, 1968-69. HMG of Nepal. Ministry of Food and Agriculture, Economic Analysis and Planning Division, Singha Durbar, Kathmandu, Nepal, 1971. P. 12.

<sup>3</sup>Howard W. Hjort, Assisting Agricultural Development in Nepal. FDD Field Report 33, USDA cooperating with USAID, June, 1973, p. 3



The densely populated Hill districts have, on the average, about 1.1 hectares of land per person but only about 0.1 of a hectare of cropland. Most of this cropland is very intensively used and very little additional land could be brought under cultivation.

Land in the Kathmandu Valley districts, actually a part of Hill areas, also is intensively cultivated and very little new land is available for crop production.

Only in the Terai districts is the population pressure less intense and the opportunity for expansion of agricultural production of any great significance.

## **Water Resources**

One of the greatest natural resources in Nepal, and the least exploited, is the abundance of water from different sources - from rains, rivers, lakes, and ground water. While the total supply of water is more than ample, its availability and accessibility in the places needed, at the proper time, and in the desired amounts often are not.

Three major river systems intersect the country from north to south - the Kosi in the eastern area, the Gandaki-Narayani in the central part, and the Karnali in western Nepal. Altogether, they drain a total area of 141,190 sq. km. Seven other large perennial rivers have drainage areas ranging from 1,280 sq. km. to 6,400 sq. km. From east to west, these are the Mechi, Kankai, Kamala, Bagmati, Rapti, Babai, and the Sharada. These major streams, along with many other smaller river systems (several thousand, by some estimates), comprise the total drainage pattern for Nepal.

These river systems have great potential, though largely undeveloped, for irrigation and the generation of hydroelectric power. According to one estimate, this potential is about 83,000 MW - an amount equal to the combined total installed hydroelectric capacity of the United States, Canada, and Mexico. Numerous small-scale irrigation projects, and a few larger areas largely through stream diversion techniques have been developed in both the Hills and the Terai.

Recent surveys indicate large reservoirs of ground water, easily accessible for irrigation, in substantial areas of the Terai. These explorations have been conducted by Japanese technicians in the central Terai and by the U.S. in the Western Terai. Unofficial reports from the latter area indicate that a total of 184 test wells - ranging from 500 to over 1,500 feet in depth - have been drilled on 5 to 6 mile cross sections. These include 99 in the Lumbini area, 45 in Bardia and Banke districts, and 40 around Dhangari. Artesian wells were found in the Bhairawa, Nepalgunj, and Dhangari areas. In some other wells, usable water located at a depth of only 50 feet.

While some of these test wells, varying from 6 to 14 inches in diameter, will be retained for follow-up observation and study, approximately 20 to 25 percent of the wells may be made available for local irrigation developments through the Farm Irrigation and Water Utilization Section of the Food, Agriculture, and Irrigation Ministry. In view of the urgent need for further irrigation developments in the Terai area and of the availability of drilling rigs and trained crews to operate them, it would seem to be a wise investment of development funds to continue ground water explorations in all of the Terai districts.

Lakes and ponds provide another source of water for multiple uses. Numerous natural lakes in the Mountain and Hill regions may be developed further for irrigation, fisheries, municipal and village water supplies, and other uses. Ponds and small retention reservoirs have been constructed in many areas of the Terai for similar purposes.

## **Climatic Conditions**

Nepal's climate is noted for extreme variabilities in temperature, rainfall,

and other climatic factors. Actually, the country consists of numerous micro-climates which differ because of changes in altitude, the path and intensity of monsoon rains, and other conditions.

Temperatures vary from the sub-tropical heat of the Terai to the extreme cold alpine-like temperatures of the high Himalayas. Temperatures in the Terai range from 4° to 21° centigrade in December and January and from 21° to 46°C in May and June. Temperatures are more moderate in the Hills and inter-mountain valleys but vary widely with changes in altitude and other conditions. Freezing temperatures rarely occur in Kathmandu Valley and other valleys and Hill areas of equal or lower altitudes.

Monsoon rains dominate the weather patterns in Nepal. The southeast monsoon usually arrives in June and leaves in September. Distribution of rainfall is uneven, with decreasing amounts from east to west. Some areas in the East receive as much as 2500 mm. of rain annually while in the West the rainfall may not exceed 750 mm. Kathmandu Valley normally receives 1,270 to 1,520 mm. of rain per year, while some areas in the Hills get much more. For example, in the Lumle area near Pokhara, annual rainfall in excess of 6,000 mm. (approximately 240 inches) is reported to occur in some years.

Another climatic factor affecting agricultural production in many places in Nepal is the occurrence of intense hailstorms, both in the Hills and the Terai. The frequency and intensity of these storms in some Hill and valley areas often cause serious losses of grain crops but can be disastrous for fruit production, especially for tree fruits.

Wide variations in climatic conditions preclude generalizations about the suitability of major regions of the country for producing any particular crop or crop combinations.

## **AGRICULTURAL RESOURCES**

Land, water, and other physical resources already discussed form the primary basis for all agricultural production. However, other resources exist as a result of developments already made in the use of natural resources available. And, the potential for expanding agricultural production beyond current levels depends greatly upon present usage of resources.

In evaluating the potential limits of land use, land economists often refer to extensive and intensive margins. Theoretically, at least, the extensive margin is passed when the cost of bringing an additional unit of land into production exceeds the value of the production to be gained thereby. Or, stated more specifically, the optimum point of bringing new land into production is reached when the marginal factor cost (the addition to total cost of bringing one more unit into production) is just equal to the marginal value product (the value added to total revenue by the production from the last unit added.)

The intensive margin concept refers to the application of more and more inputs, such as new technologies and quantities thereof, to the same land area. Again the intensive margin is reached when the marginal factor cost is just equal to the marginal value product - when the addition to total cost of adding another unit of input to the same land area is just equal to the value added to total revenue by the last unit of production realized therefrom.

These marginal concepts may be useful in making a more realistic evaluation of the potential for increased agricultural production from one area in contrast to another — for example, the Terai vs. the Hills in Nepal.

## **Types of Farming and Crop Production**

Types of farming and the crops produced vary widely among the major geographic regions in Nepal. As a nation, the government must be concerned

about the total production of major crops in relation to domestic needs and for possible export. Likewise, consideration must be given to the potential expansion in production of specific crops in different areas of the country. Both will be considered in order.

Foodgrains are predominant in the agricultural production of Nepal, but several cash crops make a substantial contribution to the national economy. Table I, prepared by the Ministry of Agriculture, summarizes Nepal's national acreage and production estimates for major food and cash crops for the 1972-73 crop year.

Based upon these estimates, foodgrains were produced on 90 percent of the cropped area in 1972-73 and accounted for a major share of the total agricultural production in metric tons.

TABLE I  
PRODUCTION AND ACREAGE ESTIMATES FOR MAJOR CROPS  
IN NEPAL FOR THE 1972-73 CROP YEAR

Crops	(000) Metric Tons	% of Food Grains	(000) Hectares	% of Cropped Area
	(1)	(2)	(3)	(4)
<u>Food Grains:</u>				
Paddy	2,010	61	1,140	52.0
Maize	822	25	437	20.0
Wheat	312	9	259	12.0
Millet	134	4	121	5.0
Barley	25	1	27	1.0
		100		90.0
<u>Cash Crops:</u>				
Sugarcane	245	-	15	0.6
Jute	55	-	54	2.0
Oilseed	60	-	112	5.0
Tobacco	7	-	9	0.4
Potatoes	294	-	51	2.0

Source: Ministry of Agriculture, His Majesty's Government of Nepal.

Paddy is by far the most important crop in Nepal, both in total acreage and total production. It is the major export crop and accounts for 70 percent of Nepal's total export earnings. Some concern has been expressed because both acreage and yields of paddy seem to have "leveled off" in the past few years as shown in appendix table IX.

Comparisons with production target projections reveal an actual decline in paddy production in 1972-73 below that of 1969-70, rather than the 6 percent increase which was expected to accrue during the first three years of the plan. Failure to achieve production goals of other cereal grain crops also was evident. Unfavorable weather conditions may account for some of the shortcomings but inability to achieve goals for bringing new acreages into production, for expanding and improving irrigated land, and for increasing the use of fertilizers, pesticides, and improved seeds at the rate anticipated may have had more influence.

Increased production of maize, Nepal's second ranking crop, also seems to be falling far short of expectations. Wheat acreages continue to expand but total production has declined because of lower yields. Unfavorable weather conditions, and the fact that acreages have expanded to lands of lower inherent productivity, may account for production shortages.

Area-wise, the twenty Terai districts account for nearly 80 percent of the paddy production, 30 percent of the maize, and 45 percent of the wheat output. Yields tend to be higher in the Hill and Mountain areas than in the Terai.

Production patterns, sizes of farm units, and the relative importance of different crops, differ from region to region.

**Terai Farms**—In the Terai areas, farm units are larger than in the Hills. A study by Zaman indicates an average size of cultivated holdings in the Eastern Terai of 7.4 hectares and in the Western Terai of 3.2 ha. per unit.<sup>4</sup> Bullocks, and to a lesser extent buffalo, are the primary sources of power in the Terai, both for land preparation and for transport.

Paddy is by far the foremost crop in the Terai area, both from the standpoint of acreage and of total production. Paddy production is oriented primarily to the monsoon rains. While sizable acreages (approximately 120,000 ha.) have access to irrigation water in parts of the Terai, some estimates indicate that it is utilized to less than 50 percent of potential; others as low as 7 percent. Evidently, it is used primarily to supplement the monsoon during the summer rice season, rather than to support multiple cropping for year-round crop production.

Maize and wheat are the other two main food grain crops produced in the Terai. Major cash crops are sugarcane, jute, and tobacco. While jute and jute goods account for 75 percent of Nepal's exports to countries other than India, they generally have been exported at a loss because of the poor quality of the jute and high costs of processing and transportation.

Sugarcane yields in the Terai also are quite low, averaging about 17 tons of cane per hectare. This yield level is one of the lowest in Asia and only 50 percent of the yields obtained in India.

While higher output of tobacco is needed to support the cigarette factories at Janakpur, Hetaura, and Birganj and a growing domestic demand, production has been stagnant for the past six years and yields remain low.

Overall, land utilization in the Terai for crop production seems far below both the extensive and intensive margins of land use. Estimates of the acreages of new land (largely cut-over forest lands) which can be converted to crop production vary widely - from 200,000 to as much as 1,000,000 hectares. If 400,000 ha. of forest land in the Terai were transferred to cropland, the net cultivated area could be increased by approximately 20 percent. This indicates that land use in the Terai is far below the extensive margin, at least in a physical sense.

Intensity of land use in the Terai also seems far below the potential. Cropping intensity in the Eastern Terai is estimated to be only 110 percent - in contrast with 125 to 130 percent in Nepal as a whole and 300 percent, or higher, in parts of Kathmandu Valley. With fuller utilization of irrigation water, currently and potentially available, an intensity of 200 to 300 percent should be attainable with good management. This presumes the application of other improved technologies along with the irrigation water - fertilizer, pesticides, improved seeds, etc.

The economic feasibility of moving closer to both the extensive and intensive margins of land use in the Terai is another question to be evaluated. Certainly the need for increased production is obvious and, at least in some areas, some degree of such adjustments would seem profitable. In any event, such intensification in the Terai areas seems to offer the only real hope for substantial increases in food grain production in Nepal.

**Hill Farms**—Hill farming methods and intensive land use have evolved through many centuries in response to extreme population pressures on the land. Over 60 percent of Nepal's population is concentrated in the Hills which contain

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<sup>4</sup>M.A. Zaman, *Evaluation of Land Reform in Nepal*. Ministry of Land Reforms, His Majesty's Government of Nepal, 1973. p. 85.

only about one-third of the cultivatable land. Population density per square kilometer of arable land may be as high as 1,100.

Farm units in the Hills differ substantially from the Terai farms. First, they are much smaller in size, averaging little more than 0.3 to 0.6 hectare per farm unit in different areas. Holdings are not only small but often quite fragmented because of traditional procedures for inter-generation transfers of land.

Many Hill farms, a high percentage of the total number, are on terraced hillsides which have slopes ranging from 10 to 40 percent, sometimes steeper. Because of extreme population pressures on the land, many farm units have been established on land far too steep and depleted for producing grain and, from the standpoint of good land use, should be converted to forage and forest production.

Maize is the principal crop in the Hill areas, followed by paddy, wheat, millet and barley. In some areas, potatoes are an important crop, along with fruits, vegetables, mustard (rape) seed, and other specialty crops.

Livestock production is a key factor in the economy of the small subsistence hill farms, both for food and manure production. Only through the careful use of manure and composting have the Hill farmers been able to maintain yields at higher levels than in the Terai. Cattle also provide milk for the family and bullock power for cultivation in some areas. Buffalo are kept for both meat and milk production and ghee (a semifluid clarified butter made from butterfat of milk from cows, buffalo, chauri and yak) is a major source of agricultural cash income. Goats contribute to the manure supply and provide meat for the family diet. As a rule, goats are not used for milk production although some efforts are under way to introduce breeds of milk goats in the area. Chickens contribute meat and eggs for the family food supply.

Most hill farms are isolated in small, micro-settlements because of the rugged terrain. Several days of trekking time often are necessary for most farmers to get to a market or to a motorable road. Consequently, they are not oriented to an exchange economy and have only nominal annual cash income - often no more than \$30 to \$40 per capita. Cash is available only for barest non-farm produced necessities - such as salt, cloth, kerosene, etc.

Through hard work and ingenuity, Hill farmers have attained a high level of efficiency in land use. In fact, land utilization already may have reached both the extensive and intensive margins.<sup>5</sup> In many places, land use appears to have gone beyond the extensive margin, in both physical and economic terms. Much steep land currently used for grain production suffers severe damage through sheet and gully erosion and landslides. This contributes to more rapid run-off and accentuates flooding and siltation problems in lowland areas.

From the standpoint of land use intensity, the hill farms have progressed much closer to the intensive margin than those in the Terai. Crop use intensity ranges from 120 percent in the Eastern Hills to 140 in the Western Hills, even as high as 300 percent in parts of Kathmandu Valley.

All this suggests the practical impossibility of any dramatic increases in food grain production in the Hill areas. Likewise, expectations of any major shifts in production from food grains to either more extensive livestock and forage enterprises or to more intensive specialty crops (such as fruits, vegetables, herbs, etc.) on a commercial basis probably is little more than wishful thinking in the short run - either in the next five year plan or in the coming decade. Transportation facilities and accessibility to markets, for both necessary inputs and products for sale, simply cannot be made available in the near future. Furthermore, shifts to more extensive systems of forage and livestock production on a commercial

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<sup>5</sup>Refer to the Explanatory Footnote No. 9 on page 13 of the main text of this paper for an explanation of extensive and intensive margins of land use.

basis would require substantially larger tracts for economically viable units. This, in turn, would require large-scale movement of farm families from the Hills to the Terai or elsewhere.

Hill farmers seem to place a higher value on some assurance of family survival than on making a small, and perhaps uncertain, gain in cash income. They have more confidence in attaining the survival goal through time-tested traditional methods and, hence, will be very reluctant to make any major changes which might jeopardize this position.

This does not mean a "do nothing" approach to alleviating problems of Hill farmers. Specific suggestions will be offered later.

**Mountain Farms**—Farming in the high mountain valleys consists largely of livestock production, primarily sheep and yak. Traditionally, the herdsmen have moved their animals southward during the winter to utilize pastures and fodder in the lower forest and hill areas. Then, they take their herds back to the high valleys for summer grazing. Ghee and wool have been the primary sources of agricultural cash income. Some short-season food crops - such as potatoes, barley, and vegetables - contribute to family food supplies.

Current land use in the mountain areas probably approaches both the intensive and extensive margins. Areawise, mountain farmers are in a "squeeze" from both the North and South. Extension of summer grazing into the Tibetan plateau has been cut off by closure of the Chinese border, while gradual expansion of Hill farming to steeper lands reduces the areas available for winter foraging.

Little opportunity exists for intensifying production in the mountain areas because of limitations imposed by climatic conditions and soil resources. Some help may be afforded through improvement in quality of livestock and more productive short-season crops. Cross breeding of Yak with cattle to produce chauri offers promise for substantial increase in milk production per animal while introduction of new breeds of sheep for crossbreeding with local breeds may bring higher production of wool and meat.

In the longrun, substantial increases in forage production might be achieved through renovation of depleted forest and wasteland by reforestation with fodder trees and reseeding with improved grasses and legumes, accompanied by controlled grazing and good management. Such developments, which are slow and expensive, could enhance the carrying capacities for winter grazing.

## **Livestock and Livestock Products**

Livestock production makes a substantial contribution to the economy of Nepal. According to 1968-69 statistics, the value of livestock products (meat, milk, milk products, eggs, hides and skins, dung, etc.) amounted to Rs.1,511 million at the current prices. This represents 41 percent of the total value of foodgrain crops, and approximately 22 percent of the Gross Agricultural Product.

Estimates of livestock numbers in 1969-70 approximated 6.2 million cattle, 3.5 million buffalo, 2.2 million goats, 2.1 million sheep, and 320,000 pigs. Livestock production for the same year amounted to 46,300 metric tons of meat, 582,600 MT of milk, 55,000 MT of cheese, and 9,000 MT of ghee.<sup>6</sup>

Ghee is the major livestock export product to India, with an estimated value of Rs. 21 million in 1966-67, ranking fifth in value among export commodities. Imports, however, included live buffalo, goats, and sheep with a value of NC Rs. of 112 million.

Livestock production in Nepal is largely on a subsistence basis. Because of religious restrictions, cattle are kept only for milk and for draft purposes (except for milk only in Kathmandu Valley). Buffalo provide meat, milk and animal power in both Hill and Terai areas. Goats provide meat, primarily, and are not

<sup>6</sup>OP. Cit. Agricultural Statistics of Nepal. 1972. pages. 43-44

used for milk production. Sheep provide meat as well as wool, but not enough wool fiber for the domestic market. Yak are the all-purpose animals in the mountain areas, supplemented by chauri, goats, and sheep.

Animal productivity is low because of genetic make-up and a lack of good management, proper feeding, and health control. Expansion in total production is largely limited by the supply of forage with little prospect for rapid increases in forage output. Commercial livestock production is further hampered by a lack of organized marketing facilities, sanitation regulations, slaughter houses, and licensing procedures for animal slaughtering.

## **Machinery and Equipment**

Investments in machinery and equipment are nominal, in relation to other farm investments, in both the Hill and Terai regions. Home made ox-drawn equipment and hand tools are characteristic.

Capital investments in tools and implements amounted to only 1 percent of total investments per farm in 1968-69, according to surveys in selected districts in both the Terai and Hill areas.<sup>7</sup> Except for a very few large-scale mechanized farm units in the Terai, machinery and equipment investments are of little economic significance - from the standpoint of either fixed or variable costs associated with ownership and operation.

## **Farm Buildings**

Farm building investments in Nepal, likewise, are not of great economic significance. For the most part, one building serves all family needs - for grain storage, livestock shelter, and family living.

According to the Farm Management study, farm housing represented 19 percent of total farm investments in selected Terai districts and only 11 percent of the total in Hill district farms sampled. Investments in livestock exceeded the building investments in both areas.

# **HUMAN RESOURCES**

People and agriculture are intimately related to the economy of Nepal. According to some estimates, 90 percent of the total population of 11.5 million people (1971 census) rely on agriculture for a living. Most of the peasant farmers, especially in the Hills, operate on a subsistence basis with a precarious balance between food production and consumption in most years. As shown in appendix table IV, population is heavily concentrated in the Hills but cultivated land resources per capita and per household are extremely limited.

Population projections indicate an annual growth rate in excess of 2.0 percent per annum. With this rate of growth, total population could reach 14,000,000 by 1980 and over 22,000,000 by 2001.

Recent production statistics reveal an annual increase in food grain production of only 1.2 percent during the past five years (1966-73). (Details are shown in appendix tables IX and X) This evident imbalance between the population growth rate and the rate of increase in food-grain production is a matter of growing concern to government officials. It is generating support for increased allocations to the agricultural sector in preparing for the coming five-year plan, as well as for

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<sup>7</sup>OP. Cit. - Farm management study in selected regions of Nepal, 1968-69 pages 40-41.

“crash plans” for ambitious programs to stimulate higher production of food grains.<sup>8</sup>

Regional distribution of the population is distorted in relation to farm land resources. Approximately 39 percent of the people live in the Terai region with heaviest concentration in the Eastern Terai. But this region has 65 percent of the cultivated area in food grain and cash crops. In contrast, the Hills region includes 61 percent of the population but only 34 percent of the land under cultivation. (See appendix table I for details).

In appraising the human resources in Nepal in relation to agricultural production, a few items are of primary concern: the nature of the population; the degree of education and training; the degree of efficiency in labor use; and managerial capacities. These will be considered briefly.

## Nature of Population

Nepal has a young population. Census data in 1961 show a young age distribution with 40 percent under age 15 and as much as 50 percent under age 20. Also, marriage at an early age and almost universal marriage is characteristic of the country. In 1961, only 5 percent of women over age 20-24 were unmarried and 25 percent of those aged 10-14 were reported as already married.

A young population, early marriages, high fertility and improvement in public health facilities indicate the potential for acceleration in the rate of population growth — perhaps above the current projections of 2.0 percent per year.

## Education and Training

Nepal has made remarkable progress in educating its people, considering the starting point in 1951. For more than 100 years prior to this date, the feudalistic Rana regime opposed any form of universal public schooling. Children of only a few of the ruling families were given opportunity for formal instruction. Less than one percent of the children of school age was enrolled in primary schools. Some of the progress since then is indicated in Table 2. The number of primary schools in the country was over 22 times greater in 1970 than in 1951 and the number of primary school students enrolled was more than 50 times higher. Percentagewise, the increases in schools and in the number of students enrolled advanced even more rapidly in the secondary and higher level schools.

TABLE II  
PROGRESS IN EDUCATIONAL DEVELOPMENT  
IN NEPAL, 1951-1970

School Level	No. of Schools			No. of Students		
	1951	1961	1970	1951	1961	1970
Primary	321	4,001	7,256	8,505	182,553	449,141
Secondary	11	156	1,065	1,680	21,115	102,704
Higher	2	33	49	250	5,143	17,200

Source: Educational Development Report, Planning, Statistics, and Research Division, Ministry of Education, HMG., Kathmandu, Nepal.

But many problems remain to be solved. A shortage of trained teachers persists and some who receive training choose other jobs, either because of higher pay or of more desirable locations. Many aspects of administration, facilities,

<sup>8</sup>A *Crash Programme for Increased Grain Production in the Hills*. (A proposal for the period 1973/74-75/76). Planning-Evaluation Division, MAFI, HMG, Nepal. July, 1973.



curricula, and other conditions need improvement. Curricula are reported to be "too academic" with little relevance to the needs of everyday life and to earning a livelihood.

As a result of these and other problems, the drop-out rate from schools is high and substantial numbers of "educated" young people are unemployed. The general education provided fails to train many for the technical and middle-level manpower positions for which help is badly needed, especially in the agricultural sector.

Since 1970, rapid progress has been made, according to many reports, in modernizing and adjusting the educational institutions and policies to alleviate some of the above problems.

In the Agricultural Sector, a few young people have received advanced training and are beginning to assume responsible positions in public and private service. However, a severe shortage of adequately trained personnel for positions in extension, research, and agricultural services still prevails.

Continued and intensified manpower training efforts, carefully formulated, still require high priority by the government of Nepal and by external donors. Some of the progress made to date and plans for extending manpower training in the years immediately ahead are summarized in Appendix Table XXII.

## **Efficiency in Labor Use**

In contrast with rather high land use efficiency on the small Nepalese farms, labor efficiency is extremely low — the output per hour of labor is at a low level. This is due to a number of factors: the small units and hand methods; the fragmentation of land holdings; the seasonality of work, creating under-employment at productive work through much of the year; the time required for "non-productive" labor — such as carrying water and fuel, walking to fields, and attending traditional festivals; and other such activities.

Because of many factors of long standing, any rapid improvement in farm labor efficiency in the short run seems quite remote. And, many would question the desirability of attempting to increase such labor efficiency rapidly, because of the current unemployment and under employment of labor in rural areas and the increasing numbers of young people to be absorbed into the economy.

Efficiency in labor use also is low in other facets of the agricultural sector. Office work often is hampered by crowded conditions, inadequate office equipment and filing systems, the large number of festivals and holidays, and general inefficiency in office management. Field workers in extension and agricultural services are severely hindered from carrying on their work expeditiously because of poor communications — a lack of roads, vehicles, telephones, radios, etc. .

## **Managerial Capacities**

One of the major constraints to agricultural development in countries such as Nepal, is the general lack of managerial and entrepreneurial experience and capacity. This is revealed in many phases of the agricultural sector — government, service organizations, financial institutions, agricultural industries, etc. .

Many of the agricultural manpower training efforts in the past, both by HMG and by external donors, seem to have been concentrated on professional and technical training — as agronomists, engineers, animal scientists, etc. . While highly trained people are needed in these and related fields, future efforts might well give more attention to managerial training than in past years.

# INSTITUTIONAL RESOURCES

## Governmental Structures

Rapid economic development in a country, or in a sector thereof, such as agriculture, is not possible without a reasonably effective governmental structure. This is quite difficult to achieve quickly in a developing country such as Nepal, with an extremely short supply of educated and trained personnel to assume responsible positions.

Another problem in newly developing countries seems to be a tendency to "over organize." Governmental structures seem to get too unwieldy and complex, with too many top positions to fill with too few trained people. This often results in overlapping and duplication of efforts, delays in decision making, and general inefficiencies.

A review of a succession of changes in the Ministry of Food, Agriculture and Irrigation reveals many of the above afflictions. These changing structures over time are well documented in governmental publications and will not be included here. The most recent structure of the Ministry seems to be a substantial improvement over earlier versions. Because of the limited reserve of highly trained staff members, it seems that the number of Joint Secretary positions might be reduced from four to two with the new ones as follows: 1) a Joint Secretary for Planning, Coordination, Project Review, and Evaluation; and, 2) a Joint Secretary for Administrative Management. The latter might include an office management "expert" to advise with Division and Department staffs on improvement in the efficiency of office organization and daily routines.

Other constraints to greater efficiency in the entire agricultural Ministry, in Kathmandu and Nation-wide, seem to include the following: low salary levels; frequent shifting of personnel; long delays in granting tenure; lack of job security; slow advancement in rank and pay; inadequate provision for retirement and medical benefits; and other such factors. Those were revealed by numerous contacts with field staff members in different parts of the country.

While many of these are difficult to correct in a country with limited resources, government administrators probably should give them careful attention in future plans.

## Other Supportive Institutions

Numerous institutions are closely related to national and local governmental units. More zealous efforts to coordinate the work of these various institutions serving agriculture would be mutually helpful.

A few of the primary supporting institutions in the Agricultural Sector will be recognized briefly.

1. **Extension Service**—The extension service is designed to serve the key role in passing on improved technologies to farmers. The nation-wide organization now includes 4 Regional Agricultural Development Officers (RADO's), 54 District Agricultural Development Officers (DADO's), and 600 Village-level workers, Junior Technicians (JT's) and Junior Technical Assistants (JTA's). The performance of JTA's is widely criticized and, no doubt, needs substantial improvement. Perhaps one of greatest needs is for subject matter specialists at the district level to train and advise them on current problems and adapted technologies. In the 1973/74 budget, Extension was scheduled to receive almost 12 percent of agricultural expenditures.
2. **Agricultural Research**—With external donor help, largely from USAID, several Research Stations and Farms have been established. These include seven Agricultural Research Stations located at Bhairawa, Dhankuta,

Jumla, Jiri, Parwanipur, Rampur and Tarahara. Six Research Farms have been established at Doti, Hardinath, Janakpur, Kakani, Khumaltar, and Nepalganj. National research centers have been designated for paddy, wheat, and maize for Parwanipur, Khumaltar and Rampur, respectively.

In addition to these, 23 horticultural stations, 4 multipurpose livestock farms, and 12 fish breeding centers have been established.

Budgetary allocations for research in 1973/74 include only slightly more than 4 percent, a figure considered quite low in view of the urgent nation-wide need for more adaptive research in agricultural technology.

3. **Cooperatives**—According to most reports, written and verbal, cooperatives have not been very successful in Nepal. Some of the reasons may be attributed to factors such as the following: a lack of educated local leaders to assume responsibilities; difficult communication systems - especially the lack of access roads; the delays and difficulties in getting facilities and supplies; a lack of guidance and training; and a general lack of knowledge and information about the role cooperatives were expected to serve. Some feel that too many cooperatives were organized too quickly.

Nevertheless, a need seems to exist for gradual development of a strong network of cooperative societies to help provide, and to assure, needed services in credit, input supplies, and marketing opportunities. The government seems to be taking actions to strengthen the cooperative system.

Recent consolidation of service institutions into the Agricultural Development Bank (ADB) for financial services and the Agricultural Marketing Corporation for supply and marketing services offers opportunity for more effective performance in these areas.

4. **Financial and Credit**—As indicated above, the Agricultural Development Bank is now in position to play a more significant role in agricultural finance and credit. It recently has become the sole agency for supplying agricultural financing from the center to the village. In the 1972/73 crop year, the ADB/N accounted for about 93 percent of the institutional loans to farmers, totaling about Rs.36 million. As shown in appendix table XVIII, other sources of credit are far more important, volume-wise, in agriculture, particularly in supplying credit for small farmers.

More aggressive and imaginative leadership is necessary in adjusting to the financial needs of small farmers at reasonable costs.

5. **Marketing and Pricing**—Many constraints hamper an effective marketing and pricing system in the agricultural sector of Nepal.

Many are physical constraints which are difficult to correct in the shortrun — such as the lack of roads and trails, marketing centers, proper storage facilities, slaughter houses, etc. .

Others are governmental in nature. A lack of a uniform national system of standards, grades, weights, measures, and other regulatory provisions seriously hinders the marketing and exchange of agricultural products. These and other marketing constraints are well documented in a paper by Mr. Lee.<sup>9</sup> He offers many suggestions for improvements in the marketing systems. Certainly Nepal cannot expect to enter the export market with fruits, vegetables, meat, eggs, and other farm products on a competitive basis until uniform quality standards and grades are established and enforced.

Another major problem in motivating farmers to strive for higher

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<sup>9</sup>C.Y. Lee. *Agricultural Marketing System in Nepal - The Present Situation and Improvement Programs*, FAO report to EAPD, MFA, and HMG, Feb. 1972.

output of agricultural products and in achieving more effective marketing, is the overall policy of pricing. Unjustified price differentials seem to exist in different areas within the country and with those in external markets.

It is easy to cast the blame on India for most of the pricing problems in Nepal, and the Indian markets do exert a powerful influence. However, a need seems to exist for a prompt and thorough analysis of the overall pricing policies in Nepal — considering the consequences of alternative policies on consumption, production incentives, export potentials, and the general effect on the economic development of the country.

The Agricultural Marketing Corporation (AMC) is the key institution in agricultural marketing. It has a staff of over 600 at some 23 branch offices and the head office in Kathmandu. It is charged with responsibility for distributing modern inputs to the agricultural sector. It operates through 380 local institutional units and 644 private dealers.

6. **Educational Institutions**—A brief resume of educational institutions and developments since 1951 was given earlier. Some of these adjustments will have a very direct impact on the course of agricultural development.

The newly developing Institute of Agriculture and Animal Sciences at Rampur should play an important role in training future professional workers in agriculture — employees for extension, supporting-level research workers, financial and marketing organizations, and in agro-industries, to name a few. Careful attention must be given to curricula and teaching programs to keep the training oriented to the pressing needs in Nepal.

Expansion of vocational schools in progress also should contribute to a better-trained staff of JTA's, other field-level workers, and future farmers.

For some years to come, Nepal will lack the resources for higher-level graduate study. The training of M.S. and Ph.D. candidates in most agricultural disciplines must be arranged with institutions in countries outside Nepal.

7. **Commercial Institutions**—Commercial institutions - businesses, marketing concerns, construction contractors, custom operators, and other such firms - have not played a major role on a private enterprise basis as in many other countries.

Some trend data indicate considerable growth in various segments of the Nepalese economy. These trends, as measured by contributions to the gross domestic product (GDP), are summarized in appendix table XX. While agriculture is the predominant contributor and continues to grow, other segments of the commercial sector also have shown good growth. Many of these relate directly to the agricultural sector and influence the rapidity of agricultural development.

While it is true that traders have filled an important gap in the primitive marketing system in much of Nepal, and under difficult conditions, little statistical data have been found on the extent and quality of such services. In the field of credit, many also serve this function but at rates often considered quite exorbitant. (See Appendix Table XVIII).

Some phases of agricultural development might be enhanced greatly through private enterprise expansion. For example, well-trained and equipped private contractors might make a full-time business of complete development of small-scale irrigation systems for organized groups of farmers on a contractual arrangement.

Another possibility is to encourage custom operators to get proper

equipment for plowing and other field work on a fee basis. Most machinery investments are not economically feasible for the small individual farm units in Nepal.

## EXTERNAL DONOR RESOURCES

External donors, including many different countries and agencies, have made major contributions to the development of the agricultural sector of Nepal. Cumulative data on financial contributions from such sources are summarized in Appendix Table XXIV. India and the U.S.A. have been the big contributors, as shown in the table, contributing 79 percent of the total from 1951 to 1970.

A breakdown of the external donor assistance to the agricultural sector in Nepal, among different segments of the agricultural economy, is shown in Appendix Table XXV. For the entire period (1951-70), providing agricultural infrastructure was the major contribution, accounting for approximately 50 percent of the total funds provided. However, during 1970, this proportion dropped slightly to 48 percent of the total donations.

A more detailed summary of USAID assistance is given in Appendix Table XXVI. The food grain technology project, currently active, has received the lion's share of allocated funds (\$9,694,185), accounting for almost 65 percent of the total of more than \$15,000,000 for all agricultural projects. Assistance with agricultural credit and cooperatives ranked second in fund allocations.

Primary emphasis in past USAID projects has been focused on manpower training and technical assistance — especially in recent years of the Food Grain Technology Project. However, in the early years of assistance, substantial amounts were allocated for building essential infrastructure — construction of buildings, land preparation, installing irrigation facilities at research farms, etc. . A major purpose has been to improve the effectiveness of research and extension efforts in selected areas around the research farms and stations.

USAID staff members recently have prepared a detailed summary of project assistance rendered by other external donors and the capital allocated to each project from 1951 to 1971. A brief resume of the purpose of each project, the nature of the assistance, and project locations also are included in the tabulations which are shown in Appendix Table XXVII.

## APPENDIX - SECTION B

### PROPOSED ANALYTICAL FRAMEWORK FOR PLANNING, IMPLEMENTING AND EVALUATING PROGRAMS AND PROJECTS

Some systematic and logical procedure for planning, implementing and evaluating programs and projects is considered essential for formulating proposals and carrying them out over time. The following ten-step process is suggested:

1. **INVENTORY RESOURCES**—Classify and evaluate the different kinds of resources on which the longrun agricultural development of the country depends.
2. **ESTABLISH GOALS**—Conceptualize and articulate the goals to be achieved through the plans and programs developed.
3. **IDENTIFY PROBLEMS**—Itemize major constraints which hinder attainment of goals.
4. **ANALYZE ALTERNATIVES**—Evaluate the pros and cons of different strategies for development.
5. **CHOOSE A PLAN**—Select a strategy for development which seems most appropriate for the resources available, for the current situation and stage of development, and for the planning horizon considered.
6. **TAKE ACTION**—Outline the most relevant actions, the programs and projects, which will help implement the chosen strategy in the most expeditious and effective manner possible.
7. **ALLOCATE RESPONSIBILITIES**—Assign responsibilities, along with authority for execution of plans, to those who will carry out various phases of programs and projects.
8. **EVALUATE PROGRESS**—Establish benchmarks as a basis for measurements and devise a continuing system of records, reports, and analytical procedures to aid in evaluating progress over time.
9. **ESTABLISH CONTROLS**—Set up administrative policies, procedures, and accounts to help assure the use of capital and other resources in accordance with development plans selected.
10. **ADJUST**—Incorporate sufficient flexibility in programs and projects to facilitate adjustments in case of unexpected events which either retard progress or hasten development.

## APPENDIX - SECTION C

### REFERENCE TABLES OF STATISTICAL DATA ABOUT RESOURCES, PRODUCTION, AND DEVELOPMENT PROJECTS OF THE AGRICULTURAL SECTOR OF NEPAL

Tables and charts in this section include more detailed information about population in relation to farm size, production data, investments, external donor assistance and related data for the Agricultural Sector of Nepal.

Tabular data have been drawn from a number of different sources as indicated. Many of the tables were taken directly from a working paper prepared by C.H. Antholt early in 1974.<sup>1</sup>

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<sup>1</sup>C.H. Antholt. *Unpublished Working Paper Agricultural Sector Assessment for Nepal*. USAID/Nepal and Washington. March 20, 1974.

# REFERENCE TABLES ON STATISTICAL DATA

## Population, Farm Size, and Production Data:

APPENDIX TABLE I  
REGIONAL DISTRIBUTION OF POPULATION  
IN NEPAL, 1971-72

Region	Number in Millions	Percent of Total
Eastern Terai	2.89	25
Western Terai	1.04	9
Inner Terai	0.58	5
Eastern Hills	2.77	24
Western Hills	4.27	37
	11.55	100
		100

Source: Central Bureau of Statistics

APPENDIX TABLE II  
AVERAGE SIZE OF FARMS IN NEPAL BY REGIONS

Average farm size by region	Average farm size (hectare)
Kathmandu Valley	0.7
Eastern Terai	3.2
Western Terai	7.4
Eastern Hills	0.6

Source: Zaman, M. A., Evaluation of Land Reform in Nepal, 1973

APPENDIX TABLE III  
RELATIVE IMPORTANCE BETWEEN THE HILLS AND TERAJ REGIONS  
IN NEPAL IN THE PRODUCTION OF THE MAJOR FOOD GRAINS  
1972/73 (PERCENT)

	Hills	Terai	Total
Paddy	22	78	100
Maize	68	32	100
Wheat	38	62	100
Barley	77	23	100
Millet	84	16	100

Source: C. H. Antholt, Op. Cit.



APPENDIX TABLE IV  
CULTIVATED LAND AND POPULATION  
BY REGIONS IN NEPAL, 1971

Regions	Cultivated Land** (1000 ha.)	Population* (1000)	Households** (1000)	Cultivated Land Per	
				Capita (ha.)	Per Household (ha.)
Mountain	97.0 (4.9)***	1,193.0 (10.3)***	205	0.085	0.473
Hills	606.0 (30.3)	6,071.0 (52.3)	1,091	0.100	0.555
Terai	1,293.0 (64.8)	4,346.0 (37.4)	794	0.297	1.628
Nepal Totals	1,996.0 (100.0)	11,610.0 (100.0)	2,090	0.173	0.995

Source: \* Central Bureau of Statistics. Highlights of National Population Census, Nepal, 1971-72, Kathmandu, 1973.

\*\* Ministry of Food, Agriculture and Irrigation, HMG, Nepal.

\*\*\* Figures in parentheses are percentages of respective tables.

APPENDIX TABLE V  
CULTIVATED AREA UNDER THE MAJOR FOODGRAINS & CASH CROPS BY  
NEPAL REGIONS, 1972/73

Region	(000 ha.)	Percent
Eastern Terai	849	38
Western Terai	434	19
Inner Terai	188	8
Eastern Hills	322	14
Western Hills	435	20
	2,228	

Source: Ministry of Agriculture

APPENDIX TABLE VI  
FOOD GRAIN PRODUCTION BY REGIONS IN NEPAL, 1972/73  
IN (000) METRIC TONS

	Paddy	Maize	Wheat	Barley	Millet	Total	% of foodgrain Production
Eastern Terai	956	65	104	4	10	1,139	34
Western Terai	473	89	74	1	6	643	19
Inner Terai	130	109	16	1	5	261	8
Eastern Hills	207	243	53	3	39	545	17
Western Hills	244	316	65	16	74	715	22

Source: Ministry of Agriculture

APPENDIX TABLE VII

RELATIVE IMPORTANCE OF MAJOR FOOD GRAINS BY REGIONS  
IN NEPAL, 1972/73 (PERCENT OF TOTAL PRODUCTION)

Region	Paddy	Maize	Wheat	Barley	Millet
Eastern Terai	84	6	9	0.3	0.7
Western Terai	73	14	12	0.2	0.8
Inner Terai	50	42	6	0.4	1.6
Eastern Hills	38	44	10	0.5	7.0
Western Hills	<u>34</u>	<u>44</u>	<u>9</u>	<u>2.0</u>	<u>11.0</u>
National	61	25	9	.8	4

Source: Ministry of Agriculture

APPENDIX TABLE VIII

ESTIMATED SURPLUS OR DEFICIT OF FOODGRAIN  
PRODUCTION BY REGIONS IN NEPAL, 1970/71

Region	(000 M. T.)	Foodgrain Production as a percent of requirements
Eastern Terai	166.9	133
Western Terai	187.1	205
Inner Terai	60.1	147
Eastern Hills	-24.3	95
Western Hills	<u>-96.4</u>	<u>92</u>
	293.4	115

Source: Ministry of Agriculture

APPENDIX TABLE IX  
FOODGRAINS: CHANGES IN AREA, PRODUCTION  
AND YIELDS IN NEPAL, 1966-73

	Unit	1966/67-68/69	1970/71-72/73	Annual Change Percent
<u>Paddy</u>				
Area	1,000 ha.	1,139	1,174	0.7
Production	1,000 M. T.	2,102	2,220	1.8
Yield	Kilograms	1,845	1,891	0.6
<u>Maize</u>				
Area	1,000 ha.	428	441	0.7
Production	1,000 M. T.	778	805	0.9
Yield	Kilograms	1,818	1,825	0.1
<u>Wheat</u>				
Area	1,000 ha.	172	242	8.9
Production	1,000 M. T.	199	242	5.0
Yield	Kilograms	1,157	1,000	-3.6
<u>Barley</u>				
Area	1,000 ha.	26	27	0.9
Production	1,000 M. T.	25	25	0.0
Yield	Kilograms	962	926	-0.9
<u>Millet</u>				
Area	1,000 ha.	104	117	3.0
Production	1,000 M. T.	118	131	2.7
Yield	Kilograms	1,135	1,120	-0.3
<u>Total Grains</u>				
Area	1,000 ha.	1,869	2,001	1.8
Production	1,000 M. T.	3,222	3,423	1.2
Yield	Kilograms	1,724	1,711	-0.2

Source: C. H. Antholt, Op. Cit.

APPENDIX TABLE X  
CHANGES IN THE PRODUCTION OF FOODGRAINS IN THE HILLS  
AND THE TERA I IN NEPAL, 1966-1973

	Unit	1966/67-68/69	1970/71-72/73	Annual Changes Percent
<u>Hills</u>				
Area	1,000 ha.	626	691	2.5
Production	1,000 M. T.	1,174	1,246	1.5
Yield	Kilograms	1,875	1,803	-1.0
<u>Terai</u>				
Area	1,000 ha.	1,241	1,317	1.5
Production	1,000 M. T.	2,046	2,177	1.6
Yield	Kilogram	1,649	1,652	0.1

Source: C. H. Antholt, Op. Cit.

APPENDIX TABLE XI  
CHANGES IN PRODUCTION OF FOODGRAINS  
IN NEPAL, BY REGIONS, 1966-1973

	<u>Unit</u>	<u>1966/67-68/69</u>	<u>1970/71-72/73</u>	<u>Annual Changes Percent</u>
<u>Eastern Terai</u>				
Area	1,000 ha.	731	765	1.1
Production	1,000 M. T.	1,249	1,259	0.2
Yield	Kilograms	1,709	1,646	-0.9
<u>Western Terai</u>				
Area	1,000 ha.	376	402	1.7
Production	1,000 M. T.	551	649	4.1
Yield	Kilograms	1,471	1,614	2.4
<u>Inner Terai</u>				
Area	1,000 ha.	134	144	1.8
Production	1,000 M. T.	246	269	2.3
Yield	Kilograms	1,836	1,868	0.4
<u>Eastern Hills</u>				
Area	1,000 ha.	256	283	2.5
Production	1,000 M. T.	516	540	1.1
Yield	Kilograms	2,016	1,908	-1.4
<u>Western Hills</u>				
Area	1,000 ha.	370	408	2.5
Production	1,000 M. T.	658	706	1.8
Yield	Kilograms	1,778	1,730	-0.7
<u>Total Grains</u>				
Area	1,000 ha.	1,867	2,002	1.8
Production	1,000 M. T.	3,222	3,423	1.2
Yield	Kilograms	1,726	1,710	-0.2

Source: C. H. Antholt, Op. Cit.

APPENDIX TABLE XII  
 CASH CROPS: CHANGES IN AREA, PRODUCTION AND  
 YIELD IN NEPAL, 1966-1973\*

	Unit	<u>1966/67-68/69</u>	<u>1970/71-72/73</u>	Annual Change Percent
<u>Sugarcane</u>				
Area	1,000 ha.	11	14	6.2
Production	1,000 M. T.	168	242	9.6
Yield	Kilograms	15,272	17,286	3.1
<u>Jute</u>				
Area	1,000 ha.	42	55	7.0
Production	1,000 M. T.	42	55	7.0
Yield	Kilograms	1,000	1,000	0.0
<u>Oilseeds</u>				
Area	1,000 ha.	99	110	2.7
Production	1,000 M. T.	54	57	1.3
Yield	Kilograms	545	518	-1.3
<u>Tobacco</u>				
Area	1,000 ha.	9	8	-2.9
Production	1,000 M. T.	6	8	7.4
Yield	Kilograms	667	1,000	10.7
<u>Potato</u>				
Area	1,000 ha.	43	50	3.8
Production	1,000 M. T.	265	286	1.9
Yield	Kilograms	6,163	5,720	-1.8
<u>Total</u>				
Area	1,000 ha.	204	237	3.8

\* The changes in foodgrain production regionally are presented in Appendix Table X.

Source: C. H. Antholt, Op. Cit.

APPENDIX TABLE XIII  
 INTENSITY OF CROPPING IN SELECTED DISTRICTS  
 OF NEPAL AND PERCENTAGES OF CROPPED  
 AREAS UNDER FOODGRAINS

District	Total Cultivated Land (Ha.)	Total Cropped Area (Ha.)	Cropping Intensity	Percentage of Cropped Area under	
				Foodgrains	Other Crops
<u>Eastern Hills</u>					
Ilam	349	401	115	91	9
Kavrepalanchowk	307	389	127	86	14
<u>Western Hills</u>					
Dhading	276	477	173	97	3
Syangja	226	272	120	100	-
Sallyan	205	309	151	98	2
<u>Kathmandu Valley</u>					
Kathmandu	741	1,179	159	97	3
<u>Inner Terai</u>					
Chitwan A.	1,205	1,719	143	72	28
Chitwan B.	159	228	143	84	16
<u>Eastern Terai</u>					
Morang	1,754	1,889	108	73	27
Saptari	1,816	2,066	114	95	5
Dhanusha	1,540	1,707	111	86	14
Parsa	1,765	1,906	108	91	9
<u>Western Terai</u>					
Rupandehi	2,335	3,028	130	84	16
Bardia	2,229	3,438	155	66	34
Kailali	3,875	5,746	148	77	23

Source: Farm Management Study, Op. Cit.

# LAND TENURE, FINANCE AND MANPOWER RESOURCES

APPENDIX TABLE XIV

## LAND OWNERSHIP PATTERNS IN NEPAL\*

Class	% of Households	% of Cultivable Area
Landlords	3.3	26.9
Owner/Cultivators	65.2	49.1
Owner/Cultivator/Tenant	20.7	15.4*
Tenant	10.8	8.6

\* (46.3 percent of this cultivated land is rented.)

Source: M. A. Zaman, Evaluation of Land Reform in Nepal, 1973.

APPENDIX TABLE XV

## FARM HOLDING DISTRIBUTION BY SIZE IN NEPAL, AFTER LAND REFORM

Size of Holdings	Households in Percentage	Area in Percentage
Less than 1 ha.	53.5	10.5
1-3 ha.	19.5	18.0
3-5 ha.	7.1	12.0
5-10 ha.	5.8	21.0
10-15 ha.	2.1	11.0
15-20 ha.	0.9	7.0
20-30 ha.	0.5	5.5
30-and above	0.6	15.0
Totals	100.0	100.0

Source: M. A. Zaman, Evaluation of Land Reform in Nepal. p. 6 Data based on results of Sample Survey - Table 10, Annex III.

APPENDIX TABLE XVI

## AREA AND NUMBER OF HOUSEHOLDS IN DIFFERENT SIZE GROUPS IN THE TERAI DISTRICT, NEPAL

Size of Holding	Households		Area in Hectares	Percent of Land	Avg. Size of Holding (Ha.)
	No.	% of Total			
Less than 2.5 ha.	676,661	88.10	102,351.8	44.96	0.72
2.5- 6.8	66,996	8.66	278,088.9	25.56	4.1
6.8-10.2	13,288	1.73	116,249.9	10.68	8.7
10.2-15.04	9,778	1.27	130,624.0	12.00	13.3
15.4-& above	1,878	0.24	73,982.4	6.80	39.3

Source: Department of Land Reform, HMG, Nepal. (The Data were compiled from the Survey Report 1972 from the 17 Terai Districts).

APPENDIX TABLE XVII  
 SIZE OF HOLDING OWNED BY LANDLORDS BEFORE  
 AND AFTER LAND REFORM BY  
 REGIONS IN NEPAL

Region	Average Size Holding in Hectares	
	Before Land Reform	After Land Reform
Eastern Terai	56.20	39.85
Western Terai	128.66	30.65
Average Total Terai	96.68	34.33

Source: M. A. Zaman. Evaluation of Land Reform in Nepal. Ministry of Land Reforms, Kathmandu, 1973. p. 90

APPENDIX TABLE XVIII  
 AVERAGE FARM BORROWINGS AND OUTSTANDING DEBT IN NEPAL

	Percent Borrowings	Percent of Outstanding Debt
<u>Institutional</u>	<u>20.9</u>	<u>17.0</u>
Cooperative	1.5	.9
Ward/Village Committees	7.8	9.2
NADB	2.3	1.5
Land Reform Saving Corporation	6.1	1.5
Commercial Banks	3.2	2.4
<u>Private</u>	<u>79.1</u>	<u>83.0</u>
Moneylenders	37.4	42.6
Landlords	5.2	4.5
Traders	2.9	2.1
Friends & Relatives	33.6	33.8
Average per family	Rs. 345	Rs. 665

Source: Rastra Bank, Agriculture Credit Survey, 1972.

APPENDIX TABLE XIX  
 TOTAL AMOUNT OF COMPULSORY SAVINGS COLLECTED  
 IN NEPAL, 1964/65 to 1968/69  
 (Cash in Rs. 1000; kind\* in metric tons)

Item/Year	1964/65	1965/66	1966/67	1967/68	1968/69	Total
Cash	1,036.4	5,577.5	2,029.9	735.0	5,632.8	15,011.6
Kind	32,291.0	82,456.0	27,429.0	10,958.0	4,872.0	158,006.0
Total in Cash	22,671	60,822.0	20,407.0	8,077.0	8,897.0	120,875.0

Source: Ministry of Land Reform, HMG, Nepal.

\* Kind converted into cash at the rate of Rs. 670 per metric ton of grain.



APPENDIX TABLE XX

PLANNED PUBLIC SECTOR INVESTMENT OUTLAYS IN NEPAL IN THE  
FOUR PLANS BY MAJOR DEPARTMENTS

Department	Outlays (Rs. in Millions)			
	Plan I 55/56-59/60	Plan II 60/61-64/65	Plan III 65/66-69/70	Plan IV 70/71-74/75
A. Transport/Communication	124.0	143.5	615.0	1,050.0
Percent of Total	(37.6)	(23.9)	(35.3)	(40.9)
B. Agriculture and Village Development	94.5	117.1	377.5	716.6
Percent of Total	(28.7)	(19.5)	(21.7)	(27.9)
C. Industry & Power	55.0	193.0	385.0	446.0
Percent of Total	(16.6)	(32.2)	(22.1)	(17.3)
D. Social Service	44.0	115.2	292.5	308.4
Percent of Total	(13.3)	(19.2)	(16.8)	(12.0)
E. Miscellaneous	12.5	31.5	70.0	49.0
Percent of Total	(3.8)	(5.2)	(4.1)	(1.9)
Total (Rs. in Millions)	330.0	600.0	1,740.0	2,570.0
Percentages	(100.0)	(100.0)	(100.0)	(100.0)

Source: B. P. Dhital, Role of Agriculture in Economic Development in Nepal.  
Unpublished Ph. D. Dissertation, Iowa State University, Ames, Iowa, 1970.

APPENDIX TABLE XXI

GROSS DOMESTIC PRODUCT (GDP) IN NEPAL FROM  
AGRICULTURE AND OTHER SECTORS,  
1964/65 THROUGH 1968/69

Sectors	Rs. Millions				
	1964/65	1965/66	1966/67	1967/68	1968/69
Agriculture	3,915	4,694	4,218	5,217	6,406
Mining	1	2	1	1	1
Manufacturing	83	98	104	137	212
Construction	123	144	116	134	186
Transport, Communication, Storage	91	93	102	120	141
Cottage Industry	392	469	422	522	641
Financial Institution	69	80	82	87	106
Ownership of Dwelling	676	689	677	698	714
Public Administration and Defense	82	101	143	154	357
Public Utilities	4	5	8	10	11
Wholesale and Retail Trade	309	299	248	247	316
Services	170	177	204	219	235
<u>Grand Total</u>	<u>5,915</u>	<u>6,851</u>	<u>6,275</u>	<u>7,546</u>	<u>9,326</u>

Source: Central Bureau of Statistics, HMG, Nepal.

APPENDIX TABLE XXII

AVAILABILITY OF TRAINED MANPOWER IN THE AGRICULTURAL  
SECTOR OF NEPAL, WITH PROJECTIONS TO 1975 AND 1985

Category	Available at present	To be added by 1975	Required by 1985
A. High Level	463	85	882
1. Ph. D. Standard	14	3	12
2. Post Graduate Standard	106	11	100
3. Agriculture Graduates	249	40	600
4. Agriculture Engineers	17	15	50
5. B. V. Sc.	30	6	50
6. B. E. (Irrigation)	47	10	70
B. Medium Standard			
1. JT & JTA	1,310	300	3,000
2. Overseer & Sub-overseer	300	65	600
3. Food Inspector	10	10	40
4. Agricultural Marketing Assts.	8	10	40
5. Credit Cooperative Manager	140	105	1,500

Source: 10-Year Agriculture Development Plan & Policy outlines, HMG/N.

**BUDGETARY AND FINANCIAL DATA—  
HMG AND EXTERNAL DONORS**

APPENDIX TABLE XXIII

BUDGET ALLOCATION TO THE AGRICULTURAL SECTOR  
OF NEPAL, BY FUNCTIONS, 1973/74\*

Area	Rs. (000,000)	Percent of Total
Irrigation	107.87	42.8
Extension	29.82	11.8
Forestry	24.90	9.9
Agriculture Development Bank	24.50	9.7
Dairy Development	15.09	6.0
Agriculture Research	10.70	4.2
Cadastral Survey	9.43	3.7
Livestock	6.73	2.7
Horticulture	5.76	2.3
Compulsory Savings	4.74	1.9
Resettlement	3.59	1.4
Land Reform	3.31	1.3
Cooperatives	2.37	0.9
Fisheries	1.83	0.7
Planning, Analysis, Intelligence	1.38	0.5
Other	0.46	0.2
Total	252.08**	100.0

Source: Ibid. C. H. Antholt. \* "The classification of budget items into one functional area or another was done on the basis of "best judgement" and so there might be minor errors in the figures presented."

\*\* This amount represents 16 percent of the Total HMG budget allocations for 1973/74.

## APPENDIX TABLE XXIV

CUMULATIVE AMOUNT OF INTERNATIONAL ASSISTANCE TO  
NEPALESE AGRICULTURE, 1951-70

	<u>\$ US 000</u>		
<u>Bilateral</u>	<u>1951-70</u>	<u>1966-70</u>	<u>1970</u>
India	23,807	8,616	2,463
U. S. A.	21,242	7,133	204
Switzerland (SATA)	1,104	440	119
Israel	965	584	106
United Kingdom	845	825	253
West Germany	800	800	726
Japan	411	411	227
Australia	-	120	15
Netherland	117	117	23
France	62	62	26
New Zealand	38	7	-
USSR	36	36	18
Pakistan	20	20	-
<u>Multilateral</u>			
FAO	5,242	3,004	1,014
WFP	1,246	1,246	600
ADB	120	120	52
Private Institutions	<u>2,337</u>	<u>380</u>	<u>78</u>
Total	58,392	23,921	5,924

Source: Ibid. Antholt

APPENDIX TABLE XXV

CONSOLIDATED SUBSECTOR BREAKDOWN OF INTERNATIONAL  
ASSISTANCE TO THE AGRICULTURAL SECTOR  
OF NEPAL, 1951 TO 1970

Subsector	Amounts in U. S. \$000		
	1951-70	1966-70	1970
Mainly crop production*	5,432	3,875	1,169
Livestock and veterinary service	2,062	898	439
Horticulture	468	252	55
Fisheries	147	107	30
Forestry	2,994	1,178	320
Agriculture infrastructure** (Mainly irrigation)	28,689	12,131	2,637
Unallocables***	16,919	5,860	752
<u>Total</u>	<u>56,702</u>	<u>24,301</u>	<u>5,402</u>

Source: Ibid. Antholt.

- \* Includes agricultural research and education, extension, agricultural supplies, agricultural credits, provision of fellowships related to the above.
- \*\* Includes irrigation (major and minor), agricultural road construction, storage construction, land reform, cooperatives, flood and erosion control, fellowships and training related to these.
- \*\*\* Includes flood relief, emergency relief, agricultural administration, agricultural planning, research, statistics, resettlements, integrated rural development, fellowships, seminars and training related to these.

APPENDIX TABLE XXVI  
SUMMARY OF USAID AGRICULTURAL ASSISTANCE PROJECTS  
IN NEPAL - CUMULATIVE CONTRIBUTIONS  
THROUGH JUNE 30, 1972

Projects	USAID Contributions	
	U. S. \$	Rs. N. C.
<u>ACTIVE PROJECT</u>		
Food Grain Technology	9,694,185	10,23,70,594
<u>TERMINATED PROJECTS</u>		
1) Agriculture Supply Corporation	585,775	61,85,784
2) Agricultural Development Bank	730,994	77,19,297
3) Agricultural Credit & Cooperatives	1,427,095	1,50,70,123
4) Rapti Valley	706,746	74,63,238
5) Technical Agricultural Training	415,321	43,85,790
6) Crop Improvement, Livestock Improvement, and Plant Protection	813,993	85,95,766
7) Resettlement Plowing	105,964	11,18,980
8) Soil Survey	31,003	3,27,392
9) Inland Fisheries	31,951	3,34,402
10) Poultry Development	63,302	6,68,469
11) Other Projects in Agriculture	403,258	42,58,404
Total	15,009,587	15,85,01,239
<u>FOOD ASSISTANCE AND EMERGENCY RELIEF</u>		
1) Flood Relief	1,457,753	1,53,93,872
2) Title II Food Grants including WFP and UNICEF	5,257,448	5,55,18,651
Total	6,715,201	7,09,12,523

Source: Ibid. Antholt

APPENDIX TABLE XXVII  
SUMMARY OF FINANCIAL ASSISTANCE AND PROJECT  
ACTIVITIES OF EXTERNAL DONORS TO NEPAL  
1951 THROUGH 1971

Past assistance from various external donors are summarized in the following table:\*

Project/Activity Title	Approximate Assistance Committed (US \$ Equivalent)	Duration of Project	1. Main purpose of project 2. Nature of Assistance 3. Location
<b>A. UNITED NATIONS DEVELOPMENT (UNDP)</b>			
Feasibility Study of Irrigation Development in the Terai Plain NEP/67/507	909,750	1966-72	<ol style="list-style-type: none"> <li>1. Feasibility study of irrigation projects on southern Nepal</li> <li>2. 4/23 m.m of expert services, 6/50 m.m of fellowships \$125,000 for equipment \$360,595 for sub-contracts \$ 7,700 for miscellaneous</li> <li>3. Bara and Parsa Districts</li> </ol>
Increased use of High Yielding Crop Varieties and Fertilizers Central Nepal. NEP/70/512	1,379,474	1970-74	<ol style="list-style-type: none"> <li>1. Study of the ways in which utilization can be made of high-yielding crop varieties in Nepal.</li> <li>2. 8/74 m.m of expert services \$43,228 for equipment \$ 7,200 for miscellaneous in 1971</li> <li>3. Narayani Zone</li> </ol>
Forest Development NEP/69/513	894,538	1969-74	<ol style="list-style-type: none"> <li>1. Assistance in developing the forest resources of Nepal.</li> <li>2. 8/73 m.m of expert services 3 1/2 m.m consultancy</li> <li>3. \$ 2,000 for sub-contracts \$34,000 for equipment \$10,000 for miscellaneous in 1971</li> <li>3. Banke and Bardia Districts</li> </ol>

(continued)

Source: Teruji Sakiyama, International Assistance to Nepalese Agriculture - Subsectoral and Project Analysis (1951-70).  
EAPD Staff Paper No. 4, MFA, HMG, Singha Durbar, Kathmandu, Aug. 1971.

\* USAID Assistance omitted - data included in Appendix Table XXVI.

APPENDIX TABLE XXVII (CON.)

Agricultural Development Planning NEP/68/5	154,250	1969-73	<ol style="list-style-type: none"> <li>1. Assistance in general Agricultural development planning</li> <li>2. 2/23 m. m. of expert services 2/12 m. m. of fellowships \$1700 for equipment \$4080 for equipment in 1971</li> <li>3. Kathmandu</li> </ol>
Animal Production and Health NEP/68/65	8,500	1969-72	<ol style="list-style-type: none"> <li>1. Assistance in animal vaccination campaign and liaison with FAD/SATA livestock mission on animal health matters.</li> <li>2. 1/3 m. m. expert services in 1971</li> <li>3. Kathmandu</li> </ol>
Animal By-Products NEP/68/7	58,300	1969-72	<ol style="list-style-type: none"> <li>1. Assistance in establishing an animal feed-mix and animal by-products plant.</li> <li>2. 1/12 m. m. services and 1/4 m. m. fellowships in 1971</li> <li>3. Hetaura</li> </ol>
Inland Fisheries Development NEP/68/8	66,700	May 1969	<ol style="list-style-type: none"> <li>1. Assistance in establishing</li> <li>2. 1/12 m. m. expert services 1/6 m. m. fellowships in 1971</li> <li>3. Parsa, Chitwan, Makwanpur and Kathmandu</li> </ol>
Land Administration NEP/68/11	72,700	Oct. 1970	<ol style="list-style-type: none"> <li>1. Evaluation of the Governments</li> <li>2. 1/12 m. m. expert services 1/4 m. m. fellowships, one vehicle in 1971</li> <li>3. Kathmandu</li> </ol>
Wildlife Management NEP/69/2	85,000	Apr. 1970	<ol style="list-style-type: none"> <li>1. Assistance in preservation of wildlife and establishment of National Parks</li> <li>2. 1/12 m. m. expert services 2/8 m. m. fellowships \$ 310 for equipment \$3,500 for vehicles in 1971</li> <li>3. Chitwan, Suklaphanta Lamgtang, Solukhumbu</li> </ol>
Consult on Food and Nutrition Policy	4,000	1970-71	<ol style="list-style-type: none"> <li>1. Advise on nutrition and food production policy.</li> <li>2. 1/2 m. m. expert services in 1971</li> <li>3. Kathmandu</li> </ol>

APPENDIX TABLE XXVII (CON.)

Agricultural Statistics NEP/70/7	66,000	May 1971	<ol style="list-style-type: none"> <li>1. Advise on the strengthening of the organization for the collection of agricultural statistics and improvement in their quality.</li> <li>2. 1/8 m. m. expert services 1/3 m. m. fellowships \$1,100 for equipment in 1971</li> <li>3. Kathmandu</li> </ol>
Flying hours for FAO Experts	3,840	1971	<ol style="list-style-type: none"> <li>1. Funds for flying hours for FAO project</li> <li>2. \$3,840 was spent in 1971</li> <li>3. Nepal</li> </ol>
Torrent and Erosion Control	240,500	1969-74	<ol style="list-style-type: none"> <li>1. Assistance in preparing projects to control erosion and advice on other erosion control measures.</li> <li>2. 1/5 m. m. expert services, \$200 for equipment in 1971</li> <li>3. Nepal</li> </ol>
B. FOOD AND AGRICULTURE ORGANIZATION (FAO)			
Food Packaging-		1971	<ol style="list-style-type: none"> <li>2. Fellowship on food packaging financed by FAO and Government of Denmark.</li> <li>3. Nepal, India</li> </ol>
Production of Protein Foods		1971 2 months	<ol style="list-style-type: none"> <li>2. Fellowships financed by FAO and Canadian agencies</li> <li>3. Mysore, India</li> </ol>
Food Technology		1971-73	<ol style="list-style-type: none"> <li>2. Three fellowships for two years. Financed by FAO and Canadian Agencies.</li> <li>3. Mysore, India</li> </ol>
C. WORLD FOOD PROGRAM (WFP)			
Establishment of Fish Farms in the Rapti Valley (242)	238,500	1968-71	<ol style="list-style-type: none"> <li>1. Establish two fish farms in the Rapti Valley to cultivate fish commercially for sale in Kathmandu.</li> <li>2. Food in exchange for labor, external transport.</li> <li>3. Rapti Valley</li> </ol>



APPENDIX TABLE XXVII (CON.)

Mixed feed for cattle (332)	457,000	1970-73	<ol style="list-style-type: none"> <li>1. Provide an inexpensive cattle feed concentrate to assist farmers to raise milk production.</li> <li>2. 2,000 tons of maize over three years to be processed in the plant with local ingredients, plus bone meal, etc. from the FAO/FFHc by-products plant to make low cost mixed feed.</li> <li>3. Hetaura</li> </ol>
Resettlement			
1. Jhapa Area (697)	335,000	1971-73	<ol style="list-style-type: none"> <li>1. To assist in the resettlement of Nepali farmers from eroded hill areas, or service men and repatriated personnel returning from Burma or Assam.</li> </ol>
2. Bardia Area (713)	335,000	1971-73	<ol style="list-style-type: none"> <li>2. External Transport and food for 270 days for settler and family until first harvest</li> </ol>
3. Parasana Area (574)	532,000	1971-73	
4. Bellauri Area (575)	532,000	1971-73	<ol style="list-style-type: none"> <li>3. See areas in left column.</li> </ol>
5. Banke Area (261)	399,500	1969-72	
D. UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION (UNIDO)			
Food Processing	1,150	1970 2 1/2 months	<ol style="list-style-type: none"> <li>2. Group training program for engineers in the field of food processing. One participant financed by UNIDO and Government of India</li> <li>3. Mysore, India</li> </ol>
Cotton Industry	2,800	1971 four months	<ol style="list-style-type: none"> <li>2. Fellowships in Cotton Industry</li> <li>3. United Kingdom</li> </ol>
Sugar Technology	3,700	1971 six months	<ol style="list-style-type: none"> <li>2. Fellowship for study tour in sugar technology</li> <li>3. USA, Puerto Rico, Japan, Australia.</li> </ol>

APPENDIX TABLE XXVII (CON.)

E. FREEDOM FROM HUNGER CAMPAIGN

Rural Youth Development Project	40,000	1970-73	<ol style="list-style-type: none"> <li>1. Strengthen the rural youth program through leadership training and fellowships</li> <li>2. Fellowships, training, equipment. German Volunteers assisted in training.</li> <li>3. Nepal.</li> </ol>
Headquarters and Regional Offices	30,000		<ol style="list-style-type: none"> <li>1. Prepare project in irrigation and forestry development</li> <li>2. Participation in seminars, training courses and project reviews.</li> <li>3. Nepal.</li> </ol>

F. ASIAN DEVELOPMENT BANK, AGRICULTURE

Kankai Irrigation	1,500,000	signed 14 Dec. 1971	<ol style="list-style-type: none"> <li>1. Irrigate the Morang - Jhapa area to benefit 2,000 farm families and to provide year round water to 5,000 hectares of under developed farm land</li> <li>3. Morang and Jhapa Districts</li> </ol>
Agricultural Credit	2,400,000	Signed 23 Dec. 1970	<ol style="list-style-type: none"> <li>1. Provide a loan to the Agricultural Development Bank to cover the foreign exchange cost of providing farmers with small and medium size tractors and irrigation pumps. The loan will benefit about 100 farmers cultivating approximately 23,000 hectares.</li> <li>3. Rupendehi, Parsa, Rautahat, and Dhanukha Districts.</li> </ol>
Agricultural Development Bank	146,000		<ol style="list-style-type: none"> <li>1. Three experts in development bank management, administration, financial analysis and agricultural economics</li> <li>2. Three experts approved Dec. 1970</li> <li>3. Kathmandu</li> </ol>
Chitwan Valley Development	242,000	1971-72	<ol style="list-style-type: none"> <li>1. Feasibility study of irrigation systems and formulation of an integrated agricultural development programme in the Chitwan Valley</li> <li>2. Experts</li> <li>3. Chitwan District</li> </ol>

APPENDIX TABLE XXVII (CON.)

G. AUSTRALIAN, AGRICULTURE

Forestry	226,340	1971-73	<ol style="list-style-type: none"> <li>1. To assist in the supervision of reforestation.</li> <li>2. Provision of one forestry advisor and equipment for forest development and fire fighting</li> <li>3. Nepal.</li> </ol>
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H. ISRAEL

Resettlement Scheme in Khajura and Nawalpur	300,000	1963-	<ol style="list-style-type: none"> <li>1. To advise and give technical assistance to the Nepal Punarvas Company in resettling landless farmers in the Terai.</li> <li>2. 1 Senior Agriculturist 1 Agricultural Expert 1 Service Volunteer 8 Short term consultants, supplies &amp; equipment</li> <li>3. Khajura and Nawalpur</li> </ol>
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I. JAPAN

Survey Mission in Regional Development	80,950	1971-79	<ol style="list-style-type: none"> <li>1. Agricultural Survey Mission to prepare project in regional development in Janakpur Zone and on a demonstration farm in Chitwan District.</li> <li>2. Project started in 1972</li> <li>3. Janakpur and Chitwan.</li> </ol>
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J. NORWAY

Fellowship in Plant Culture	3,000		<ol style="list-style-type: none"> <li>2. 29 months fellowship completed 1 November 1971.</li> </ol>
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K. FEDERAL REPUBLIC OF GERMANY

Gandaki Anchal Agricultural Development Project	703,418	1969	<ol style="list-style-type: none"> <li>1. To assist in the Agricultural Development of the Whole Gandaki Zone</li> <li>2. Three experts Fertilizer and other Agricultural Supplies.</li> <li>3. Khaireni, Gandaki Zone.</li> </ol>
Frankfurt Autumn Fair	6,261	1971	<ol style="list-style-type: none"> <li>1. Participation of Nepal in Frankfurt Autumn Fair.</li> </ol>

APPENDIX TABLE XXVII (CON.)

L. INDIA

Composite Horticulture Schemes	261,700	1960-73	<ol style="list-style-type: none"> <li>1. To establish horticulture research stations, to select suitable varieties of fruit and vegetables, to discover manure and fertilizer requirements, to produce and distribute fruit plants and vegetable seeds and make root stock trials.</li> <li>2. Five experts in 1971.</li> <li>3. Nepal.</li> </ol>
Minor Irrigation	1,428,700	1969-73	<ol style="list-style-type: none"> <li>1. Provide minor surface irrigation facilities.</li> <li>3. Throughout the Terai.</li> </ol>
Chatra Canal	18,565,800	1965-73	<ol style="list-style-type: none"> <li>1. Construct a 35 mile long canal from the Kosi River to provide irrigation facilities.</li> <li>3. Sunsari and Morang Districts.</li> </ol>

M. SWITZERLAND

Parasite Control Scheme	50,000	1971	<ol style="list-style-type: none"> <li>1. Establish a parasitology diagnostic and research unit in Kathmandu, survey parasitic diseases in Nepal, design of parasite Control Scheme, training of veterinarians and stock supervisors in parasitology.</li> <li>2. Two experts, Equipment.</li> <li>3. Nepal &amp; Kathmandu.</li> </ol>
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N. THAILAND

Food Inspector Training	500	1971 3 months	<ol style="list-style-type: none"> <li>1. One scholarship under Colombo Plan for three months training in Food inspection.</li> </ol>
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O. UNITED KINGDOM

Nawal Parasi Survey	286,000	1971-73	<ol style="list-style-type: none"> <li>1. Land use survey along British Sector of Mahendra Rajmarga.</li> <li>2. Five experts, short term consultants</li> <li>3. Nawal Parasi District.</li> </ol>
Tea Corporation	16,380	1965- 1971-72	<ol style="list-style-type: none"> <li>1. Advice and assistance to Nepal Tea Corp.</li> <li>2. Tea Manager (terminated Feb. 1972.)</li> <li>3. Ilam and Saktim.</li> </ol>

APPENDIX TABLE XXVII (CON.)

P. FRANCE			
Livestock Development	8,000	1970	<ol style="list-style-type: none"> <li>1. Assess the Veterinary requirements of the Livestock Farm.</li> <li>2. 1/12 m. m. Veterinary Services 1/12 m. m. Veterinarian Fellowship</li> <li>3. Nepal.</li> </ol>
Q. NEW ZEALAND			
	20,000+	1952-	<ol style="list-style-type: none"> <li>1. Dairy Development, and fellowships in general agriculture, and pasture and sheep development.</li> <li>2. 7/24 m. m. expert advice 38 + fellowships</li> <li>3. Kathmandu and Gandaki Zone</li> </ol>
R. USSR			
	36,000	1967-70	<ol style="list-style-type: none"> <li>1. Fellowship in Food processing technology and agronomy</li> <li>2. 6 fellowships</li> <li>3. Nepal</li> </ol>
S. CANADA			
	NA	1952-70	<ol style="list-style-type: none"> <li>1. Training in Agriculture</li> <li>2. Fellowships</li> </ol>
T. PAKISTAN			
	360,000	1964-70	<ol style="list-style-type: none"> <li>1. Training</li> <li>2. 250 fellowships (proportion for Agriculture NA)</li> </ol>

## APPENDIX TABLE XXVIII

A COMPARISON OF THE BUDGETED AND ACTUAL DEVELOPMENT  
EXPENDITURES IN SEGMENTS OF THE AGRICULTURAL  
SECTOR OF NEPAL, FY 72-73

Sector Segment	Expenditures For FY 72-73			
	Budgeted		Actual	
	Amount	%	Amount Rs.	%
1. Agriculture Extension	12,632,492	11.03	8,502,282	10.87
2. Agriculture Research	15,141,038	13.23	8,628,132	11.03
3. Horticulture	5,128,477	4.48	3,209,380	4.10
4. Veterinary Research	4,092,407	3.58	3,861,455	4.93
5. Fisheries Development	1,765,177	1.54	1,288,943	1.65
6. Irrigation (major)	29,302,800	25.59	12,638,109	16.15
7. Irrigation (minor)	22,760,000	19.87	17,528,927	22.40
8. Food & Agriculture Marketing Serviced Dept.	2,083,800	1.82	1,598,018	2.04
9. Nepal Resettlement Co. Pvt., Ltd.)	1,120,500	.98	939,900	1.20
10. Agricultural Marketing Corporation	726,400	.64	706,000	.90
11. Agricultural Development Bank	18,538,328	16.19	18,153,782	23.20
12. Dairy Development Corporation	1,200,000	1.05	1,200,000	1.53
Totals	114,491,419	100.00	78,254,928	100.00

Source: Ibid., Antholt

APPENDIX TABLE XXIX  
REGIONAL DEVELOPMENT AREAS IN NEPAL

Growth Axis	Macro Region	Growth Centres (Geographic Location)
A. Biratnagar-Hedangna	Kosi or Eastern Sector	1. Biratnagar (Terai) 2. Dharan (Terai) 3. Dhankuta (Hill) 4. Hedangna (Mountain)
B. Bhairawa-Jomosom	Gandaki or Central Sector	1. Bhairawa (Terai) 2. Butwal (Terai) 3. Tansen (Hill) 4. Syangja (Hill) 5. Pokhara (Hill) 6. Tukche (Mountain)
C. Nepalgunj-Jumla	Karnali or Western Sector	1. Nepalgunj (Terai) 2. Surkhet (Inner Terai) 3. Dailekh (Hill) 4. Jumla (Mountain)
D. Birgunj-Kathmandu	Metropolitan Sector	1. Birgunj (Terai) 2. Hetauda (Inner Terai) 3. Kathmandu Valley (Metropolitan) 4. Barbise (Hill) 5. Dhunche (Mountain)
		Terai - 6 Inner Terai - 2 Hill - 6 Metropolitan - 1 Mountain - 4
		No. of Centres - 19

Source: Harka Gurung, Regional Development Planning for Nepal. National Planning Commission, His Majesty's Government, Kathmandu, 1969.

APPENDIX TABLE XXX  
SAVING, INVESTMENT, OUTLAY AND PRODUCTION DURING  
THE FIFTH PLAN IN NEPAL

(Rs. in Million)

	During the Five Years Period of the Plan	
	Minimum	Maximum
1. Gross Domestic Product*	80,160	81,579
2. Additional GDP	3,185	3,958
3. Annual Growth Rate	4%	5%
4. <u>Total Development Outlay</u>	9,197	11,404
(a) Public Sector	(6,170)	(7,545)
(b) Private Sector	(2,096)	(2,672)
(c) Panchayat Sector	( 931)	(1,187)
5. <u>Public Sector Outlay</u>	6,170	7,549
(a) Domestic Resources	(3,994)	(4,150)
(b) External Assistance	(2,776)	(3,395)
6. <u>Total Investment</u>	7,963	9,895
(a) Public Sector	(4,936)	(6,036)
(b) Private Sector	(2,096)	(2,672)
(c) Panchayat Sector	( 931)	(1,187)
7. Domestic Savings	5,187	6,500
8. Additional Savings	888	1,479
9. Average Saving Rate	6.4%	7.9%
10. Marginal Saving Rate	27.8%	37.4%
11. Average Investment Rate	9.9%	12.1%

\* The base year 1974/75 GDP is estimated at Rs. 1432.6 crore.

Source: Nepal, the Fifth Plan (1975-80), In Brief. His Majesty's Government, Nepal, 1975.



APPENDIX TABLE XXXI  
ALLOCATION OF FIFTH PLAN OUTLAY IN NEPAL  
(Minimum Programme)

(Rs. in Crore)

Sector	Government Sector Amount %	Panchayat Sector Amount %	Private Sector Amount %	Total Amount %
1. Agriculture, Irrigation, Land Reforms, Forest etc.	183.97 ( 29.8)	27.93 ( 30.0)	104.80 ( 50.0)	316.70 ( 34.4)
2. Industry, Commerce and Power	138.07 ( 22.4)	--	41.92 ( 20.0)**	179.99 ( 19.6)
3. Transport and Communications	143.28 ( 23.2)	46.55 ( 50.0)	62.88 ( 30.0)***	252.71 ( 27.5)
4. Social Services (Health, Education, Drinking water etc.)	151.68 ( 24.6)	18.62 ( 20.0)	--	170.30 ( 18.5)
<b>Total</b>	<b>617.00 (100.0)</b>	<b>93.10 (100.0)*</b>	<b>209.60 (100.0)</b>	<b>919.70 (100.0)</b>

\* Including Government Grant

\*\* Including loans for investment from Government sources

\*\*\* Including construction

Source: Nepal, the Fifth Plan (1975-80), In Brief. His Majesty's Government, Nepal, 1975.

APPENDIX TABLE XXXII  
ALLOCATION OF FIFTH PLAN OUTLAY IN NEPAL  
(Maximum Programme)

(Rs. in crore)

Sector	Government Sector Amount %	Panchayat Sector Amount %	Private Sector Amount %	Total Amount %
1. Agriculture, Irrigation Land Reforms, Forest etc.	227.87 ( 30.2)	35.61 ( 30.0)	133.60 ( 50.0)	397.08 ( 34.8)
2. Industry, Commerce and Power	150.60 ( 20.0)	--	53.44 ( 20.0)**	104.04 ( 17.9)
3. Transport and Communications	199.03 ( 26.4)	59.35 ( 50.0)	80.16 ( 30.0)***	338.54 ( 29.7)
4. Social Services (Health, Education, Drinking Water etc.)	177.00 ( 23.4)	23.74 ( 20.0)	--	200.74 ( 7.6)
Total	754.50 (100.0)	118.70 (100.0)*	267.20 (100.0)	1140.40 (100.0)

\* Including Government development grant

\*\* Including loan for investment from Government sources

\*\*\* Including construction

Source: Nepal, the Fifth Plan (1975-80), In Brief. His Majesty's Government, Nepal, 1975.

APPENDIX TABLE XXXIII

ALLOCATION OF THE FIFTH PLAN OUTLAY IN NEPAL

(Rs. in crore)

Sector & Sub-sector	Minimum	%	Maximum	%
	Programme Rs.		Programme Rs.	
1. <u>Agriculture</u>	183.97	( 29.8)	227.87	( 44.7)
(a) Agriculture & Resettlement	79.90 (43.4)		101.96 (44.7)	
(b) Irrigation	70.68 (38.4)		91.44 (40.1)	
(c) Land Reform and Survey	14.31 ( 7.8)		14.31 ( 6.3)	
(d) Forest etc.	19.08 (10.4)		20.16 ( 8.9)	
2. <u>Industry &amp; Power</u>	138.07	( 22.4)	150.60	( 20.0)
(a) Industry	48.35 (35.0)		53.10 (35.3)	
(b) Cottage & Small Industry	5.83 ( 4.2)		5.83 ( 3.9)	
(c) Labour	0.35 ( 0.3)		0.35 ( 0.2)	
(d) Power	73.72 (53.4)		80.00 (53.1)	
(e) Tourism	2.00 ( 1.4)		2.00 ( 1.3)	
(f) Geo-Survey & Mines	5.52 ( 4.0)		6.32 ( 4.2)	
(g) Commerce	2.30 ( 1.7)		3.00 ( 2.0)	
3. <u>Transport &amp; Communication</u>	143.28	( 23.2)	199.03	( 26.4)
(a) Roads & Bridges	113.21 (79.0)		155.55 (78.2)	
(b) Civil Aviation	15.82 (11.1)		26.65 (13.3)	
(c) Rope & Railways	3.48 ( 2.4)		6.06 ( 3.0)	
(d) Telecommunication	9.77 ( 6.8)		9.77 ( 4.9)	
(e) Postal Services	1.00 ( 0.7)		1.00 ( 0.6)	
4. <u>Social Services</u>	151.68	( 24.6)	177.00	( 23.4)
(a) Education	64.53 (42.5)		67.51 (38.2)	
(b) Health	42.61 (28.1)		45.50 (25.7)	
(c) Drinking Water	21.65 (14.3)		24.80 (14.0)	
(d) Physical Planning	3.95 ( 2.6)		6.10 ( 3.4)	
(e) Administration	0.51 ( 0.3)		0.90 ( 0.5)	
(f) Publicity & Broadcasting	2.03 ( 1.3)		2.79 ( 1.6)	
(g) Panchayat	13.30 ( 8.8)		25.30 (14.3)	
(h) Planning & Statistics	3.10 ( 2.1)		4.10 ( 2.3)	
<b>Total</b>	<b>617.00</b>	<b>(100.0)</b>	<b>754.50</b>	<b>(100.00)</b>

Note: Figures in brackets indicate the percentages.

Source: Nepal, the Fifth Plan (1975-80), In Brief. His Majesty's Government, Nepal, 1975.