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MINISTRY OF PANCHAYAT AND LOCAL DEVELOPMENT

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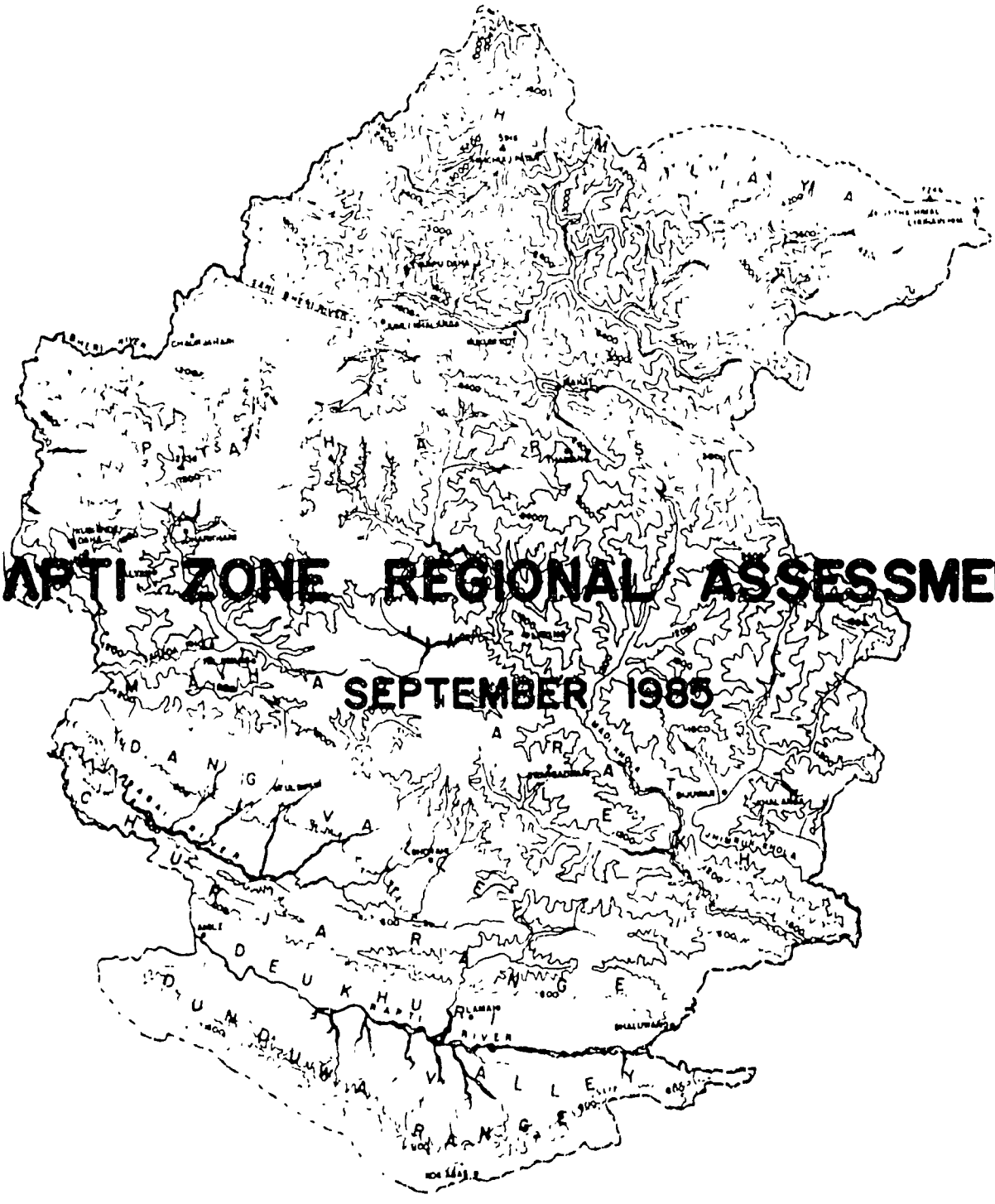

RAPTI ZONE REGIONAL ASSESSMENT

SEPTEMBER 1985

RAPTI INTEGRATED RURAL DEVELOPMENT PROJECT

—

PADCO, INC.

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RAPTI ZONE REGIONAL ASSESSMENT

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PREFACE

This report was prepared for the U.S. Agency for International Development and His Majesty's Government of Nepal. The project was financed by USAID/Nepal and was carried out between May and September of 1985. A draft of this report was completed in August and reviewed by USAID and HMG. This final version incorporates comments from many sources as well as a number of corrections.

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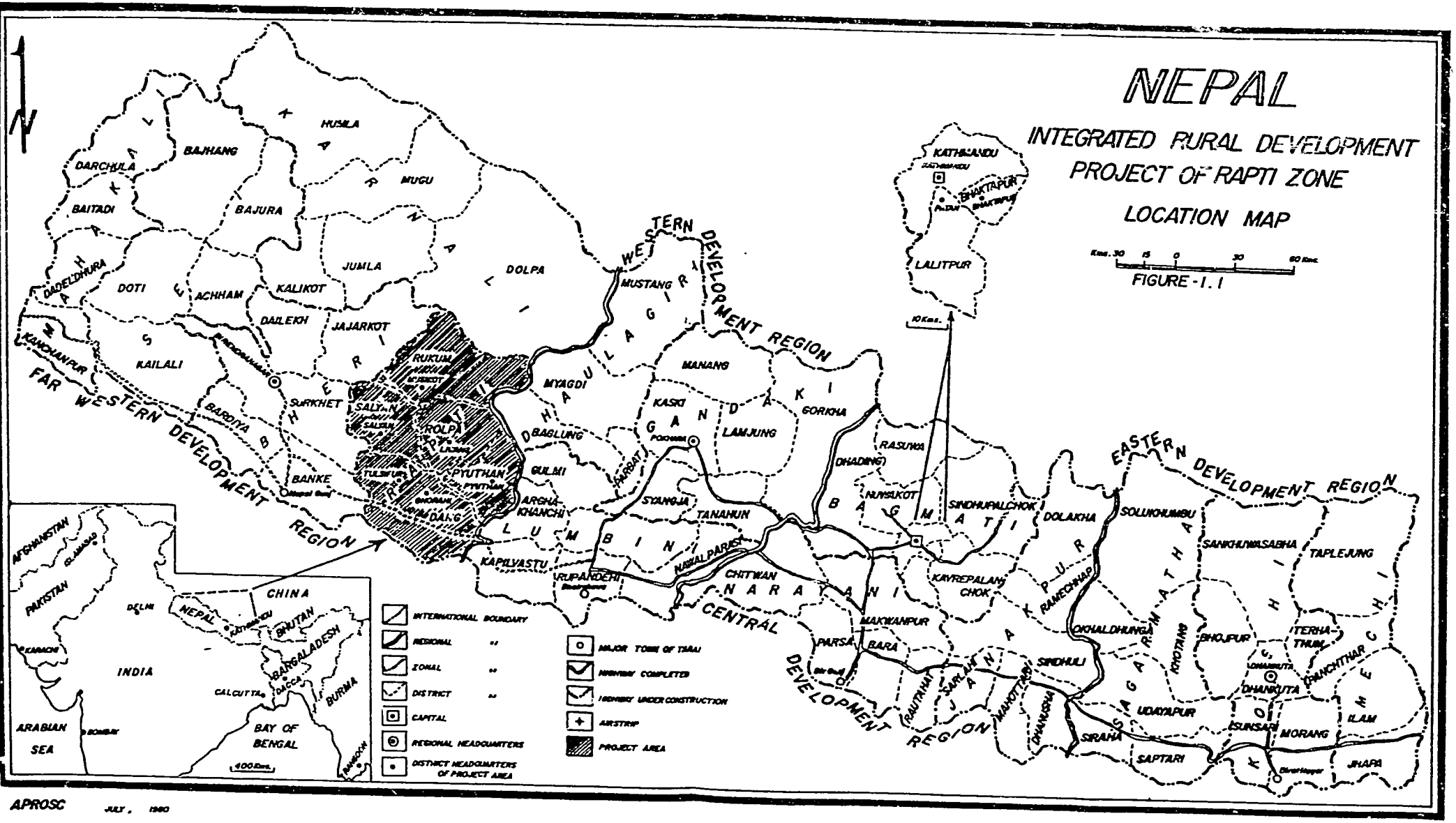
LIST OF ACRONYMS

ADB/N	Agricultural Development Bank of Nepal
AIC	Agricultural Inputs Corporation
APROSC	Agricultural Projects Services Center
DDP	District Development Plan
DIHM	Department of Irrigation, Hydrology, and Meteorology
DWSS	Department of Water Supply and Sewerage
HMG	His Majesty's Government of Nepal
IRDP	Integrated Rural Development Project
JT, JTA	Junior Technician, Junior Technical Assistant
LDO	Local Development Officer
LRMP	Land Resources Mapping Project
MBCR	Marginal Benefit Cost Ratio
MPLD	Ministry of Panchayat and Local Development
NFC	Nepal Food Corporation
NPC	National Planning Commission
PCO	Project Coordination Office of the Rapti IRDP
PPVT	Pre-Production Verification Trial
SFDP	Small Farmer Development Program



APROSC JULY, 1980

By:- TILAK PD. KARASTHA

I. INTRODUCTION AND SUMMARY OF RAPTI ZONE SITUATION AND POLICY/STRATEGY RECOMMENDATIONS

A. INTRODUCTION

This report presents an overview of the situation, problems, and potential of the Rapti Zone. The purpose of this "Assessment" is to help guide future planning and programming by AID, HMG, and other organizations. This study covers a wide range of issues and programs. It attempts to look at the Zone from a regional planning perspective; that is, to analyze the relationships between the Zone's resources, productive activities, and settlements, to assess the differences between the districts and physiographic areas of the Zone, and to examine the Zone's economic, infrastructure, and service delivery linkages.

Aspects of AID's Rapti Integrated Rural Development Project, which has been underway for the past four years, are discussed under various headings. However, the Rapti IRDP is not the primary focus of the present study.

This report is based mainly on secondary source data. Such sources include previously-conducted surveys, official statistics, and available reports by public and private organizations. Each source was examined to determine whether the data were reasonably reliable. Caveats appear in the text where necessary to explain the limitations of the data used. One original data collection exercise was carried out for this study. Duane Kissick spent nearly three weeks trekking through the Rapti Zone obtaining information on the settlement system, its economic linkages, and services provided in towns and villages. These original data appear in Chapter IV.

This document is divided into five chapters. This first chapter will continue with summaries of the current situation in the Rapti Zone and of the Assessment's principal policy and strategy recommendations. Chapter II deals with the resource base of the Rapti Zone, focusing on population, land use, forestry, and water resources. Chapter III covers numerous economic issues and trends, including agricultural yields, the food balance, incomes, commodity production, marketing, and the labor force. Chapter IV analyzes the Zone's settlement system in an attempt to define the functions of the main towns and villages and the economic and service linkages between them. Chapter V assesses the coverage of services in the Zone and examines institutional development issues (including Nepal's recent political/ administrative decentralization measures).

B. SUMMARY OF RAPTI ZONE SITUATION

1. Population and Labor Force

Slow Growth in Hills, High Growth in Dang: According to the 1981 Census, the total population of the Rapti Zone was 877,325, about six percent of the national population. Between 1971 and 1981 the Rapti Zone grew more slowly than the national population: Rapti's annual average growth rate was 2.04 percent compared with 2.66 for the nation as a whole. This indcates that the Zone experienced substantial net outmigration over the decade.

Based on a continuation of past trends, the Rapti Zone probably has a population of around 950,000 today.

In 1981 Dang District, with 266,247 people, had about 30 percent of the Zone's population. The four hill districts had from 15 to 19 percent (about 130 to 170 thousand) each.

Dang District's population grew well over twice as fast as that of the Zone as a whole between 1971 and 1981 (4.72 percent average annual rate). Rolpa and Salyan had almost zero population growth over the decade, while Rukum and Pyuthan grew modestly (2.12 and 1.40 annual averages). This is indicative of intrazonal migration to Dang.

Net Permanent Outmigration from Hills: Based on rough calculations using Census data, it is estimated that about 100,000 people left the hill districts of the Rapti Zone permanently between 1971 and 1981. About half of these migrants went to Dang District and the other half to other destinations within Nepal or outside the country.

Most Hill Labor Growth to be Absorbed Elsewhere: According to medium projections by the Central Bureau of Statistics, the labor force of the hill districts of Rapti will grow by about 94,000 between 1981 and 1996. Dang's labor force will grow by about 48,000 in the same period. This means that, if past trends continue, the majority of the labor force growth of the hill districts will be absorbed elsewhere--in Dang or outside the Zone.

Rapti Workers Lack Job Skills: The labor force of the Rapti Zone is throughly ill-equipped to compete for non-farm semi-skilled or skilled jobs. Ninety-six percent of workers are agricultural. Literacy rates are 26 percent for males and seven percent for females, significantly lower than the national averages.

2. Land, Agriculture, and Income

Land Use: According to very reliable data from the Land Resources Mapping Project, 26.5 percent of the land area of Rapti Zone--about 273,000 hectares--is used for agricultural cultivation. Rolpa, Salyan, and Pyuthan Districts have the highest shares of cultivated land, each with around one third of its area in agriculture. Rukum has the lowest share, about 16 percent, while Dang has about 27 percent cultivated land. Forest area in the Zone amounts to about 569,000 hectares, 55 percent of the Zone's area, but only around 150,000 of these hectares are classified as true forest--the remainder is immature forest (the great majority) or shrub.

Arable Land Overutilized Except in Dang: Dang is the only district of the Rapti Zone having uncultivated arable land in which expansion of cultivated area is ecologically advisable. Of the nearly 34,000 hectares in Dang that could be brought under cultivation, about 72 percent is grazing land, the rest forest. Salyan also has some uncultivated agricultural land, but it should not be planted because Salyan has an inadequate supply of compost and fodder to support further expansion of cultivated area.

Declining Agricultural Yields 1974-83: HMG Ministry of Agriculture data indicate that yields of paddy and maize, the Rapti Zone's main crops,

declined in all five districts between 1973/74 and 1982/83. Wheat yields increased in all districts but Rolpa.

Severe and Worsening Food Deficit: All the hill districts of Rapti are food deficit areas. In terms of foodgrain calories, Rukum and Rolpa supply only about 20 percent of their food needs. Salyan and Pyuthan supply about 50-60 percent. If other food sources, particularly vegetables and milk products, were taken into account, the deficit estimates would be somewhat lower, but they would still be substantially negative for the hills. Dang District produces a modest food surplus, part of which goes to the hills and part to other destinations including India. Over the 1976/77 to 1982/83 period, the food deficit worsened in Rukum, Rolpa, and Pyuthan; improved in Salyan; and varied with no trend in Dang.

Worsening Hill Income Distribution: Household survey data from 1978 and 1983 show that the ratio of income of the largest land holders to that of small land holders increased between the two years for all four hill districts of Rapti. Even allowing for differences in measurement of income and land holdings, these results suggest that income distributions, especially for total as opposed to farm income, have worsened. This conclusion is also supported by rising ratios of farm to total income between the two surveys in all districts. Since less-wealthy households earn proportionately more income from non-farm sources, greater reliance on farm income has a stronger negative impact on marginal farmers than on medium or large farmers.

Forest Deficits in Pyuthan, Rolpa, Salyan: Dang and Rukum Districts have substantial surpluses of accessible forest products (for fuel and fodder) relative to demand. On the other hand, forest products supply deficits exist in Pyuthan, Rolpa, and Salyan. Forests in these districts are very degraded, and what remains is almost totally accessible and thus at especially high risk.

3. Service Delivery

National Food Corporation: The NFC supplies an estimated 4.5 percent of the food needed to close the Rapti Zone food deficit. The bulk of food is supplied by private traders.

Agricultural Inputs Corporation: AIC provision of fertlizer, seed and pesticide reaches only a tiny fraction of farmers in the Rapti Zone. AIC centers in Rukum reported serving around 250 farmers per year, while those in Pyuthan were serving around 150. AIC-supplied fertilizer and seed, measured on a per-household basis, is too low to have an impact on food production.

Irrigation: Modern irrigation systems cover about 1,280 hectares in the Rapti Zone, mostly in the hills. However, modern systems now under construction will add about 2,400 additional irrigated hectares over the next three years, 1,800 of these in Dang. Traditional irrigation systems, seasonal structures made out of branches, logs, and earth, cover much wider cultivated areas than the modern systems do, but reliable estimates of the area irrigated by such systems are not available. Unconfirmed estimates by District Agricultural Offices put the share of the Zone's cultivated area under year-round irrigation at eight percent. Surface irrigation potential

in Rapti is low compared with other areas of Nepal, owing mainly to inadequate river flows in the middle hills and Dang and rugged topography in the northern part of the Zone. On the other hand, groundwater irrigation potential in Dang appears promising.

All the medium and most of the small irrigation projects in the Rapti Zone have suffered contractor problems and construction delays. In addition, unresolved user problems are pervasive. In some projects there are disputes between upstream and downstream users. In others, secondary canals have not been built because responsibility for them was left to the farmers, who have been unable to organize themselves to do the work. Much greater attention must be given to the socio-economic aspects of irrigation project design and management.

Forestry and Soil Conservation: Serious efforts to promote community forestry, forest protection, and soil conservation in the Rapti Zone have been underway only in the last three years. These programs have grown rapidly, and institutions have been strengthened, but it is too early for the efforts to have made more than a marginal impact on the environmental problems of the Zone. Larger sustained efforts over many years are essential.

Drinking Water: Projects have been built since 1980 to serve nearly 20 percent of the Zone's population. The coverage of drinking water projects ranges from 25 percent of the population in Dang to 10 percent in Salyan and Pyuthan. These coverage estimates are overstated, though, because drinking water projects have a high breakdown rate. This results from poor construction, inadequate operation and maintenance, improper use of systems by users, and vandalism.

Roads: An all-weather gravel road connects the main Zonal centers of Ghorahi and Tulsipur in Dang District to the East-West Highway. Seasonal jeepable roads run from Tulsipur to Salyan Khalanga and from Ghorahi to Pyuthan Khalanga and partway into Rolpa. Road expenditures have dominated all other social and economic expenditures in Rapti in the last four years by a wide margin. Not counting expenditures on the East-West Highway, roads have accounted for about 40 percent of all social and economic expenditures.

Other Expenditures: The agriculture, livestock, cottage industry, forestry, soil conservation, and education sectors each receive less than six percent of social and economic expenditures in Rapti Zone, in some cases substantially less.

4. Settlement System

Settlement Structure: The settlement system affecting the Rapti Zone is dominated by the larger economically active centers of Nepalganj, Bhairawa, and Butwal. These towns have areas of influence extending to numerous Zones in the Western, Mid-Western, and Far Western Development Regions. Within the Rapti Zone proper, Ghorahi and Tulsipur are most dominant economically and have important public service functions. The spheres of influence of Ghorahi and Tulsipur cover the entire Zone. Other economically active centers include Lamahi, Bhaluwang, and Chaurjhari. In the hill districts, commercial and service development is largely a function of the public

service base found in the principal settlements. As a consequence, the district centers rank highest in the hierarchy, though not all of them are the largest hill towns. Other hill settlements serve much more limited hinterlands.

Population: Ghorahi and Tulsipur are the largest settlements in the Rapti Zone, each with several thousand inhabitants. As a rule, the population of the Zone is settlement-based. The vast majority of settlements have populations of less than 2,500, and most have fewer than 1,000 people. General migration trends in the Zone suggest movement from the hill districts to Dang and from hill settlements to valley locations. The most rapidly growing settlements in Rapti are located in Dang District, which contains four of the five towns that grew by over 1,000 people between 1979 and 1985 (Ghorahi, Tulsipur, Lamahi, and Bhaluwang). Chaurjhari,in Rukum, is the only hill settlement growing at a similar rate. However, at present settlements are more numerous and more concentrated in the hills than in Dang, in part because access is much more difficult.

Economic Characteristics: Nepalganj, Butwal, and Bhairawa offer a wider and more diversified range of economic activities and social services than can be found in any Rapti Zone settlement. They also serve as the principal marketing and supply points for Rapti and other Zones. When Rupandehi District (Bhairawa/Butwal) and Banke District (Nepalganj) are considered together with those of Rapti, the former two districts accounted for 81 percent of manufacturing employment in 1983, while Dang accounted for 17 percent. The hill districts of Rapti had a minute percentage of manufacturing jobs.

Within Rapti Zone, Tulsipur and Ghorahi are the most economically dominant settlements. A commerce and services survey conducted in 27 settlements throughout the Zone in May 1985 revealed that 50 percent of all commercial and service establishments inventoried were located in Ghorahi and Tulsipur. If establishments in Bhaluwang and Lamahi are added, the four towns account for 68 percent of establishments surveyed. For those settlements where time series data were available, virtually all registered growth in the commerce/services sectors. Koilabas was the only settlement to show a decline in business activity, owing to the completion of the East-West Highway to Nepalganj. Among eight settlements for which data were available about 965 jobs in commerce and services were added between 1979 and 1985.

The dominance of Tulsipur and Ghorahi is reflected in current marketing patterns. Hill farmers generally transport their own commodity exports for sale down to Dang, Nepalganj, or Butwal/Bhairawa and purchase consumption goods in these places as well. There is virtually no trade among hill districts. Transport costs from the Terai and Dang into the hills are quite high, and this is reflected in steeply rising price gradients for basic products as one moves northward in the Rapti Zone. It appears, however, that most hill residents, being greatly underemployed, are willing to trade off considerable time against monetary expenditures by travelling long distances to purchase goods more cheaply in Dang and the Terai.

Public Service Functions: Public service and administration are key functions of the settlement system of Rapti, particularly in the hills. About 440 HMG offices within about 50 functional categories have been established in over 40 settlements. Governmental functions are more evenly distributed

in Rapti than commercial and service establishments. The concentration of governmental functions in district centers--which together house several hundred HMG staff members--makes them principal bases for commercial and service establishments. In addition, businesses take advantage of the fact that large volumes of people are drawn to district centers to transact routine governmental affairs.

C. SUMMARY OF POLICY AND STRATEGY RECOMMENDATIONS

This section is divided into three parts:

1. Major policy and strategy issues for the Rapti Zone;
2. Sectoral policy and strategy issues; and
3. Differences among the Rapti districts in development opportunities and constraints.

A table depicting the main elements of a Rapti Zone development strategy appears at the end of this chapter (Table I.1).

1. Major Policy and Strategy Issues

a. Labor Force: The existing labor force of the Rapti Zone suffers from extremely low literacy, low educational levels, overwhelming lack of non-farm skills, and extremely high levels of underemployment. This is coupled with the prospect of high future labor force growth and few job opportunities. If past trends continue, the majority of the labor force growth of the Rapti Zone's hill districts will be absorbed elsewhere--through migration--in Dang District or outside the Zone. The hill areas of the Rapti Zone lack the natural resource base and comparative economic advantage to support significant numbers of additional people. Thus there is no point in basing any strategy on "keeping people in the hills". Rather, the focus must be on developing strategies for productively absorbing migrants in Dang and in the Terai by providing productive employment and basic services. This does not mean "writing off" the Hills, however. Efforts must continue to raise productivity for the many thousands of households tied to the land in the Hills.

With Rapti Zone's limited labor absorption capacity in commerce, industry, and services, the burden must be on the agriculture/ rural sector to provide jobs, but this sector already has high underemployment. The only safety valve is outmigration, supplemented by the following:

- Opening up uncultivated arable land in Dang to farming.
- Greater integration and intensification of crop, livestock, and horticultural production in the hills.
- Creating a truly effective and extensive program to provide training, technical assistance, and credit for small-scale industries catering to basic needs. The training must be tailored to the goods and services for which markets exist locally.

- o Urgent improvement and expansion of skill training programs to assist the labor force to acquire jobs and added income within and outside the Zone. Training should focus on construction and building trades (carpentry, masonry, plastering, etc.), mechanical trades (machining, electricity, plumbing, repair, etc.), and services (transportation, hotel, tourism, food, sanitation, hygiene, etc.). Trainees from the Rapti Zone could be sent in groups to strengthened existing skill training centers (public and private) in proximity to the Zone. New training centers would not necessarily be needed in Rapti.

b. Population Growth Reduction: The Rapti Zone is experiencing a continuing trend toward less favorable person-land ratios and environmental deterioration. This argues for a reduction of fertility rates Zone-wide but especially in the hills. It is essential that birth control programs be intensified. Complementary maternal and child health programs should accompany them.

c. Agricultural Yields and Production: Yields of paddy and maize--the Rapti Zone's main crops--are falling, and the food balance in the hill districts of the Zone is severe and worsening. But, the Cropping Systems Program has shown that major increases in yields are feasible with adequate inputs. Households in Rapti rely on farm income for about two thirds of total income, and this reliance has been rising. All this argues for radical changes to improve delivery of seeds, fertilizer, pesticides, and technical assistance to farmers. This should be HMG's primary concern. At present only a tiny fraction of farmers use modern inputs or receive technical help. Private sector procurement and sale of inputs must be encouraged. Also, private sector seed production and distribution enterprises must be promoted.

d. Incomes and Poverty: Income inequality and poverty appear to have been increasing in the Rapti Zone. The key elements of a strategy to deal with this are 1) increase agricultural production so that more farmers can generate a surplus (see above) and 2) radical reform, upgrading, and expansion of cottage industry and skill training (see item (a) above). If land reform could actually be implemented in the Rapti Zone, real improvements in income levels and distribution could be achieved. Under current circumstances price policy will have little effect on agricultural production in the hills due to the predominance of the relation between marginal farmers and large landowners/traders/ moneylenders in which credit is granted to the former in exchange for crop sales at pre-set low prices. Because of this system, higher producer prices may filter only marginally to the vast majority of actual producers.

e. Marketing: Major investments in marketing infrastructure--e.g. roads--should follow sustained efforts to increase agricultural production. However, high priority should be placed on two measures: 1) cost-effective methods to increase the storage capacity of producers to enable them to wait beyond post-harvest time to sell and 2) wider availability of institutional credit to small farmers (e.g. through the SFDP).

f. Efficiency: The poor economic situation of the Rapti Zone and in Nepal generally cries out for major improvements in the efficiency of investment. Projects that produce short to medium term economic payoff should receive

higher priority than those giving long-term returns. Expenditures on costly physical works of dubious economic benefit (e.g. new buildings, all-weather roads) should be de-emphasized. Large-scale subsidies for transport of inputs into the hills should be reduced. Large and medium irrigation project proposals should be carefully scrutinized and evaluated. Essential drinking water projects should be continued, but ways must be found of reducing the large amounts of money being wasted on projects that break down after construction. The focus of investment should be on service and input delivery for improved production.

g. Service Delivery: Service delivery throughout the Rapti Zone is in great need of improvement. All sectors require changes in management, procedures, policies, and a host of other areas. Two key aspects need to to emphasized. First, service delivery must be made more relevant to local conditions. Authority must be delegated to district-level technical staff for the design of programs and projects that are relevant to local needs. Central agencies can still set targets, but these can be defined in such a way as to allow more local flexibility in how they are met. Sectors where such flexibility is needed most are agriculture, forestry, soil conservation, livestock, and cottage industry.

Second, the focus of service delivery targets should be shifted away from construction of physical facilities and indicators of agency output and toward measures of real service delivery to beneficiaries. This will bring into sharper focus important inadequacies such as poor quality of service delivered and operation and maintenance problems of physical works.

h. Settlement System: The functional hierarchy of settlements in the Rapti Zone will not change in the foreseeable future. Transport costs, marketing and distribution patterns, prices, and infrastructure systems all combine to perpetuate the existing settlement structure. The following are the key issues and programmatic implications regarding the settlement system:

- Future investment programming for settlement job generation and supporting infrastructure should focus on the more dynamic settlements as a first priority to increase the chances of success of these programs. These places include Nepalganj, Bhairawa, Butwal, Tulsipur, Ghorahi, Lamahi, Bhaluwang, and Chaurjhari.

- There is some scope in these settlements for development of small industry, commerce, and services. It is unlikely that major commercial development can occur in the hill settlements, however. In addition, current marketing, income, and cost patterns are such that road construction will not promote commercial development in the hill settlements; it may actually strengthen the larger and more distant centers in Dang and the Terai. Roads appear to have a distinct impact on transport costs, but whether they will prove economically feasible and help to reverse the Zone's serious economic difficulties in the short to medium term is questionable.

- The HMG has established an important network of settlement-based public service facilities throughout the Zone. However, the quality of service provided to beneficiaries leaves much scope for

improvement. As suggested above, more emphasis is required on quality of service provided rather than on construction of facilities. Lately, the HMG has been replacing rented offices with centrally planned and costly modern buildings. This policy should be reconsidered, as it appears that in most cases it would be more cost-effective to rent facilities or to construct them of traditional materials. In addition, ease of access to new facilities should be given greater consideration. Valley locations in proximity to major tracks and trails should be given preference.

- HMG plans to create a network of service centers, one of which will be located in each District's nine Ilakas. Conceptually, the service center network should improve service delivery and access for beneficiaries. However, a clear, implementable strategy has not yet been defined. Analysis of proposals for the Rapti Zone suggest that 1) First priority should be given to improving service quality in existing facilities (buildings do not in themselves constitute service delivery); 2) It would prove very costly to provide a full array of service facilities in each of the Zone's Ilakas, and even so, given current performance, service delivery may not be adequate; 3) Care should be taken to distribute service centers on ther basis of actual need--some suggested service center areas overlap (e.g. in Pyuthan and Dang), while other areas will not be served; 4) In many cases new service center facilities are simply replacing existing rental office space rather than creating new service outlets.

- A hierarchy of service centers should be designed and implemented in a phased manner. Tulsipur and Ghorahi should be considered Zonal centers; the existing roles of district centers should be maintained with improved service delivery; one sub-district center in each district should be provided with a broad range of services; a network of smaller centers serving several Ilakas should provide primarily agriculture, veterinary, and forestry extension as well as post offices and health posts; and the lowest order of centers should provide only a basic and periodic level of services.

- Analysis of construction costs for public buildings and service centers suggests that it will be more advantageous to rent the facilities or construct them of traditional materials. In the latter case, satisfactory facilities can be built at one third to one half the cost of the currently-used "modern" construction.

i. <u>District As Focus of Development</u>: The physiographc and economic evidence indicates that there is no compelling reason to treat the Rapti Zone as a single entity for development purposes. The focus of most development activities should be shifted to the district level. This is already happening, but the process should be accelerated. Future technical support should be located in each district and not at the Zone level.

There are a few higher order services which should be located in Dang District to serve the hill districts of Rapti. These are essentially services that need some sort of major, central physical facility with good

transportation access to the rest of Nepal; e.g. hospital, AIC godown, NFC godown, Roads Department subdivision.

Another implication is that future development programs need not be Zone-wide. Particular programs may be targeted in some but not all districts of Rapti, in the interest of focusing limited resources on a more intensive effort where needs or opportunities are greatest. One example is the groundwater development program in the Dang and Deokhuri Valleys. Another would be special community forestry efforts in Salyan, Rolpa, and Pyuthan Districts.

j. Decentralized Planning and Implementation: The decentralization act and its rules and regulations are being carried out slowly, but they are already causing changes and realignments of authority. Planning of not only rural works but also other sectoral programs will increasingly be bottom-up rather than top-down. Future programming for the Rapti Zone should have a strong component of technical support for the district-level structure that already exists in law: the District Panchayat Secretariat headed by the LDO, with its staff consisting of the District Planning Officer and the district's sectoral line agency personnel. One possibility is to use one or more of the Rapti Zone's districts as an intensive laboratory for developing district-level planning, budgeting, and implementation capacity. This would have to be done in close cooperation with NPC and MPLD. The capability and motivation of local staff should be the key criteria for selecting where to do this.

k. Training: All panchayat leaders and technical personnel in the Rapti Zone need training in planning, budgeting, and implementation. It is vital that the National Planning Commission, MPLD, and the line agencies agree as soon as possible on a standard set of formats and procedures for preparing annual District Development Plans as well as periodic (five-year) plans. Effective practical training programs can be designed only if clear, consistent procedures exist which can be taught. The following are suggested training subjects:

- Compiling a district or panchayat data base.
- Filling out an annual budget plan form.
- Estimating local resource generation.
- Estimating the cost of a proposed project or program to insure that it fits within resource constraints.
- Conducting a meeting to consolidate a District Development Plan from various input sources.
- Preparing a local periodic development plan.
- Complying correctly with HMG budget procedures to avoid late budget releases.
- Conducting feasibility studies of irrigation, road, and small works projects. For the latter, the Rapti IRDP Technical Unit has already prepared some materials.

l. Relation of Resources to Objectives: In the future there should be better analysis of what level of investment resources and instititutional changes are needed to actually produce intended economic development and basic needs objectives. Then goals and objectives of development programs can be tailored accordingly and made realistic. The findings of this study on the economic situation and service delivery in the Rapti Zone indicate that the potential effects of relatively large investments have been reduced or even negated by broader problems such as high population growth, national economic weakness, and fundamental institutional limitations.

m. Long-Term Perspective: The previous point suggests the need for a long-term perspective on development for the Rapti Zone. A few years--the lifetime of one donor-funded project--is not enough to obtain significant improvements in incomes and welfare. A time frame of decades seems more appropriate.

2. Sectoral Policy and Strategy Issues for Rapti Zone

a. Agriculture: Higher priority should be placed on farmer outreach--direct extension and training for farmers. Of greatest importance is a concerted effort to devise and implement a better agricultural input delivery system which relies more on the private sector. Land reform, yet unimplemented, is critical for increasing agricultural production. More widespread availability to small farmers of institutional credit and small storage facilities would also make a great contribution.

b. Livestock: Much higher priority should be given to fodder development in a combined effort involving the Agriculture, Livestock, Forest, and Soil Conservation departments. The two basic components are 1) fodder tree and plant development and dissemination and 2) promotion of stall feeding. This should take precedence over genetic improvement programs. Other priorities are improving the procurement system for medicines so that supplies are sufficient and timely and delegating authority to district level staff to make programs more relevant to the local situation.

c. Irrigation: Future focus should be on smaller projects with emphasis on early formation and participation of users' groups. Planning of projects should include greater emphasis on the non-engineering aspects, especially arrangements for operation and maintenance. Feasibility study methods for irrigation projects need to be improved to make them more realistic, taking into account likely construction delays, breakdowns, O & M problems, and user problems. An intensive economic feasibility study of tubewell irrigation is needed for Dang District, where groundwater resources appear to be significant.

d. Forestry: Training should be provided to rangers and assistant rangers in community forestry and forest resource development. Training is also needed in preparation of Panchayat Forest and Panchayat Protected Forest management plans. Higher priority must be given to fodder tree development in concert with the Livestock Department (see above). The lease forest program should be implemented, though a streamlining of the approval process is needed at the national level. Special attention is needed for

solving the late budget release problem, which is particularly damaging to forestry programs.

e. Soil Conservation: This is a good program suffering from low priority in funding. It should be given higher priority.

f. Roads: Roads do not appear to have much effect on marketing of farm products. Road heads are more important as points for distribution of purchased goods. Roads lower transport costs, but this factor is of minor importance in comparison with other aspects of the marketing situation. New road construction, particularly of all-weather roads having very long-term economic payoff, should have low priority until agricultural production is improved. Adequate funding should be provided for maintenance of existing roads. Upgrading of main walking trails and tracks should continue to assist local market integration.

g. Drinking Water: Projects have so far been built to serve around 20 percent of the Rapti Zone population. But, it is unlikely that this number of people is actually being served due to the high breakdown rate of projects. Dang District has the highest coverage (25 percent), followed by Rukum (18 percent). Rolpa, Salyan, and Pyuthan have 10-15 percent coverage. Much greater attention is needed on the non-engineering aspects of drinking water schemes: 1) the social and political factors surrounding the location of and access to schemes and 2) better systems for operation and maintenance.

h. Mule Tracks: These are useful projects to enhance local market integration. They should be continued with emphasis on upgrading of existing tracks.

i. Suspension Bridges: A simpler, less expensive design using more local materials is needed. One such bridge has been built through the Rapti IRDP. The lessons learned from it should be used for further development.

j. Health: The focus should be shifted from construction of physical facilities to actual service delivery: more and better personnel, equipment, medicine, and training. Also, a review of health delivery strategy in the Zone should be conducted, emphasizing sanitation and preventive approaches.

k. Education: The recommendations in the health sector apply to education, though attention is needed to maintenance of school buildings. Teacher training must be emphasized above all else.

l. Agricultural Inputs Corporation: The amount of fertilizer and seed being distributed by AIC in the Rapti Zone is so small that the aggregate effect on production is negligible. The timeliness of delivery of the little that is distributed is also a problem. A strategy for AIC should consist of the following: 1) Reduce or eliminate costly transport subsidies for carrying inputs to hill distribution centers. Distribute the bulk of AIC inputs from large depots in Dang District, allowing farmers to come to them for inputs as part of their normal marketing trips; 2) Do everything possible to encourage private sector fertilizer and seed production and distribution; 3) Reassess the government monoply on fertilizer importation; 4) Encourage private sector seed production schemes.

m. Nepal Food Corporation: NFC supplies less than five percent of the foodgrain needed to cover the Zonal food deficit. Clearly the private sector is the dominant distributor of food. NFC's role should be limited to dealing with food crisis situations.

n. Cottage Industry: This is an important program that needs much higher priority, much better planning, management, and implementation, and tailoring of programs to local markets and raw materials. It should be linked to a program of credit and technical assistance to micro-enterprises.

o. Appropriate Technology: This has been a generally successful program in the Rapti Zone in terms of its exploratory, experimental nature. Now much more emphasis is needed on promotion, marketing, and servicing of proven technologies. Research and development is needed in the use of local materials for building construction. The link between the Appropriate Technology program and ADB/N should be maintained and strengthened.

3. Differences Among Rapti Zone Districts in Development Opportunities and Constraints

a. Dang

Land: Dang is the only district in Rapti with a high proportion of Class I and II agricultural land (flat or only gently sloping; good soils). Dang also has a significant amount of uncultivated arable land (mostly grazing land but some forest also) that could be turned to agriculture. At the same time, it appears that since 1978 there has been a significant amount of conversion in Dang of forest, shrub, and grazing land to agriculture. Land tenure in Dang is highly unequal, and any strategy for increasing production will have to take into account the different incentives among large landowners, marginal farmers, and tenants (not to mention the strong social/ethnic divisions). Experience to date indicates that larger landowners in Dang tend not to be interested in increasing grain production through new techniques because they already produce enough for their own consumption and marketing/irrigation prospects are too uncertain. However, landlords do show interest in increasing production of cash crops such as mustard, linseed, and lentils.

Forest: The supply of forest products in Dang exceeds the demand even when accessibility is taken into account. However, Dang has a high proportion of "degraded forest". The District suffers from acute soil conservation problems. Obtaining community participation in forestry programs is usually difficult in Dang. Thus in forestry Dang requires a strategy of 1) government-initiated, large-scale, intensively managed plantations and 2) incentives for larger landlords to plant trees in their own interest.

Water: Dang's surface water irrigation potential is higher than that of the hill districts but limited due to low or non-existent flows in winter and spring and high soil permeability. The potential for groundwater development in Dang is apparently promising. The ADN/N tubewell program in Dang is expanding. An intensive economic feasibility study of groundwater development through tubewells is needed for Dang.

Yields: Yields of major foodgrains are lower in Dang by about 25-50 percent than in the hill districts of Rapti. This is due in part to the higher amount of labor per unit of land area in the hills. Priority must be placed on improving yields in Dang to help improve the Zonal food balance.

Food Balance: Dang District produces a modest food surplus, part of which finds its way to the Rapti hill districts and part to other destinations, including India. However, within the district there is a significant amount of malnutrition due to poverty.

Cottage Industry: Dang district has a higher-than average concentration of oil and grain mills and brick and tile factories. The district also has specializations in pottery-making and basket-weaving.

Settlement System: The dominant towns of the Rapti Zone are in Dang: Ghorahi and Tulsipur, which are well-established, and Lamahi and Bhaluwang, which are newly emerging. Ghorahi and Tulsipur are the only towns in the Zone with Zone-wide functions. Most of the dynamic (growing) settlements of the Zone are in Dang District (the four abovementioned towns). These should be the focus of special planning and programming.

Service Centers: Too many service centers are proposed for Dang District, except in the western Deokhuri Valley. Grade "B", sub-district service centers, should be chosen from those towns which already have high concentrations of services: Lamahi, Gadhawa, Koilabas, and Gobardiya.

b. Hill Districts in General

Land: It appears that no significant land use changes have occurred in recent years, but probably there have been numerous very small, localized changes.

Water: Some localized potential for small irrigation schemes exists in the hill districts, tapping second-order rivers. However, the financial and economic feasibility of such schemes must be examined. Groundwater exploitation potential in the hills is poor in the short to medium term due to high costs, small irrigable areas, and lack of electricity for pumps.

Food Balance: The hill districts of Rapti suffer from a high and worsening food deficit (except in Salyan, where the deficit has been slowly declining).

Cottage Industry: The ready availability of cheap Indian goods, especially cloth, has led to a significant reduction in the amount of cloth made in the Rapti Zone's (and Nepal's) hills. Indian competition has also negatively affected other Nepalese cottage industries and crafts.

c. Salyan

Land: While some uncultivated arable land (sloping) exists in Salyan, putting this land to agricultural use is not advisable because soil fertility cannot be maintained given the inadequate existing supply of compost and fooder. Natural or chemical soil nutrient supply must be increased before cultivation area is expanded.

Forest: Forests in Salyan are highly degraded. Forest areas are almost totally accessible and thus at great risk. Salyan should be the target of an intensive forest development and protection strategy based on community forestry. This is also true of Pyuthan and Rolpa.

Cottage Industry: Salyan specializes in cotton textiles, oil and grain mills, furniture, and construction. Cottage industry development programs should explore further potential of these markets.

Settlement System: Salyan Khalanga (the district headquarters) is not growing. In future planning, the disadvantages of the Khalanga's hilltop location for some types of services should be taken into account.

Service Centers: There is a gap in planned service centers in the west and northwest of Salyan District. Priority in selection of Grade B service centers should be given to Kavra and Thamare, which have existing concentrations of services.

Socio/Political Factors: Salyan has historically been relatively free of internal political rivalries. It remains the district with the greatest degree of political stability in the Rapti Zone.

d. Rolpa

Forest: Rolpa's forests are highly accessible; there is no surplus--and probably a deficit--of forest products supply. Intensive community forestry programming is needed (see Salyan, above).

Food Balance: Rolpa, along with Rukum, has the most severe food deficit in the Rapti Zone. Rolpa produces less than 20 percent of its food needs from local grain production.

Cottage Industry: Rolpa has concentrations of woolen goods, cotton textile, and furniture production, which should be developed further.

Service Centers: There is a gap in planned service centers in Rolpa's northeast area. Grade B centers should be chosen from among Ghartigaon, Tabang, Sulichor, and Holeri.

e. Pyuthan

Land/Forest: Cultivation has extended itself to the limits of arable land in Pyuthan, creating an unfavorable agriculture-forest balance. A high proportion of forest is degraded due to this pressure and the almost total accessibility of forests in the district. Forest products demand exceeds supply. Strong community forestry efforts are needed for protection and development.

Agriculture: Pyuthan has the most untapped agricultural potential of the four Rapti hill districts. Some of Pyuthan's hill valleys are quite fertile, and there is potential for increasing the number of crops grown per year.

Water: The Madi River in Pyuthan is exceptional among hill rivers of Rapti in having a reliable minimum flow in winter, usually enough to support a significant wheat crop.

Settlement System: Pyuthan Khalanga is one of the few major settlements in the hills which is growing. This indicates that it has potential for stronger commercial, industrial, and service development.

Service Centers: Too many service centers have been proposed for Pyuthan. Grade B centers should be chosen from among Bhingri, Okarkot, and Bhairola, where concentrations of services already exist.

Socio/Political Factors: Pyuthan's development is negatively affected by the existence of political factions led by wealthy individuals who vie for control of the District Panchayat.

f. Rukum

Forest: The supply of forest products exceeds demand even when accessibility is taken into consideration. However, community forestry programs are needed in the highly-populated southwestern area of the district.

Water: The first-order rivers in Rukum have tremendous perennial flows, but tapping them for irrigation or power appears infeasible in the forseeable future due to inaccessibility, rugged terrain, limited irrigable land, and difficulty of lifting water great distances.

Food Balance: Rukum shares with Rolpa the most acute food deficit problems in Rapti. Rukum also produces less than 20 percent of its own foodgrain needs. Among the hill districts Rukum poses the greatest difficulties in expanding agricultural output due to its remoteness, topography, and internal political divsions.

Cottage Industry: Rukum has concentrations of cotton textile producers, oil and grain mills, and furniture makers.

Settlement System: Chaurjhari is one of the fastest growing towns in all of the Rapti Zone. It has potential for playing an increasingly significant role in a radius of influence beyond the borders of Rukum district. Musikot is also growing. But, Rukumkot appears to be stagnating.

Service Centers: Proposed service centers are well distributed but there are gaps in the northeastern and northwestern parts of the district. Grade B centers should be chosen from among Chaurjhari, Rukumkot, Baphikot, and Ahtbiskot, which have existing concentrations of services.

Socio/Political Factors: Rukum's historical seat of power changed several times from Baphikot to Rukumkot to Musikot (the latter is the present district headquarters). The feud between the would-be rulers of Musikot and Rukumkot is very real today and sometimes disrupts development efforts.

Table I.1

RAPTI ZONE STRATEGY MATRIX

	Dang	Salyan	Rolpa	Pyuthan	Rukum
1. Increase agricultural production through extension and drastically improved input delivery with private sector participation.	o	o	o	o	o
2. Focus special attention on raising foodgrain yields to improve Zonal food balance.	o				
3. Focus on fertile hill valley areas for intensive efforts to raise agricultural production.				o	
4. Integrate and intensify crop, livestock, and horticultural production.	o	o	o	o	o
5. Implement effective and extensive small-scale industry training, TA, and credit program oriented to local markets and raw materials.	o	o	o	o	o
6. Improve and expand job skill training.	o	o	o	o	o
7. Implement family planning and maternal/child health programs to reduce fertility rates.	o	o	o	o	o
8. Implement land reform.	o	o	o	o	o
9. Widen availability of institutional credit to small farmers.	o	o	o	o	o
10. Open uncultivated land to farming.	o				

RAPTI ZONE STRATEGY MATRIX (cont'd)

	Dang	Salyan	Rolpa	Pyuthan	Rukum
11. Train panchayat leaders and local technical staff in planning, budgeting, & implementation techniques.	o	o	o	o	o
12. De-emphasize new building and road construction in short/medium term; adequately maintain existing facilities.	o	o	o	o	o
13. Improve economic and social feasibility studies of physical works.	o	o	o	o	o
14. Tailor service delivery programming to local conditions; emphasize indicators of quality of services delivered.	o	o	o	o	o
15. In livestock, place highest priority on fodder supply development.	o	o	o	o	o
16. In irrigation, focus on smaller projects, early formation and involvement of user's groups, and operation and maintenance issues.	o	o	o	o	o
17. Expand soil conservation efforts.	o	o	o	o	o
18. Address social and operating/maintenance problems of drinking water schemes.	o	o	o	o	o
19. Continue track and trail upgrading projects.	o	o	o	o	o
20. In health shift focus from buildings to improving personnel, equipment, medicine. Emphasize sanitation and preventive approaches.	o	o	o	o	o

RAPTI ZONE STRATEGY MATRIX (cont'd)

	Dang	Salyan	Rolpa	Pyuthan	Rukum
21. In education give top priority to teacher training.	o	o	o	o	o
22. Emphasize promotion, marketing, and servicing of proven appropriate technologies; develop traditional construction techniques.	o	o	o	o	o
23. Focus community forestry efforts.		o	o	o	
24. Develop intensive, government initiated, large-scale forest plantations and provide incentives to larger landlords to plant trees.	o				
25. Implement in-depth economic feasibility study of groundwater resource development.	o				
26. Focus productive urban investments in main dynamic towns.	o				o
27. Limit number of new service centers; select towns with existing concentrations of services.	o	o	o	o	o
28. For offices, emphasize renting and traditional construction over new "modern" construction.	o	o	o	o	o

II. ZONAL RESOURCES

A. POPULATION AND HUMAN RESOURCES

According to the 1981 Census, the total population of the Rapti Zone was 877,325, about six percent of the national total. Between 1971 and 1981 the Rapti Zone grew more slowly than the national population: Rapti's average annual population growth rate was 2.04 percent per year compared with 2.66 per year for the nation as a whole. This indicates that the Zone experienced substantial net outmigration over the decade. Based on a continuation of past trends, the Rapti Zone probably has a population of around 950 thousand people today.

Population trends for 1971-81 in the Rapti Zone are shown in Table III.11. These figures indicate that in 1981 Dang District, with 266,247 people, contained 30 percent of the Zone's population. The four hill districts each had from 15 to 19 percent of Zonal population (about 130 to 170 thousand each).

Dang District's population grew well over twice as fast as that of the Zone as a whole between 1971 and 1981 (4.72 percent average annual rate). Rolpa and Salyan had almost zero population growth over the decade, while Rukum and Pyuthan grew modestly (2.12 and 1.40 annual average). This is indicative of intrazonal migration to Dang (see Chapter III section on migration).

Detailed population growth projections for the Rapti Zone and its districts, prepared by the Central Bureau of Statistics, appear in Appendix Table A.III.24. The "medium" projection shows the Zone gaining about 150 thousand people between 1986 and 1996, a growth rate of about 1.4 perecent per year. The "high" projection gives the Zone an increase of about 300 thousand people over the next ten years, a growth rate of approximately 2.7 percent per year.

According to the 1981 Census, only about 17 percent of the population over six years old in the Zone was literate. This is worse than the national 1981 literacy rate of 22 percent. There is a large disparity between male and female literacy rates: for Rapti in 1981 26 percent of males were literate while only seven percent of females were. This disparity is a national phenomenon. Dang District had the highest literacy rate in 1981: 22 percent. The four Rapti hill districts all had literacy rates of about 13 to 16 percent.

Regarding educational attainment, 77 percent of the Rapti Zone population over five years old had no formal education whatsoever in 1979, according to the Rapti IRDP Baseline Survey. The proportion of women with no formal education was 93 percent; the proportion of men was 62 percent. Only 1.2 percent of the over five population of the Zone had attained the School Leaving Certificate level or higher. There was very little variation among Rapti's districts with respect to educational attainment.

The school enrollment rate for all levels (primary, lower secondary, and secondary, encompassing ages 6-15) was 30 percent overall in the Rapti Zone

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in 1979 (this is an "apparent" enrollment rate, which is the total number of students enrolled, regardless of age, as a percentage of the total population of school age). The school enrollment rate for males was 49 percent, while the rate for females was only 10 percent. Primary school enrollment was much higher than in the upper two levels: primary, 56 percent; lower secondary, 18 percent; and secondary, 9 percent. There was a moderate variation in total enrollment across the five Rapti districts, with Dang highest at 34 percent and Rukum lowest at 20 percent.

While no data specific to the Rapti Zone on labor force skills are available, there is no question that the Zone's labor force is on the whole thoroughly ill-equipped to compete for semi-skilled or skilled jobs. Ninety-six percent of the labor force in Rapti is employed in farming, almost all of it subsistence family farming or unskilled farm laboring. Migrants from the Rapti hill districts to Dang or the Terai find it impossible to compete with workers from India for urban-based jobs in services, commerce, or industry (see Chapter III section on labor force). Cottage industry training programs in the Zone have been far too limited to have had an appreciable impact on the general skill or occupational profile of the labor force. Some of the skill deficiency is attributable to inadequate primary education.

Appendix 1 of this report presents a brief review of the historical background and social structure of the Rapti Zone.

B. LAND USE AND CAPABILITY

1. Introduction

The five districts of the Rapti Zone encompass a variety of environment types. The Zone may be divided into five major physiographic regions based on terrain features. This division reflects a north-to-south transition from High Himalayas to Terai. Table II.1 presents a breakdown of physiographic areas by district for the Rapti Zone based on data from the Land Resources Mapping Project (LRMP; HMG and Government of Canada). The middle mountains area constitutes the single largest physiographic area in the Zone, comprising almost one half of Rapti's land area. The majority of the Zone's population resides in the middle mountains, and it is there that many of Rapti's land resource problems--basically erosion and forest degradation--are most acute.

It should be noted that the Rapti Zone contains only a miniscule amount of Terai land. The LRMP data classify the Dang and Deokhuri valleys of the southern Rapti Zone as "Dun" or "Inner Terai" areas within the Siwalik physiographic region.

Each of the Rapti Zone's districts can be subdivided into smaller, more specific ecological units based on landforms, soils, and climate. The resulting heterogeneity of the natural environment produces a complex mosaic of land systems which pose diverse opportunities and constraints on land resource development and man-land relations generally.

Table II.1

PHYSIOGRAPHIC REGIONS BY DISTRICT IN RAPTI ZONE

(Area in Thousands of Hectares; Percentages of Total District Area)

District	Terai		Siwalik 1/		Middle Mountain		High Mountain		High Himal		Total
	Area	Percent	Area	Percent	Area	Percent	Area	Percent	Area	Percent	Area
Rukum	-	-	-	-	32.0	11.0	197.6	68.0	61.0	21.0	290.6
Rolpa	-	-	-	-	122.2	74.0	42.9	26.0	-	-	165.1
Pyuthan	-	-	4.9	4.0	114.6	88.0	10.0	8.0	-	-	129.5
Sallyan	-	-	0.2	0.1	149.9	99.9	-	-	-	-	150.1
Dang	0.6	0.2	249.3	84.2	46.2	15.6	-	-	-	-	296.1
Rapti Zone	0.6	-	254.4	24.7	464.9	45.1	250.5	24.3	61.0	5.9	1,031.4

1/ Includes Dun (Inner Terai Valleys formed by division of Siwalik range).

Source: Computed from Land Resources Mapping Project (LRMP) data.

2. Land Capability

The Land Resources Mapping Project has provided Nepal with a rich and reliable information base on land use and capability. The data were first developed from nationwide aerial photos; subsequently an extensive ground verification program was carried out. Given the challenges of preparing this type of data base in Nepal, it represents a tremendous achievement.

A land capability classification system has been developed for Nepal by the LRMP. This system incorporates significant biophysical factors into a set of specific land use categories based on "optimal use". The LRMP project has also developed a land utilization classification whose results for the Rapti Zone will be discussed below. In working with such data, three points should be kept in mind:

- Systems of land classification based on physical parameters (soils, landform, climate) provide a valuable basis for land planning but in themselves are not sufficient. Policy analysis on "optimal use" of land must also consider such factors as accessibility, institutional arrangements, and cultural systems.

- The utilization or capability class assigned to a given area of land reflects the dominant class of land in that area. Given the extreme fragmentation of land types in Nepal and the large areas covered by the LRMP maps at 1:20,000 scale, significant portions of other classes often exist which cannot be included in final area summations. This means that for analysis of specific locations, the LRMP data must be supplemented by additional information.

- The political subdivision of a Zone into districts may not be appropriate for some land resource development strategies.

The percentage distribution of land capability classes for the districts of the Rapti Zone appears in Table II.2 (the same data in terms of absolute numbers is given in Appendix Table A.II.1). In general terms, land suitable for agricultural use appears in Classes I, II, and III. Class IV is restricted to forest use for fodder, fuelwood, and timber. Class V is limited to grazing and fodder collection. Classes VI and VII are either too fragile or of excessively low biological productivity to be suitable for intensive land resource development. A fuller explanation of these classes is given in Appendix 2. Table II.2 shows that almost one third of the land area of the Rapti Zone is suitable for agriculture, but the great majority of this land is Class III--moderately to steeply sloping (up to 30 degrees)--on which terracing is mandatory for cultivation and erosion is a general hazard. Dang District stands alone in having a high proportion of higher-quality Class I and II land (29 percent). Agricultural land in the hill districts is almost entirely composed of Class III land.

3. Current Land Use

The aerial photographs on which the LRMP data are based date from 1979. Specialists consulted for this project said that for the hill areas, at the district-wide or even panchayat area scale, land use distributions probably have not changed much since then. Notable differences in hill land uses

Table II.2

LAND CAPABILITY DISTRIBUTION[1/]

BY DISTRICT IN RAPTI ZONE

(Percentages)

District	I	II	III	IV	V	VI	VII	Total[2/]	District Area (ha.)
Rukum	0.3	0.8	13.7	43.8	3.5	19.9	17.5	99.5	290,614
Rolpa	0.2	0.4	35.7	49.5	0.7	13.2	0.0	99.7	165,137
Pyuthan	1.8	2.5	29.0	50.3	0.3	14.5	0.0	98.4	129,521
Salyan	1.6	0.7	40.3	43.9	0.1	12.1	0.0	98.7	150,075
Dang	19.7	9.0	9.4	22.3	0.3	35.4	0.0	96.1	296,065
Rapti Zone	6.2	3.3	21.6	39.5	1.2	21.5	4.9	98.2	1,031,412

1/ Classes I, II, and III are defined as suitable for agriculture; Classes IV and V are suitable for forestry and grazing; and Classes VI and VII are unsuitable for intensive resource use. See Appendix 2 of this report for more information.

2/ Total do not equal 100.0 percent because some land has been left unclassified (Active river beds and channels).

Source: Computed from Land Resources Mapping Project (LRMP) data.

could show up if one were focusing on a small area such as a village. However, for Terai or Inner Terai areas (i.e. Dang), significant changes in land uses probably have occurred since 1979.

At the time of this study no data were readily available allowing a valid evaluation of land use changes over time for the entire Rapti Zone. Specialists advised the Rapti study team that use of Landsat photos for this purpose would give very unreliable results because of the difficulty of interpreting Landsat photos of Nepal's rugged terrain.

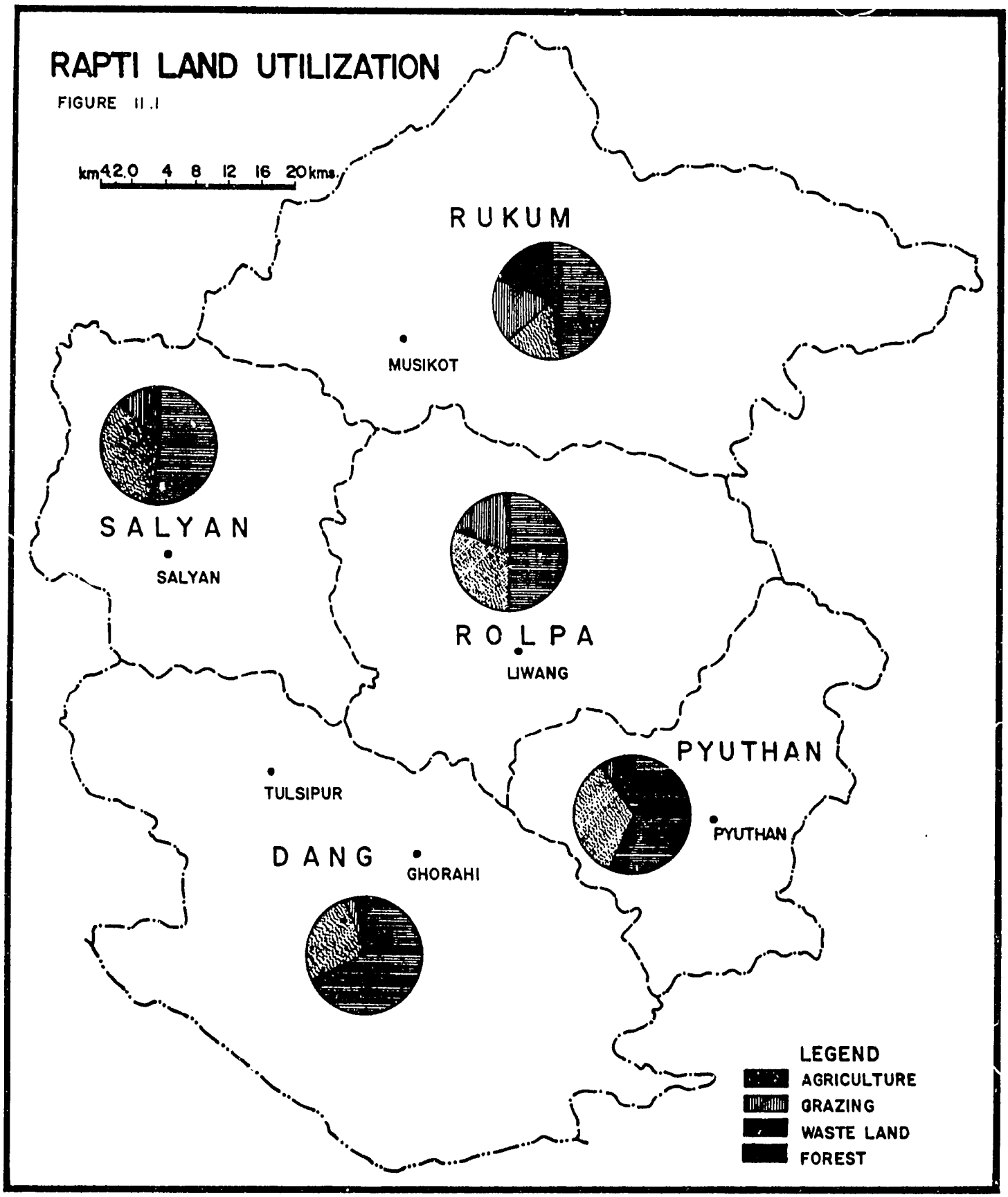
However, some time-series data for limited samples of land in the Rapti Zone have recently been analyzed by the HMG Remote Sensing Center. This work involved measuring land use changes using aerial photographs taken in 1978 and 1985 of three selected areas of the Zone. The areas are: 1) around Tulsipur in Dang District, 2) around Pyuthan District Center, and 3) north of Pyuthan District Center. Each area measures around 130-140 km2. Using 1:50,000 scale photos blown up to 1:10,000, the RSC has calculated land use areas in the two years for seven land use categories.

Figure II.1 gives a rough overview of the land use distribution by district in the Rapti Zone.

Appendix Table A.II.2 presents a detailed land utilization breakdown based on the LRMP data for the districts of the Rapti Zone. Over the Zone as a whole, about 38 percent of the land is in some sort of agricultural use. Over two thirds of this agricultural land consists of terraces plus grazing land. More than half of the Zone's land is classified as forest, but nearly three quarters of this is composed of immature or shrub forest. Dang District has a lower-than average share of agricultural land use (30 percent) and a higher-than average share of forest (67 percent). It also has a relatively low share of grazing land. Among the hill districts, Rolpa has the highest proportion of agricultural land use (49 percent). Rukum and Rolpa have the highest proportions of mature and reproductive forest as well as grazing land. In Dang, Salyan and Pyuthan the share of what might be termed "degraded forest" (immature and shrub forests) is extremely high, covering about half the total land area of these three districts.

The results of the Remote Sensing Center exercise described above are illuminating. While the land use changes observed over the seven year (1978-1985) period were small in percentage and absolute terms, they are indicative of general trends. In the Pyuthan area the net changes were extremely small, the principal ones being 25 hectares changing from grassland to forest and 20 hectares changing from agriculture to stream alluvial, within an overall area of 14,000 hectares. In the 13,400 hectare Dang sample, the land use changes were more significant. Over the seven-year period 274 hectares of forest land were converted to agriculture, shrub, or grassland. Another 80 hectares of various types of land were converted to agriculture, and the urban area of Tulsipur expanded onto 42 hectares of previously agricultural land.

It is not possible to say whether the rate of conversion of forest land to other uses observed in Dang is representative of the entire District, but if it is, it represents an alarmingly fast pace of forest loss considering that there is very little corresponding new forest plantation development taking place. While some afforestation efforts have been started in Darg


RAPTI LAND UTILIZATION
FIGURE II.I
km 4 2 0 4 8 12 16 20 kms.
RUKUM
MUSIKOT
SALYAN
SALYAN
ROLPA
LIWANG
PYUTHAN
PYUTHAN
TULSIPUR
DANG
GHORAHI
LEGEND
AGRICULTURE
GRAZING
WASTE LAND
FOREST

recently, their scope has been quite small. While Dang has a "surplus" of uncultivated arable land that can be brought into cultivation--as will be shown below--it is important that such opening of new land be accompanied by effective forestry and soil conservation measures in Dang.

The evidence of the RSC analysis indicates that the LRMP data for Dang District, being from 1979, probably understate the amount of agricultural land and overstate the amount of forest land. The percentage of degraded forest in Dang has probably gone up also.

4. Comparison of Land Use and Land Capability

Comparing the land use and land capability data permit one to gauge the extent to which land is being over- or under-utilized. Appendix Table A.II.3 presents both sets of figures for the districts of the Rapti Zone. The land use classes of Appendix Table A.II.2 have been aggregated into six categories for easier comparison. If one considers only those lands suitable for agriculture (Classes I, II, and III) and compares these with present agricultural land use (Categories 1 and 2), one finds considerable pressure exerted on existing arable land resources in the four hill districts of Rapti. In three of these districts--Rukum, Salyan, and Pyuthan--the amount of land presently under cultivation exceeds the amount of land optimally suited for that purpose. This is especially alarming given the heavy dependence of agricultural fields on forest areas as nutrient reserves under the prevailing traditional cultivation system.

Table II.3 summarizes the data in the aforementioned table for agricultural land. Dang and Salyan are the only districts in which a significant amount of agriculturally suitable land is not being cultivated. Out of the 33,750 ha. in Dang which could be cultivated but are not, about 9,600 ha. (about 28 percent) are forest areas. The great majority of these 9,600 ha. are Class I and II lands located in northwestern Dang, particularly in the northwestern part of the Babai River Valley. The remainder of the non-cultivated arable land is being used for grazing. For Pyuthan the composition of the approximately 11,250 ha. of uncultivated arable land was not measured, but without much doubt the vast majority is moderately to steeply sloping grazing land.

The presence of an arable land "surplus" in Dang and Salyan does not necessarily mean that cultivation should be expanded in both districts. The potential for such expansion depends on the availability of nutrients to renew the cultivated soil. In Nepal, where chemical fertilizers are generally unavailable or too expensive, this inevitably means having a high forest-agriculture land ratio, so that forest-generated compost and manure (through fodder) are sufficiently available for soil nutrition. As the forestry supply and demand analysis in the next section shows, Dang has an excess supply of forest products which could serve to produce compost and fodder. On the other hand, Salyan has a very large deficit of forest products supply; thus expansion of cultivated area in Salyan is not advisable unless the amount of forest area were increased substantially.

In many other areas of Nepal, the LRMP data reveal "excess" arable land. This is shown in Table II.4, in which data for several other districts in Nepal appear. These districts were chosen to represent a variety of physiographic regions. The reason that the percentage of non-cultivated arable

Table II.3

AGRICULTURAL LAND CAPABILITY/LAND USE

COMPARISON BY DISTRICT, RAPTI ZONE

(Percentages of District Areas)

District	Land Suitable for Agriculture (Classes I, II,III)	Present Agricultural Land Use	Difference
Rukum	14.8	15.6	- 0.8
Rolpa	36.3	31.9	4.4
Sallyan	42.6	35.1	7.5
Pyuthan	33.3	33.2	0.1
Dang	38.1	26.7	11.4
Rapti Zone	31.1	26.4	4.7

Source: Computed from Land Resources Mapping Project (LRMP) data.

Table II.4

DIFFERENCE BETWEEN LAND CAPABILITY AND ACTUAL LAND USE FOR RAPTI ZONE DISTRICTS AND OTHER DISTRICTS IN NEPAL

(Percentages of District Areas)

District	Agriculture	Grazing 1/
Rukum	- 0.8	- 14.8
Rolpa	4.4	- 16.8
Sallyan	- 7.5	- 11.3
Pyuthan	- 0.1	- 9.9
Dang	11.4	- 2.7
Doti (Western Hills)	17.0	- 17.0
Tanahun (Central Hills)	13.0	- 21.0
Chitwan (Central Inner Terai)	32.0	- 9.0
Ilam (Eastern Hills)	17.0	- 23.0
Solukhumbu (Eastern High Mountains)	1.0	- 18.0

1/ Capability Class V land only.

Note: A negative number means that actual land use for agriculture or grazing exceeds the amount of land classified as capable for these uses.

Source: PADCO analysis using Land Resources Mapping Project (LRMP) data.

land is quite high in most areas of Nepal is that traditional agriculture requires a high ratio of fodder and compost-producing land (i.e. forest) to cultivated land in order to maintain soil fertility. The LRMP criteria for classifying land as suitable for agriculture do not take this into account (this is not to be construed as a criticism of the LRMP data). Where agriculture has expanded to meet or exceed the limits of potentially arable land, as is the case throughout much of Rapti, this indicates a loss in the nutrient recycling capability of the land resource system. This is precisely what is occurring throughout the Rapti Zone and translates directly into declining soil fertility and agricultural productivity (see Chapter III).

A second significant issue that arises from comparing land capability with present land use is that of grazing land management. Table II.4 also shows differences between land suitable for grazing and land actually used for this purpose. The Rapti Zone and the other selected districts all show high negative values, indicating the percentages of district areas on which "excess" grazing is taking place. This is a fundamental problem common to the Kingdom as a whole: How best to utilize non-farm land for livestock production. The large negative values for grazing in Table II.4 point to intense pressure on lands most optimally suited for forestry and soil conservation. Land capability Class V is the only class recommended as optimal for grazing. In all instances, the actual amount of land in this class is small. Livestock populations, on the other hand, are large, and grazing has expanded considreably onto Class IV and Class VI lands. This, in conjunction with traditional range management through burning, has led to degradation of forest over 40 percent of the Rapti Zone's entire area. The loss of ground cover mitigates the positive role of forests in slope stabilization, and the continual removal or destruction of seeds, seedlings, and understory species by overgrazing and yearly burning disrupts forests' regenerative ability. Class IV and VI lands should be used for fodder collection under a stall-feeding system for livestock.

C. FOREST ACCESSIBILITY, SUPPLY AND DEMAND

This study has made use of a computer-based model for calculating the accessibility of forest areas to agricultural areas and the balance between supply and demand for fuelwood. The model was developed by specialists of the Land Resources Mapping Project and uses LRMP land use data for Nepal. Calculations were made for the five districts of the Rapti Zone.

The forest resources model uses a sample of six percent of the area of each LRMP map, consisting of three strips one centimeter wide runnning vertically through each map. The strips are divided in one cm. squares, each of which equals one square km. The model calculates the supply of forest products available from each square of forest land based on the type of forest cover and also calculates the demand for forest products from each square of agricultural land based on the prevailing cropping pattern, cultivation type, and intensity. The model also determines the percentage of accessible forest, shrub, and grassland to the agricultural land in each district. This is an important consideration, since accessibility is a major factor in the degree to which given forest areas are under pressure from fuelwood and fodder demand. In Nepal some forest areas are too far away from agricultural--and, hence, settled--areas for their resources to

be tapped. In other districts, almost all the forest land is accessible and thus subject to strong degradation pressure.

The model assumes a horizontal distance of four kilometers as the maximum one-way accessibility distance between any agricultural land square and forest squares lying north or south of it along the sample strip. This and and other aspects of the model's methodology have been reviewed by several specialists from USAID and elsewhere and found to be sound.(1) The model estimates total shrub plus forest area per district to a very acceptable degree of accuracy.

Two additional methodology points should be noted. First, the model calculates the demand for fuelwood, but not for fodder. The demand for fodder was originally included as a function of cropping patterns, but it has since been decided that more valid estimates would be obtained using livestock numbers. There are plans to improve the model in this regard. Second, the estimates cover district areas, but for sample squares within four kilometers of district borders, the calculation of agricultural demand for forest products goes across the border (as would the farmer).

Table II.5 summarizes the results of the analysis. From line 1 it is evident that Pyuthan, Rolpa, and Salyan are the districts in which forests are most "at risk" because 90 to 100 percent of forest area is accessible. The percentage of accessible forest in Rukum is low because there are large amounts of forest in the northern part of the district that are far from agricultural areas. In Dang the percentage is low also because Dang contains much larger tracts of forest than the hill districts; thus there is less total boundary area between agricultural and forest land. However, the estimate for Dang may be too low, as the flatter topography of Dang makes access easier, and the high proportion of landless people there in fact causes high pressure on forest resources.

Grassland and shrubland provide only a very small fraction of forest products supply, but it is useful to consider them, since they tend to be closer to agricultural land than forests and thus at greater risk. Lines 2 and 3 of Table II.5 show that shrub land is 100 percent accessible in Pyuthan, Rolpa, and Salyan, 80 percent accessible in Rukum, and 62 percent accessible in Dang. Grassland is almost totally accessible except in Rukum.

Turning to the supply-demand balance, the yearly demand figures may be compared with the supply figures from line 7; the results are given in line 8. Supply exceeds demand by a wide margin in Dang and Rukum. Supply slightly exceeds demand in Rolpa. However, in Pyuthan and Salyan the demand is greater than the supply, with the deficit especially large in Salyan.

Taking accessibility into account accentuates the problems in Rolpa and Salyan. About 90 percent of forest areas in these districts are accessible. Thus in Rolpa the surplus of supply over demand goes down to only a very slim margin, and in Salyan the deficit grows by about 7,600 tons per year.

For this study it was not possible to obtain data on fodder demand. However, it is clear that if fodder demand were included in the estimates, the deficits in Pyuthan and Salyan would be even worse and the balance in Rolpa might turn negative.

Table II.5

FOREST PRODUCTS ACCESSIBILITY AND SUPPLY/DEMAND IN RAPTI ZONE

	Dang	Pyuthan	Rolpa	Rukum	Salyan	Rapti Zone
Percent of Acessible						
(1) Forest Area	66.6	100.0	91.4	68.1	90.2	78.1
(2) Shrub Land Area	61.5	100.0	100.0	80.0	100.0	83.6
(3) Grassland Area	100.0	100.0	90.9	61.4	100.0	79.1
Yearly Demand for Fuelwood (000tons)	176.1	87.6	109.2	86.9	107.2	-
Yearly Supply from Forest Land						
(4) Sample Total Forest Area (000 ha.)	11.1	3.4	4.6	8.0	5.9	-
(5) Actual Total Forest Area (000 ha.)	180.1	66.3	84.5	128.5	73.6	-
(6) Sample Total Forest Supply (000 tons) 1/	24.6	4.0	7.1	12.6	6.2	-
(7) Total Supply from Forest (000 tons) 2/	399.1	78.0	130.4	202.4	77.3	-
(8) Gross Balance (Supply less demand)	223.0	-9.6	21.2	115.5	-29.9	-
Approximation of Accessible Fuelwood Supply (000 tons) 3/	265.8	78.0	119.2	137.8	69.7	-
Accessible Supply/Demand Balance (000 tons)	89.7	-9.6	10.0	50.9	-37.5	-

1/ Calculated using supply factors for each forest type.

2/ $\frac{(5)}{(4)} \times (6)$

3/ (7) x (1)

Note(s): 1. The sample area was six percent of the land area of each LRMP map.

2. The model does not calculate the demand for fodder.

Source: Forestry Supply and Demand Model, Water and Energy Resources Development Project. Model employed Land Resources Mapping Project (LRMP) data.

The implications of these findings for forestry strategy are:

- Salyan, Pyuthan, and Rolpa should be targets of an intensive protection approach based on community forestry. Their forest resources are highly accessible and under extreme pressure.

- In Rukum the focus of community-based forest protection and management should be its highly populated southwestern area adjoining Salyan and Rolpa.

- Dang District suffers from forestry problems not reflected in the above figures. First, fodder demand is high. Second, the high proportion of landless people probably makes demand per unit of area greater in Dang. Third, the social structure of Dang (highly unequal land ownership and sharper divisions between ethnic/caste groups) makes participation in community forestry much more difficult to obtain. Fourth, erosion problems in Dang are very acute (the Dang Valley is considered the third most degraded area in the Kingdom), requiring afforestation for soil conservation. These factors suggest that Dang needs 1) government initiative to create large-scale, intensively-managed plantations and 2) a program to provide larger landlords with incentives to plant trees in their own interest.

D. WATER RESOURCES

1. Surface Water and Rainfall

The Mid-Western Development Region, in which the Rapti Zone is located, is relatively rich in water resources. The Mid-Western Region contains a number of first-order rivers (originating in the High Himalayan Range and having perennial flows). These are the Karnali and its main tributaries, the Mugu Karnali, Tila, Thuli Beri, and Sani Beri Rivers. The Karnali has been considered as a potentiallly major source of hydro-power; however, the high cost of constructing dams in the deep valleys of the area make such works unlikely in the forseeable future.

Compared with other parts of the Mid-Western Region, the Rapti Zone has modest water resources. The Bheri River separating the Rapti Zone from the Bheri Zone also flows in a narrow, deep valley and as such its water would be difficult to tap for power or irrigation. The same is true for the Sani Beri, which flows through the length of Rukum District.

The other main rivers of the Rapti Zone are classed as second-order, meaning that they originate from springs of the Mahabharat Range (south of the High Himalayas) and have greatly reduced flows in wintertime. These rivers are the Rapti and Babai in Dang District, the Sarada in Salyan District, the Sibai, Marin, and Lungri Khola in Rolpa District, and the Madi and Jhimrukh in Pyuthan District. The flows in these rivers fluctuate greatly over the course of the year. For example, in 1975 the maximum flow measured for the Rapti River at Jalkundi was 2,880 m3 per second in August, while the minimum flow was 1.05 m3 per second in May. The annual mean measured between 1964 and 1975 was about 115 m3 per second (see Appendix

Table A.II.4). Similar wide variations in flow are shown in Appendix Table A.II.5 for the Jhimruk and Madi rivers.

The Madi Khola in Pyuthan is exceptional within the Rapti Zone in having a relatively reliable minimum flow in wintertime. This flow ranged from about 5.0 m3 per second to about 8.0 m3 per second between 1964 and 1973. The other second order rivers of the Zone either have unreliable minimum flows (e.g. the Rapti) or minimum flows that are too low for potential irrigation (e.g. the Jhimruk Khola).

Dang District has a large number of third-order rivers originating in the Churia and Dudhawa Ranges (Siwaliks). These rivers run dry in the winter and spring and are marked by flash floods during the monsoon.

The Rapti Zone receives less rainfall than areas in Eastern and Central Nepal. However, compared to other zones of the Mid-Western and Far Western Development Regions, Rapti is in a slightly better position in terms of annual rainfall. The reason for this is that Nepal receives most of its precipitation from the southeastern monsoon wind, resulting in a pattern of decreasing rainfall as one moves from east to west. The mountainous terrain and altitude factors cause considerable local variations. Even within the Rapti Zone the mean annual rainfall varies greatly. The area around Rukumkot in Rukum District is a pocket of exceptionally heavy rainfall in Nepal (see Figure II.2 and Table II.6), above 2,500 mm. in some years. Salyan, on the other hand, has a mean annual rainfall of only around 1,000 mm.

Rainfall in the Rapti Zone varies considerably across the year, as shown in Appendix Table A.II.6. The precipitation pattern does not permit growth of more than one main cereal crop of rice or maize per year without irrigation. However, the slight amount of rainfall in winter does permit a wheat crop to be grown. The data in Appendix Tables A.II.5 and A.II.6 also indicate that rainfall in the Rapti Zone is not reliable in terms of amount or timing. For example, Bijuwar Tar in Pyuthan recorded 80 mm. of rain in June 1983, as against 344 mm. for the same month in 1981. Tulsipur in Dang recorded 71 mm. in June of 1983 and 386 in the same month of 1981. The annual rainfall at Bijuwar Tar in 1967 was 852 mm., while in 1981 it was 1,561. In Rukumkot the total amount rainfall was 3,325 mm. in 1968 and 1,624 mm. in 1982.

In general, then, the Rapti Zone's rivers provide an ample supply of water during the June-September monsoon period, but the water supply drops abruptly in the winter and spring. In most of the rivers of the hill districts the water does not percolate, so that some minimal flow is present throughout the year. On the other hand, the rivers of the Inner Terai Dang and Deokhuri Valleys of Dang District dry up in winter and spring owing to the high permeability of the soil.

2. Surface Irrigation Potential

Up to now the vast majority of HMG irrigation resources have been concentrated in the Terai, with the emphasis on large-scale irrigation projects. Only in recent years has HMG begun to devote some attention to small irrigation systems in the hill areas. Since the Rapti Zone does not have any Terai land, it has not been accorded priority in the development pro-

MEAN ANNUAL PRECIPITATION (mm), 1956-1975, NEPAL

FIGURE II.2

0 20 100 km.

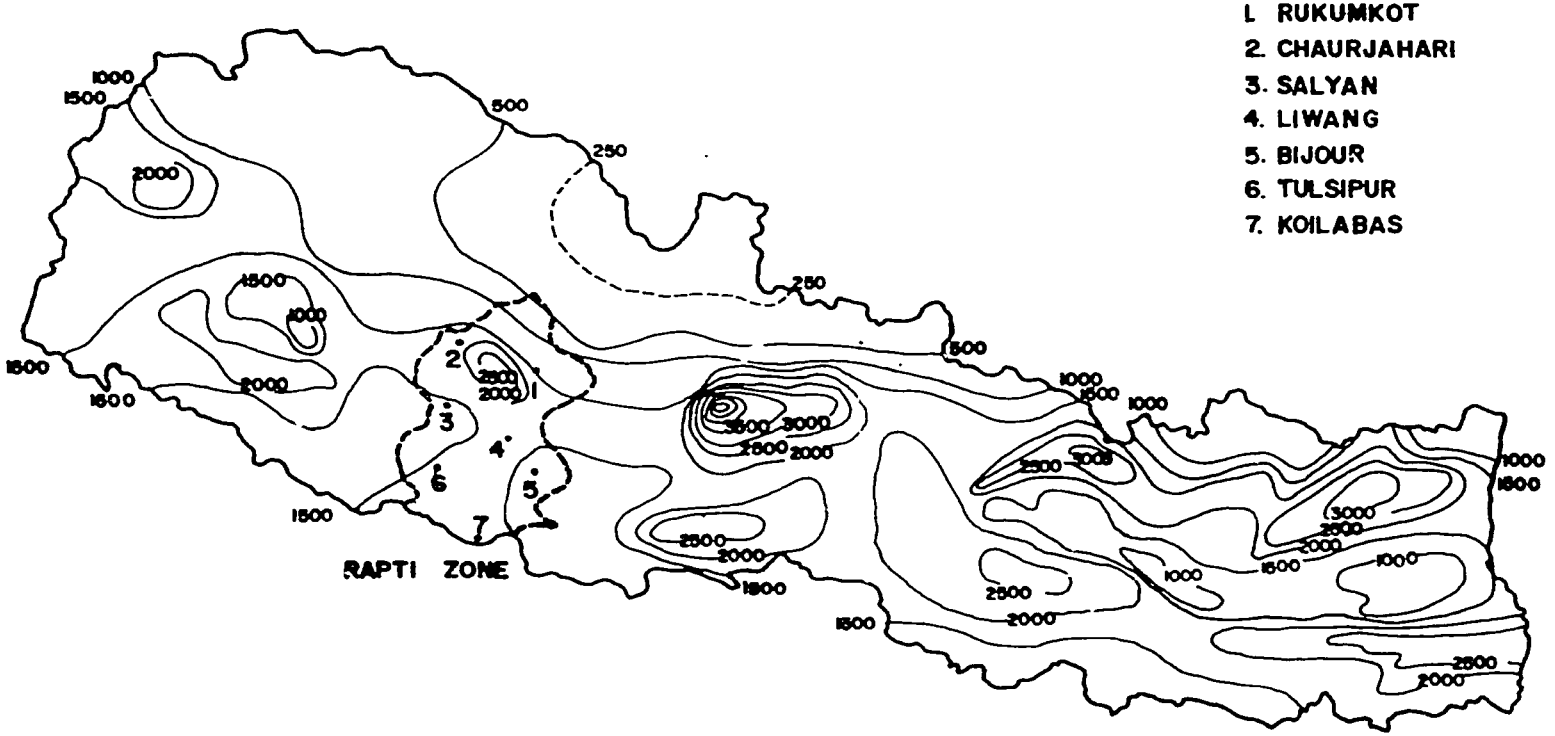


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Table II.6

TOTAL ANNUAL RAINFALL FOR SELECTED YEARS
AT SEVEN STATIONS IN RAPTI ZONE
(Millimeters)

Places	1967	1968	1969	1972	1981	1982	1983
Rukumkot	-	3,324	2,823	-	1,705	1,624	2,590
Libang Gaon (Rolpa)	1,331	1,713	1,536	-	1,345	1,818	1,781
Bijuwar Tar (Pyuthan)	852	-	1,065	-	1,561	1,244	1,386
Tulsipur (Dang)	-	-	-	1,141	2,088	1,852	1,787
Koilabas (Deokhuri)	-	-	-	1,215	998	1,557	1,585
Sallyan	848.9	867.6	-	896	1,099	1,176	1,152
Chaurjahari (Rukum)	-	-	-	-	1,202	1,335	1,593

Source: HMG, Nepal Meteorological Service, Department of Irrigation, Hydrology. and Meteorology.

grams of the irrigation sector. Prior to the commencement of the Rapti Integrated Rural Development Project, only three medium irrigation projects had been undertaken in the Zone by HMG: the Chaurjhari project in Rukum (400 ha.), the Kwadi project in Pyuthan (200 ha.), and the Gwar Khola project in Dang (700 ha.).

According the the Feasibility Study of the Rapti IRDP, in 1980 about 4,000 to 4,500 ha. of farmland were irrigated under traditional systems in the Dang and Deokhuri Valleys of Dang District. While reliable estimates of the amount of land covered by traditional irrigation in the rest of the Zone are not available, it appears that such systems are widespread. The traditional systems tend to consist of temporary diversion structures made out of tree branches and flumes made of hollow logs. These systems need to be rebuilt each year.

Tapping the first-order rivers of the high mountain area of Rukum District is impractical at this point because of the high cost of construction, the limited area of arable land, and the difficulty of lifting water in the steep terrain. Most of the second-order rivers of Salyan, Rolpa, Pyuthan, and Rukum Districts offer some potential for surface irrigation, particularly in small irrigation systems.

HMG's Department of Irrigation, Hydrology, and Meteorology has carried out 70 pre-feasibility studies of surface irrigation projects in the Rapti Zone: 24 in Dang, 15 in Rukum, 8 in Salyan, 15 in Rolpa, and 8 in Pyuthan. Out of these 70, only 17 were found to be infeasible. The irrigable areas in the hill districts range from 21 ha. to 300 ha., with an average of around 117 ha. One notable exception is Bhingri in Pyuthan, whose estimated irrigation area is 1,875 ha. The irrigable areas of Dang District studied by DIHM are considerably larger. All but five of the potential projects exceed 200 ha. Four projects in Dang are 1,000 ha. or larger.

Out of the total area covered by DIHM's pre-feasibility studies--17,700 ha.--about 70 percent (12,300 ha.) is in Dang District. The next highest area is in Pyuthan (3,400 ha.), about 19 percent of the land studied. Dang clearly has advantages with respect to surface irrigation potential. However, the potential for carrying out high-impact small irrigation projects in the hills should not be discounted, particularly if such projects can be designed around effective user's groups. Past experience in Nepal and elsewhere shows that one of the key problems with irrigation projects is lack of cooperation from the users. Small, community-based irrigation projects may in some cases offer better conditions for effective user participation in design, operation, and maintenance of systems.

One caveat must be noted: The pre-feasibility studies carried out by DIHM deal with the engineering, but not the financial or economic feasibility of projects. Cost-benefit information is needed before a truly realistic picture of surface water potential can be arrived at.

3. Ground Water

The Rapti Zone has not been a priority area for the development of ground water. As with surface water, HMG efforts have been concentrated on the Terai. Most of the experimental tube wells drilled in the Terai have been

successful, and DIHM views the Terai as a promising area for tube well irrigation.

Quite recently the Ground Water Resources Development Board initiated exploratory tube well drilling in Dang District. The GWRDB has drilled three wells near Ghorahi and one near Koilabas. All of these wells showed promising results. The water table was found to be 20 to 40 feet down, and the volume of water flow was measured at between 60 and 100 m3 per hour. It is estimated that each tube well could irrigate about 40 ha.

The Dang and Deokhuri Valleys in Dang District are characterized by permeable soils through which water percolates easily. While this is a serious constraint insofar as surface irrigation is concerned, it suggests good prospects for exploitation of ground water resources. It is generally believed that the southeastern part of the Dang Valley has the highest ground water potential. The GWRDB plans to drill six more wells in the 42/43 fiscal year and has set a target of installing 20 wells each in the Dang and Deokhuri Valleys for the Seventh Plan period. All this work is being done with HMG own resources.

If the exploratory drilling in Dang proves successful, it would be desirable to examine ways of encouraging the private sector to expand tubewell provision.

In the hill districts of the Rapti Zone the prospects for ground water exploitation are poor because of high costs, small irrigable areas, and the lack of electricity for powering pumps.

The Agricultural Development Bank of Nepal initiated the provision of loans for shallow tube wells in 1980. The program has been concentrated in the Terai. ADB/N has not conducted any surveys or feasibility studies of its own; it makes its tube well loans on the basis of past experience. So far ADB/N has made eight tube well loans in Dang District, all in Satabarriya, a village panchayat near Koilabas in the Deokhuri Valley. These wells have apparently been successful. ADB/N reportedly intends to expand its tube well lending program in Dang.

A recent study found that cropping intensities were higher in areas irrigated by tube wells and small-scale surface systems than in areas served by medium or large-scale irrigation (No Frills Development Consultancy, Operation and Maintenance Problems in Nepalese Irrigation Projects, December 1984). "Cropping intensity" is a measure of the degree to which land is used for cultivation during the year. One crop per year makes a cropping intensity of 100 percent; two crops 200 percent, etc. The No Frills study measured cropping intensities of 186 to 202 percent in the tubewell and hill irrigated areas as against averages of 161 and 147 percent for large and medium irrigation projects respectively. These findings reinforce the point made in the previous section about the apparent advantages of small irrigation projects, be they surface or ground water based.

FOOTNOTES CHAPTER II

(1) For additional information on the forest accessibility and supply/demand model, the reader should contact the Water and Energy Resources Development Project (HMG and Government of Canada), Mr. Roger Nield; or USAID/Nepal, Mr. Burt Levenson.

III. ZONAL ECONOMIC ACTIVITIES AND TRENDS

A. OVERVIEW

In March-July 1977 the National Planning Commission conducted a nationwide survey of employment, income distribution, and consumption patterns. The document produced by NPC from this survey included a table giving figures on per capita consumption expenditures and incomes by Development Regions. This table is reproduced here as Table III.1. It shows that in 1977 the Far Western Region, of which the Rapti Zone was then a part, had the lowest per capita income of the four regions, Rs. 907. More significantly, rural per capita income in the Far West, at Rs. 880, was substantially below that of the other regions. In addition, the region had no savings: per capita consumption and per capita income were virtually equal.

In 1981 the old Far Western Region was divided into the present Far Western and Mid Western Development Regions, with Rapti Zone becoming part of the latter.

The economic evolution of the Rapti Zone is closely tied to the person-land balance. Table III.2 shows that the Rapti Zone as a whole, but especially the hill districts, have unfavorable person-land ratios. One response to this has been to raise the amount of labor input per unit of land. This is the main explanation for the fact that foodgrain yields are higher in the hill districts of Rapti than in Dang, as shown in Table III.3.

The other response to population pressure on the land has been to increase the amount of land under cultivation. In their book, Nepal in Crisis, Blaikie et al comment on this phenomenon:

> "The transition to settled terraced agriculture was a product of the perceived advantages of growng maize and primarily due to an increase in population on limited forest resources . . . The transition has accelerated rather than reversed the tendency to ecological decline, as the clearance of forests for terraces combined with a continuous use of the reduced forest area for economic purposes have led to a vicious circle--forest clearance for terraces, use of forests for compost and fodder to maintain production causing greater erosion, which in turn destroys terraces, necessitating forest clearances for new terraces, and so on"(1).

Given this process, the attempt to reduce the person-land ratio in the hills through cultivating additional land may actually have contributed to raising the ratio instead. With progressively less land instead of more, and with declining yields (see Section B), the food deficit in the hills of Rapti has been widening. This has accelerated migration, both both seasonal and permanent. Migration is highly selective, in that usually the most productive individuals are the ones who migrate. This has tended to further weaken agricultural production in the hills. On the other hand, migration has dramatically reduced the high rates of population growth that were producing the increasingly unfavorable person-land ratios in the first place; however, the hill population continues to grow somewhat.

Table III.1

AVERAGE ANNUAL PER CAPITA CONSUMPTION EXPENDITURE AND INCOME IN NEPAL BY DEVELOPMENT REGIONS

(Rs., 1977)

Region	Rural			Urban			National Per Capita Income 1/
	Per Capita Income	Per Capita Consumption	Excess of Income Over Consumption	Per Capita Income	Per Capita Consumption	Excess of Income Over Consumption	
Eastern	971	967.83	3.17 (0.33)	2,377	1,824.00	553.00 (23.26)	1,024
Central	988	931.76	56.24 (5.70)	2,088	1,563.08	524.92 (25.14)	1,074
Western 2/	929	939.43	73.00 (7.86)	1,992	1,577.03	414.97 (20.83)	945
Far Western	880	879.26	0.74 (0.08)	1,723	1,393.00	330.00 (19.15)	907
Nepal	950	931.91	18.09 (1.90)	2,094	1,606.66	487.34 (23.27)	1,002

Note: Figures in parenthesis indicate percentages of incomes.

1/ Based on a weighted average of rural and urban incomes.

2/ The Excess of Income over Consumption for Western Region appears to be in error as both per capita income and per capita consumption are correct from other parts of the survey.

Source: National Planning Commission, A Survey of Employment, Income Distribution and Consumption Patterns in Nepal, 1977. p. 105, Table 11.3 and p. 85, Table 8.7.

Table III.2

ESTIMATES OF THE MAN-LAND RATIO IN THE RAPTI ZONE, ABOUT 1981

District	1981 Population	Population 10 Years & Above 1/	Adult Consumption Units in the Population (ACU's) 2/	Arable Land 3/ (hectares)	Cropped Area 3/ (hectares)	MAN-LAND RATIOS (Persons/Hectare) Based on Population 10 years: Arable Land	Based on Population 10 years: Cropped Area	Based on ACU's: Arable Land	Based on ACU's: Cropped Area
Rukum	132,267	93,380	107,401	43,010	45,301	2.2	2.1	2.5	2.4
Rolpa	169,379	119,243	136,248	59,945	59,853	2.0	2.0	2.3	2.3
Salyan	151,569	102,461	120,315	49,975	52,674	2.0	1.9	2.4	2.3
Pyuthan	157 863	108,768	125,249	55,176	43,042	2.0	2.5	2.3	2.9
Total Hills	611,078	423,852	489,213	208,106	200,870	2.0	2.1	2.4	2.4
Dang	266,247	179,717	213,850	112,801	79,237	1.6	2.3	1.9	2.7
National	15,020,451	10,754,643	12,016,361	4,463,265		2.4		2.7	

1/ Proportion of population 10 years and above in 1981 by district (Districts appearing in the order listed): .706, .704, .676, .689, .675

2/ Conversion of 1981 population to Adult Consumption Units by district, using the Nutrition Advisory Committee of India weights, (Districts appearing in the order listed):.8120, .8044, .7938, .7934, .8032 . For national population, 0.8 was assumed.

3/ Prepared by the Land Resources Mapping Project.

Source: PADCO analysis

Table III.3

FOODGRAIN YIELDS BY SIZE OF OPERATIONAL LAND HOLDING
COMPARING HILL DISTRICT AND DANG DISTRICT, 1982-83
(In Kilos Per Ropani)

Land Holding Stratum	Rice		Maize		Wheat		Barley		Millet	
	Hills	Dang	Hills	Dang	Hills	Dang	Hills	Dang	Hills	Dang
I. 0-4 Ropani	134	56	139	48	107	19	56	22	71	195
II. 5-10 Ropani	168	147	127	75	80	31	128	69	128	-
III. 11-20 Ropani	148	95	87	64	89	49	81	10	113	20
IV. Above 20 Ropani	150	108	78	64	62	68	52	16	87	49

Source: No-Frills Development Consultancy, Report on the Household Production Systems in Rapti Zone, Kathmandu, December, 1983. p. 59, Table 13.

Another passage from Blaikie et al's book, which focuses on the Western Region, is also relevant to the situation in Rapti:

> "The existence of a variety of non-agricultural income sources (employment in foreign armies and the Civil Service, business, and sources of employment in India in a variety of jobs such as watchmen, coolies, labourers on public works projects, etc.) has tended to postpone the necessity of responding to the pressures of population by transforming the basis of farm production.
>
> "It is quite clear that without non-agricultural incomes the situation in the hills would be very different. It is difficult to assess the issue in the context of 'if there had been few non-agricultural opportunities for employment, what would have been the agricultural situation?' However, if the prospect of an aggregate decline in non-agricultural employment opportunities worsens, the hills will almost certainly suffer a massive emigration, consequent on the widespread inability of peasant production alone to meet the needs of the population.
>
> "However, the future prospects for all those dependent on non-agricultural income are likely to worsen and such outside 'support' certainly has not the capacity to postpone the general crisis in the hills much longer since it is largely non-productive. The provision of these incomes has enabled the crisis of a declining resource base to be staved off, not by productive investment in the resource base itself, but simply by using cash income to meet current consumption needs and therefore to avoid fundamental changes in agricultural production."(2)

The above suggests that a substantial intervention, of a minimum "critical mass", is needed to make a difference in the socio-economic trend of the Zone and Nepal as a whole. This does not refer only to monetary resources; institutional changes and improvements are needed as well. The need to coordinate policies and programs is critical also. Not only must interventions be larger than the minimum critical mass, but also they must be directed simultaneously at a large number of conditions.

The following sections will provide more detailed documentation on the economic activities and trends in the Rapti Zone.

B. TRENDS IN AGRICULTURAL YIELDS

Crop yields are low in Nepal, and they have been declining during the last 20 years. The drop in yields has been most severe in the Mountains followed by the Hills, while yields have slightly increased in the Terai (see Appendix Table A.III.1).

Turning to the Rapti Zone, the detailed picture with respect to area cultivated, production, and yields for major foodgrains and cash crops over the decade 1973/74-1982/83 is given in Appendix Tables A.III.2-7 (one table per district plus one for the Zone as a whole). The table below summarizes trends in area cultivated and yields for paddy, maize, and wheat. Data are from the HMG Ministry of Agriculture.

Trends 1973/74-1982/83

	Paddy	Maize	Wheat
	Area Cultivated		
Hill Districts			
Rukum	+	-	o
Rolpa	-	o	-
Salyan	-	+	+
Pyuthan	-	+	-
Dang District	o	+	+
	Yields		
Hill Districts			
Rukum	-	-	+
Rolpa	-	-	o
Salyan	-	-	+
Pyuthan	-	-	+
Dang District	-	-	+

Note: (+) = rising trend; (-) = declining trend; (o) = no evident trend

In the hill districts, both area cultivated and yield of paddy have been declining. In Dang, paddy area does not seem to have changed, but yield has declined. With regard to maize, area cultivated has been increasing in both the hills and Dang, while yield has been falling in both areas. The area under wheat cultivation in the hills has stayed the same or declined slightly, but wheat yield in the hills has risen. In Dang both area and yield for wheat have been increasing.

C. FOOD BALANCE

In the Rapti Zone, agricultural stagnation and rising population have reduced the per capita supply of foodgrains over the last ten years. This has worsened already serious food shortages in the hills, where cereal consumption is substantially below the minimum nutritional requirement. This is exacerbated by post-harvest food losses on the farm and in processing and distribution.

For this study, food balance calculations have been made for the five districts of the Rapti Zone for each year between 1976/77 and 1982/83. The results appear in Appendix Table A.III.8. The difference per district between annual caloric demand and supply is expressed in terms of both days out of the year and percent of the year. Data and assumptions used in the calculations are presented in Appendix Tables A.III.9-11. The methodology used here has been used often in Nepal by HMG and donor agencies. Food is defined as the caloric value of princpal foodgrains. The minimum daily caloric requirement was assumed to be 2,500 calories in Dang District and 2,700 in the hill districts.

These food balance calculations should be taken as order-of- magnitude indicators, not as exact estimates of the food deficit or surplus. For very precise estimation, one needs data on the actual composition of caloric intake for households in various parts of the Zone, as well as more locally -based standards for minimum nutrition levels. Nevertheless, the figures presented below, based on Rapti district-wise foodgrain production data and their caloric equivalents as well as generally accepted international nutrition standards, do provide a reliable indication of the general magnitude of the food balance and of the relative position of the five districts.

The figures reveal negative signs for the food balance in all the years in all four hill districts of Rapti. Moreover, the negative numbers are quite large. Clearly, the food deficit in the hills is severe. Deficits are about twice as bad in Rukum and Rolpa as in Salyan and Pyuthan. In the former two districts, less than 20 percent of food needs are being met by local production. Over time, the food deficit has been worsening in Rukum, Rolpa, and Pyuthan but improving in Salyan.

In Dang District the food balance has been consistently positive, but the surplus is very small. Dang manages to feed itself and have left over a reserve of a few months. As far as the trend is concerned, the size of surplus in Dang is erratic from year to year. Certainly no rising trend is visible.

Comparing the food balance trends for the hill districts and the Zone as a whole (in days):

	1976	1977	1978	1979	1980	1981	1982
Hills	-216	-231	-228	-251	-230	-230	-228
Rapti	-151	-132	-135	-181	-140	-137	-150

The effect of Dang's surplus is to bring the overall Zone food deficit to a level similar to that of Salyan. The Zone food deficit seems to hover at about 150 days per year.

The figures cited above do not give an indication of the extent to which the food deficit is unequally distributed among socio-economic groups. A recent study produced data which permitted calculation of food deficits by operational land-holding strata for the Rapti Zone; the results are shown in Table III.4. In both the hill districts and Dang District the deficit tends to worsen as land holding size decreases. On average, only households operating more than 20 ropanis (about one hectare), which constitute only about ten percent of households in the Rapti Zone (and two thirds of which are located in Dang), produce more food than they need to consume.

D. INCOME, WEALTH DISTRIBUTION, AND POVERTY

No time series data are available to show that income inequality and poverty in the Rapti Zone have increased. However, there is much indirect and partial evidence that makes this conclusion impossible to avoid. Some of

Table III.4

A COMPARISON OF FOODGRAINS PRODUCTION WITH ANNUAL FAMILY FOOD REQUIREMENTS FOR HILL DISTRICTS AND DANG DISTRICT BY SIZE OF OPERATIONAL LAND HOLDING, 1982-1983

District/Zone	Number of Families	Annual Family Food Requirement (metric tons)	Annual Family Food Production (metric tons)	Annual Production Less Annual Requirement	Average Family Size	Excess of Production Over Requirement Per Capita (metric tons)
Hills Stratum						
I 0 - 4 Ropani	33	1.92	0.57	- 1.35	5.0	- 0.27
II 5 - 10 Ropani	53	2.16	1.59	- 0.57	6.6	- 0.09
III 11 - 20 Ropani	53	2.79	2.52	- 0.27	7.9	- 0.03
IV Above 20 Ropani	49	3.06	4.57	1.61	9.0	0.18
Dang Stratum						
I 0 - 4 Ropani	16	2.73	1.69	- 1.04	9.3	- 0.11
II 5 - 10 Ropani	3	2.48	1.02	- 1.46	8.4	- 0.17
III 11 - 20 Ropani	7	2.38	2.07	- 0.31	8.4	- 0.04
IV Above 20 Ropani	15	4.03	11.74	7.71	10.08	0.71

Source: No Frills Development Consultancy, Report on the Household Production Systems in Kapti Zone, December, 1983, Kathmandu, p. 57, Table 12.

this evidence has been presented in the preceding sections. In this section further clues will be reviewed.

1. Land Ownership

Table III.5 presents data on the distribution of households by size of land holding from the Rapti IRDP Baseline Survey. The data apply to the year 1978. The figures indicate that land ownership is very unequally distributed. While the average farm size in each class in Table III.5 is not known, a couple of numerical examples using reasonable assumptions will illustrate the point. Suppose that in the hills the average sub-marginal to small farm is 0.1 ha. and the average medium to large farm is 1.0 ha. This would mean that in Pyuthan, about eight percent of households owned about 46 percent of the farmland. In Salyan, it would mean that about 16 percent of households owned 65 percent of the farmland. A similar procedure suggests that the land ownership distribution in Dang District is much more unequal than in the hills, something which is often said but for which no hard evidence has been compiled. Assuming that in Dang the average sub-marginal to small farm is 0.1 ha. and the average medium to large farm is 5.0 ha. (as suggested by the data in Table III.5), the result would be that about 15 percent of the households owned 90 percent of the land in 1978.

Other than full ownership, there are basically two forms of land tenancy found in the Rapti Zone. The first one, generally preferred by the tenant, is sharecropping. Under this arrangement, the tenant cultivates the landowner's land, usually receiving certain inputs from the owner such as seed or fertilizer, and is allowed to keep between one third and two thirds of the gross harvest of unhusked grain. The straw may also be divided between tenant and landlord. The proportion of the harvest accruing to the tenant varies from place to place, but no matter how poor the harvest the proportion in principle remains the same. In practice, however, if there is a very poor harvest in a given year, the landlord may forgo collecting his share of the crop. Sometimes tenants are permitted to grow minor crops fully for their own benefit.

The second arrangement is the contract system, in which the tenant is expected to turn in a set amount of grain at harvest time regardless of the total yield. In a bad year the tenant may end up with no grain at all, while in a good year a contract tenant may do better than a sharecropper. Absentee landlords prefer the contract system because they do not have to supervise the division of the harvest, and they are more likely to collect their rent in a bad year.

Under the current land reform law, sharecroppers are theoretically more secure in their land tenancy rights than contract farmers.

Inheritance of land is in most cases patrilineal, from father to son(s). As each generation passes land along, the holdings tend to become more fragmented and scattered. Only purchasing more land or keeping land under the control of one son can keep this process in check.

2. Income Levels, Sources, and Trends

Appendix Tables A.III.12 and A.III.13 provide information on the various sources of income for rural households of the Rapti Zone. The first table

Table III.5

PERCENTAGE DISTRIBUTION OF HOUSEHOLDS BY LAND HOLDINGS AND DISTRICT IN RAPTI ZONE, 1979

Type of Household 1/	Dang		Rolpa		Sallyan		Pyuthan		Rukum	
	No.	%	No.	%	No.	%	No.	%	No.	%
Sub-marginal	13,093	40.99	3,510	12.61	4,334	16.00	7,952	32.05	1,737	10.09
Marginal	9,594	30.04	13,513	48.55	10,812	39.82	9.851	39.70	5,279	30.67
Small	4,505	14.14	7,388	26.54	7,683	28.13	5,076	20.46	7,327	42.84
Medium	2,378	7.45	1,944	6.98	2,994	11.02	1,400	5.64	2,067	12.01
Large	2,370	7.42	1,460	5.25	1,334	4.92	533	2.15	800	4.65
Total	31,940	100.00	27,835	100.00	27,157	100.00	24,812	100.00	17,210	100.00

1/Type of Household	Land Holdings (ha.)	
	Hills	Terai
Sub-marginal	Below 0.001	Below 0.1
Marginal	0.001-0.2036	0.1-1.02
Small	0.2036-0.5090	1.02-2.38
Medium	0.5090-1.0180	2.38-5.10
Large	Above 1.0180	Above 5.10

Landless households are included in Sub-marginal households.
Land owned and not land cultivated is the basis of classification.

Source: APROSC, Report on Rapti Baseline Survey. Main Text, Kathmandu September, 1980. P. 31, Table 2.1.7.

gives data from the Rapti Baseline Survey and applies to 1978. The second table is made up of data from a 1983 household survey (No-Frills Development Consultancy, Report on Household Production Systems in the Rapti Zone).

One important question to examine using these data is: to what extent do households rely on farm income? The answer seems to be: quite a lot. In the 1978 table, the ratio of farm income to total income falls below 0.5 only once, for marginal farms in Rolpa, and is generally around 0.6 to 0.7. In the 1983 table, the same ratio falls below 0.5 only three times, all for stratum I households, which may be explained by the fact that stratum I includes the landless.

Another question is: does the income distribution narrow or widen when non-farm sources of income are added to farm sources? This can be examined by checking the ratio of highest to lowest income from farm and total sources. In the ten independent instances provided by the two tables (each district in a table provides a test), the income distribution always narrows when non-farm sources are added. This indicates that landless people and marginal farmers make proportionately greater use of non-farm sources to bring their incomes up to a survival level.

A comparison of household income estimates from the Baseline Survey and the HPS survey shows that the Baseline survey underestimated incomes substantially. While the two surveys define land-holding strata differently, there is a rough correspondence between Baseline Survey strata small/medium/large and HPS strata II/III/IV respectively. To give one example, then:

Rukum District Annual Household Income

	Farm Income (Rs.)		Total Income (Rs.)	
	Baseline	HPS	Baseline	HPS
Small/II	1,556	9,454	2,146	11,086
Medium/III	2,625	14,246	3,430	16,161
Large/IV	2,911	35,467	4,357	38,085

These large differences in income estimates separated by only five years cannot be explained by growth in incomes and inflation. To check the Rapti income figures, an estimate of national average household income was computed using data on national disposable income from the Ministry of Finance's 1983-84 Economic Survey. Annual average household income for Nepal in 1982/83 was about Rs. 13,600, while for 1978/79 it was about Rs. 9,700. These figures suggest that the HPS survey income estimates are probably reliable, while the Baseline Survey estimates appear to be much too low.

While it is not possible to use the two surveys to see how income levels have changed over time, the data can be used to check whether reliance on farm income has risen or fallen. Across the board, the ratio of farm to total income rises between 1978 and 1983. Again, Rukum District can be used to illustrate:

Rukum
Ratio of Farm to Household Income

	Baseline Survey	HPS Survey
Small/II	0.73	0.85
Medium/III	0.77	0.88
Large/IV	0.67	0.93

The increasing reliance on farm income suggests that income inequality may be growng, since less-wealthy households (as measured by farm size) proportionately earn more income from non-farm sources, as seen earlier. In other words, a greater reliance on farm income has a proportionately greater negative impact on marginal farmers than medium or large farmers.

The data in Appendix Tables A.III.12 and A.III.13 also indicate that income inequality appears to have increased between 1978 and 1983 in some parts of the Rapti Zone. In interpreting the data from the Baseline and HPS surveys, it must be rembered that in the Baseline Survey land tenure strata were based on ownership of land, while in the HPS Survey they were based on operational land holdings. One would expect the distribution of income based on operational holdings to be more equal than that based on ownership. Consider the evidence below for the hill districts of Rapti:

Ratio of Average Large/IV Income to Average Small/II Income

	Farm Income		Total Income	
	Baseline	HPS	Baseline	HPS
Rukum	1.87	3.75	2.03	3.44
Rolpa	1.42	2.70	1.37	2.46
Salyan	2.57	2.26	2.52	2.54
Pyuthan	2.85	2.27	2.21	2.31

Based on the abovementioned difference in how land holding strata are defined, one would expect the HPS ratios to be lower, all other things being held constant. In fact, the ratios fall in only two instances, and then very slightly.

3. Poverty

The National Planning Commission survey of 1977 attempted to determine the proportion of households and population below the poverty line. For that purpose, minimum subsistence levels of expenditure and income were established. These were compared with the actual levels of income and consumption expenditure obtained from the survey for various areas of Nepal.

The regional pattern of the incidence of poverty for 1977 is presented in Appendix Table A.III.14. The figures show the percentage of households and population with incomes and consumption expenditures below minimum subsistence levels. The highest incidence of income and consumption poverty among households, both rural and urban, was found in the Far Western Region, of which the Rapti Zone was then a part. Measured in terms of population, the Far Western Region also had the highest levels of urban consumption poverty and rural income poverty. However, for population the Western region had

the highest incidence of consumption poverty in rural areas and of income poverty in urban areas.

The survey found that in the Far Western Region about 38 percent of rural households were below the poverty line by the minimum consumption approach and about 47 percent by the minimum income approach. Thus the income measure shows a higher percentage of households in the Far Western Region below the poverty line than the consumption measure. Considering that Rapti was probably one of the poorer zones in the region and the high proportions of submarginal, marginal, and small farm households in all five Rapti districts, 47 percent of rural households below the poverty line is more likely to characterize the situation in Rapti in 1977 than 38 percent.

There is no direct evidence that poverty in the Rapti Zone has increased since the late 1970s. But, given the evidence of declining yields, growing food deficit, and greater income inequality, it is likely that poverty has indeed increased. From Table III.6 one sees that in a non-random sample of over 1,000 Rapti households in the early 1980s, only 41 percent had a grain surplus. The actual proportions of grain surplus households in Rapti are much lower than indicated by the figures in Table III.6. This is because the sample in the IDS study excluded the landless and households cultivating less than three ropanis (about 0.15 hectare), who constitute a majority of farm households in the Zone. Also, the IDS survey oversampled from areas with the best market access. Blaikie et al make the following generalizations which seem apt:

> "Wage labouring households . . . represent a group which has not been able to respond to increasing pressures of population on account of inferior access positions--mainly with regard to the possession of land. . . Most of them suffer a particularly severe period of undernourishment just before the harvesting of the maize crop, and malnutrition throughout the year . . .
>
> "<I>t seems inevitable that increasing numbers of <these> households will be forced on to the labour market, and in conditions where support from their own farms will decline and leave them vulnerable to underemployment and the permanent effects of temporary disabilities and illness, causing debt and even sale of existing resources. . . Once a household relies mostly upon labouring, unless it is very lucky indeed, it will always continue to do so and the general demographic trends and feebleness of response by any sector which might be expected to provide large-scale employment ensure that such a household faces an ever-deepening predicament of unemployment and poverty."(3)

4. Potential for Raising Agricultural Income

When one considers the progress that has been achieved in Nepal in technical improvement of agriculture, the trends described above could be mitigated considerably. For a start, a significant improvement in the Zonal food balance would result if yields of foodgrains in Dang District were raised to levels prevailing in the hill districts. According to the data in Table III.3, this would result in a 50 to 100 percent increase in output of foodgrains from Dang, which already accounts for over 50 percent of the Zonal caloric supply of foodgrains.

Table III.6

GRAIN SURPLUS HOUSEHOLDS IN
RAPTI ZONE BY DISTRICT, 1981/82
(Non-Random Sample)

Districts/Zone	Sample Size	Percentage of Households with a Grain Surplus
Rukum	148	66.0
Rolpa	198	48.0
Salyan	196	38.0
Pyuthan	190	30.0
Dang	271	34.0
Rapti Zone	1003	41.0

Note: These figures greatly overstate the actual proportion of grain surplus households. The household sample excluded the landless and households cultivating less than 3 ropanis (0.15 ha) and oversampled from areas with good market access.

Source: Integrated Development Systems, Agricultural Marketing and Price Policy in Rapti Zone and RCUP Areas, Kathmandu, December, 1984. P.90, Table 3.11.A.

The work done on Cropping Systems in Rapti and elsewhere in Nepal indicates that it is feasible to reallocate resources and intensify their utilization so as to raise food output several times over their present low levels. This has been demonstrated in the actual and heterogeneous conditions of the Rapti Zone. To make such improvements at a large scale, the main bottlenecks are 1) insuring that adequate "technological packages" of seeds, fertilizer, pesticide, and technical assistance reach farmers and 2) giving farmers adequate incentives and marketing opportunities for adoption of new technologies to be worthwhile. As argued in Setion F of this chapter, the former is more important in Rapti than the latter.

AID's Cropping Systems Program (CSP), started in 1977, has tested improved agricultural methods at various representative sites across Nepal. Rukum District was one of the cropping systems sites selected. Ratna Nagar, an Inner Terai site, is also of interest here. The CSP has had very encouraging results, as shown in Appendix Table A.III.15. Returns were recorded for over 350 farmers' fields averaging 0.5 to 1.1 hectares, using manual and animal power and combinations of improved seeds, fertilizer, and weed control methods. Marginal benefit cost ratios for the Rukum and Ratna Nagar sites were 10.1 and 9.6 respectively.

A Cropping Systems program has been part of the Rapti IRDP. The results of this program are summarized in a recent report.(4) In the numerous pre-production verification trials conducted, marginal benefit cost ratios ranged from negative up to 20, with wide variations; most were above 3 and less than 15. Yield improvements were roughly as follows: about double in Dang; about 50 percent higher in Salyan; mixed in Rolpa, with some increases as high as 50 to 100 percent; mixed in Pyuthan with a few good increases; about 25 to 50 percent higher in Rukum.

These results are quite encouraging, but there is still a long distance to go from Cropping Systems trials and block production programs to mass-scale implementation. A couple of comments in a recent World Bank report are pertinent:

> "The above examples indicate that several locally tested and economically viable technologies for improving yields are known. These technologies have yet to be delivered economically on a large scale, and, equally important, renewed biologically. These issues should receive high priority. <u>In fact, insufficient and unreliable input supplies have already constrained even the testing and the pilot production activities of the CSP</u>. To ensure successful delivery of the improved technologies, the institutions which handle agricultural inputs in Nepal need to be strengthened thoroughly and immediately. <emphasis added>

> "On the economics, it might be argued that the marginal returns . . . are high only because fertilizer prices are highly subsidized in Nepal (by up to 46 percent). . . <I>t can be shown that even if the fertilizer component of material costs were raised by 46 percent, the MBCRs would still be higher than 3. Furthermore . . . producer prices in Nepal are depressed. Hence, if removal of fertilizer subsidies were accompanied by higher producer prices, the marginal returns to improved practices would remain attractive."(5)

E. COMMODITY PRODUCTION

1. Crops

The main crops produced in the hill districts of the Rapti Zone are maize and wheat (see Table III.7). In 1981/82 these were grown over 38 percent and 25 percent, respectively, of the of the cropped area of the hills. Other widely grown hill crops are paddy (15 percent) and millet (12 percent). Although ginger does not appear in Table III.7 , it is one of the major cash crops of the hills, especially for Salyan and Rukum Districts. Except in Salyan, the distribution of areas among crops did not change significantly in the hills between the mid-1970s and early 1980s. In Salyan there was a marked shift away from paddy and toward wheat.

Crop cultivation in Dang is dominated by paddy, maize, oilseeds (mainly mustard), and wheat, which together accounted for 98.5 of the cultivated area in 1981/82. In 1974/75 about half the cropped area of Dang was occupied by paddy, but in 1981/82 it occupied just over one third. Oilseeds, maize, and wheat increased their shares during the period.

Maize is the major crop of the hills. It is often grown in association with other crops, especially legumes and finger millet.

In the hill districts wheat is mostly grown in valley bottoms and also on terraces irrigated by rain or other sources.

Paddy is the preferred crop and is grown wherever possible. However, conditions in the hills generally are not suitable for paddy cultivation, and Dang District accounts for 78 percent of the total paddy area in the Zone.

Barley is an important crop in Rolpa, Rukum, and Salyan.

Potatoes are grown as a summer crop above 2,000 meters and as a winter crop at lower elevations. Rolpa leads in area of potato cultivation.

Oilseeds, mainly mustard, are a very important cash crop in Dang District. Dang accounts for about 90 percent of the area under oilseed in the Zone.

Ginger is cultivated mainly for export, and the major production areas in the Rapti Zone are Salyan and Rukum Districts.

Most fruit cultivation is for home consumption, but increasing amounts of fruit are being grown for market. Varieties include limes, lemons, bananas, mangoes, oranges, apples, guavas, peaches, pears, jack fruit, and some wild berries.

Many kinds of vegetables, such as onion, cauliflower, cabbage, tomato, radish, lady finger, chili, and broad leaf mustard are grown in kitchen gardens in limited quantities for home consumption.

Near the Musikot Vegetable Seed Farm in Rukum, a significant number of farmers grow vegetables for seed production on a contract basis with the Farm.

Table III.7

PROPORTION OF CROPPED AREA AMONG PRINCIPAL CROPS

IN THE DISTRICTS OF THE RAPTI ZONE, 1974/75 AND 1981/82

(Percentages)

Crops	Rukum		Rolpa		Salyan		Pyuthan		Hill Districts		Dang		Rapti Zone	
	1974/75	1981/82	1974/75	1981/82	1974/75	1981/82	1974/75	1981/82	1974/75	1981/82	1974/75	1981/82	1974/75	1981/82
Paddy	7.8	9.1	7.9	7.0	25.0	17.3	20.9	18.4	18.2	15.1	49.3	36.5	35.5	27.7
Maize	48.6	46.9	43.4	45.3	29.6	27.7	44.1	46.6	39.7	38.3	19.8	24.2	28.6	30.2
Wheat	23.6	25.3	29.1	27.8	18.4	25.7	22.0	21.6	22.1	24.7	13.0	16.1	17.1	19.6
Millet	5.9	5.3	7.4	7.3	17.8	18.5	7.5	7.4	10.8	11.9	0.5	0.5	5.1	5.2
Barley	8.5	8.8	7.0	5.9	4.2	4.3	0.6	1.0	4.1	4.1	0.5	0.4	2.1	1.9
Potato	3.8	3.6	4.8	6.2	2.2	3.2	1.1	1.3	2.5	3.1	0.8	0.6	1.5	1.6
Oilseed	1.8	1.1	0.5	0.5	2.8	3.3	3.8	3.9	2.6	2.8	16.1	21.7	10.1	13.8
Total	100.0	100.0	100.0	100.0	100.0	3.3	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Note: Percentages are averages for three consecutive years, with the middle year used as the base.

Source: HMG, Ministry of Agriculture, Agriculture Statistics of Nepal, 1983

Other income-producing agricultural products grown in the Zone include the cheuri tree, or Indian Butter Tree (madhuca butyracea), from which oil is extracted; medicinal herbs; nigalo, a high altitude bamboo which is used to make woven products; and marijuana.

Raksi, a locally brewed alcoholic beverage made from any of various grains, is an important processed agricultural product. It is especially important as a source of income among the Kham Magar ethnic group. Much of the raksi is sold locally, but there is a large distillery in Devisthan, Pyuthan District, which supplies the liquor to all four hill districts of Rapti.

2. Livestock

In all the districts of the Rapti Zone livestock raising is an integral part of the household economy and farming system. Almost every farm family maintains some animals: cattle, buffalo, sheep, goats, pigs, and poultry. Livestock provide milk, meat, wool, manure (used as fertilizer and cooking fuel), draft power, and, in some cases, transportation. A typical household will keep one pair of bullocks, one or two cows, one buffalo, 2-5 goats, some sheep, and some poultry birds.

Table III.8 presents estimates of the livestock population of the Rapti Zone in 1982/83. Animals are fairly evenly distributed throughout the five districts; however, about 36 percent of all buffaloes are in Rukum District and 30 percent of cows in Rolpa District. This suggests that these two districts are relatively richer in milk-related production. Surplus milk is usually converted into ghee, a high-value, low-bulk commodity which is one of the most important hill exports. Wool and skins are also exported from the Rapti Zone.

3. Volume of Flow of Agricultural Commodities

As seen in Section C of this chapter, the hill districts of Rapti are a food deficit area. Table III.9 presents figures on the food balance in the Zone in terms of metric tons. The hill district deficits are somewhat lower and the Dang District surplus higher in this table than in Appendix Table A.III.8 because of the inclusion here of potatoes. However, the basic food balance pattern remains the same. Rukum and Rolpa have very severe food deficits, while Salyan and Pyuthan produce a much higher--though still negative--proportion of their requirements.

The Nepal Food Corporation (NFC) is responsible for supplying food to food-deficit areas, but its capacity has been far below the level needed, as shown by Table III.10. It is estimated that NFC supplied only 4.5 percent of the tonnage of grain required in 1982/83 to meet the deficit.

Hill residents have had to fulfill most of their requirements for food-grains from private dealers. In many cases farmers are compelled to sell the foodgrains they produce to private dealers soon after harvest in order to raise cash for basic necessities or pay off loans, even though they have to buy foodgrains later in the year. This is one of the reasons why there is a relatively high volume of sales of foodgrains in the hills, as shown in Appendix Table A.III.16, despite the hills being a food deficit area. Another reason for the level of sales in the hills is that in every dis-

Table III.8

ESTIMATED LIVESTOCK POPULATION IN RAPTI ZONE 1982/83

(Thousands)

District	Cows		Buffalos		Draft Animals 1/		Small Animals 2/		Poultry Birds	
	No.	%	No.	%	No.	%	No.	%	No.	%
Rukum	41	(16)	61	(36)	64	(20)	59	(17)	161	(25)
Rolpa	95	(30)	38	(22)	74	(24)	80	(23)	122	(19)
Sallyan	47	(18)	9	(5)	43	(14)	71	(21)	87	(13)
Pyuthan	25	(10)	30	(18)	35	(11)	22	(6)	41	(6)
Hill Districts	208	(80)	138	(81)	216	(69)	232	(67)	411	(64)
Dang	52	(20)	32	(19)	97	(31)	112	(33)	235	(36)
Rapti Zone	260	(100)	170	(100)	313	(100)	344	(100)	646	(100)

1/ Bullocks and, in Dang, male buffalos.

2. Goats, sheep, pigs.

Source: PADCO analysis using data from No Frills, Household Production Systems in Rapti Zone, Kathmandu, 1983, p. 65, Table 15.

Table III.9

FOOD BALANCE IN RAPTI ZONE 1982/83

(Metric Tons Unless Indicated)

District	Estimated Population 1/ (000)	Minimum Subsistence Requirement 2/	Gross Production 3/	Net Production 4/	Consumable Production 5/	Surplus (+) Deficit (-)	Consumable Production as Percentage of Requirement
Rukum	135	25,920	8,700	7,656	5,972	- 19,948	23.0
Rolpa	169	32,448	11,680	10,278	8,017	- 24,431	24.7
Sallyan	152	29,184	39,340	34,619	27,003	- 2,181	92.5
Pyuthan	161	30,912	28,480	25,062	19,548	- 11,364	63.2
Hill Districts	617	118,464	88,200	77,616	60,540	- 57,924	51.1
Dang	293	54,498	112,280	98,806	77,069	+ 22,571	141.4
Rapti Zone	910	172,962	200,480	176,422	137,609	- 35,353	79.6

1/ See Chapter II.

2/ Per capita requirement of food is averaged out to be 0.192 tons for hills and 0.186 tons for Terai. See The World Bank, Nepal: Development Performance and Prospects, December, 1979, p.8, Table I.3.

3/ Includes Cereals and Potatoes.

4/ Assumes seed requirement of 2% and waste of 10% of total production, See The World Bank op.cit. p. 68.

5/ Calculated to be 78% of net production. See The World Bank op.cit. p.68.

Table III.10

NEPAL FOOD CORPORATION SUPPLY IN RELATION TO RAPTI ZONE FOOD DEFICIT, 1982/83

District	Food Deficit (MT) 1/	Supply from NFC (MT) 2/	Supply from NFC as a Percentage of Requirement
Rukum	19,948	350	1.8
Rolpa	24,431	875	3.6
Sallyan	2,181	575	26.4
Pyuthan	11,364	800	7.0
Total Hills	57,924	2,600	4.5

1/ See Table III.9

2/ Source: NFC Zonal Office at Ghorahi.

trict there are a number of large farmers who produce surpluses to sell. This suggests that sales of foodgrains are made mainly within districts.

Sales of poultry and vegetables can safely be assumed to occur within local markets and their flow from one district to another to be negligible. However, a sizable portion of animal products and cash crops are brought down from the hills to Dang District or to Terai market centers.

Rough estimates of sales of agricultural products outside the districts of origin ("exports") appear in Appendix Table A.III.17. Only Dang District exports foodgrains. The hill districts export animal products and cash crops. Rolpa and Pyuthan are the leading animal products exporters, and Salyan and Dang are the leading cash crop exporters. It should be kept in mind, though, that the volumes of these "exports" are extremely low, averaging about Rs. 500 per farm household per year in the hills and about Rs. 1,000 per farm household per year in Dang.

The spatial distribution of commodity flows is treated in Chapter IV.

F. AGRICULTURAL MARKETING AND DISTRIBUTION

1. Marketing Structure

The agricultural marketing structure in the Rapti Zone is not very different from that in the rest of Nepal. In the hills the marketing structure is fragmented, and local supply and demand conditions can vary drastically even within short distances. Dang District has a more structured marketing system owing to its being a food-surplus district and its having easy road transport access.

A recent report has reviewed the agricultural marketing situation in the Rapti Zone and some other districts (Integrated Development Systems, Agricultural Marketing and Price Policy in Rapti Zone and RCUP Areas, USAID/Nepal, December 1984). The reader is referred to this document for useful detailed information. According to the IDS study,

> "In the context of Nepalese agriculture, the connection between proximity to a road or road access and increased surplus disposal of farm poducts is not as direct (nor as immediate) as expected. The road heads are more important as supply points or points of distribution for purchased commodities, including food items as well as agricultural inputs."(6)

Most of the major market centers are situated in the district headquarters. In Dang there are four major market centers: Ghorahi, Tulsipur, Lamahi, and Bhaluwang. Before the opening of the East-West Highway, Koilabas was an entrepot for trade with India, but it has now lost this function almost completely.

In the hill districts the major market centers are retail bazaars. Some serve as transshipment points, but wholesale marketing is limited. Such centers are Devistan, Bijuwar, and Pyuthan Khalanga in Pyuthan; Salyan Khalanga in Salyan; Sulichour, Holeri, and Libang in Rolpa; and Musikot, Rulumkot, and Chaurjhari in Rukum.

In eastern Nepal, periodic markets called "hat bazaars" are common. In western Nepal, and in the Rapti Zone, there are almost no hat bazaars. However, other less regularized indigenous marketing forms exist. One is the traveling shop, in which one or two people carry baskets full of basic household goods around to sell to villagers. Another opportunity for marketing occurs at "melas", fairs held on festival days. These usually combine economic, social, and religious functions at specific locations.

As most rural people are subsistence farmers, they do not have experience with regular marketing procedures such as the need, when producing vegetables and fruits, to supply merchants almost every day with fresh produce. The normal pattern of villagers is to go to market only after they have a full load and/or when they need cash. Another concept that is not widely understood is staggered planting, to prevent flooding the market with a lot of produce to sell at once.

2. Pricing and Marketing

The marketing structure has a direct bearing on the food pricing structure, mainly for foodgrains which consitute the bulk of marketed agricultural output. As noted in the previous section, the hill districts of the Rapti Zone are food deficit areas. However, to fulfill immediate cash needs, many farmers sell grain right after harvest even though they will have to buy grain again later. This way, marketing occurs twice; first to meet cash needs and then to meet food needs. The foodgran market is basically oligopsonistic (few buyers). In each area there are a small number of large traders who are able to buy large stocks of agricultural commodities soon after harvest at low prices (sometimes even lower than the support price set by the government--many farmers must sell to meet their various obligations at any price). Later in the year, these traders sell the grain at substantially higher prices. This way the profits from grain sales accrue almost entirely to the large traders, who are the only ones able to finance these "buffer stock" operations.

Because the dominant pattern of crop sales in the hills is highly localized and most sales are made shortly after harvest at distress prices, the hills are characterized by a fragmented, irregular market in which prices are not determined in relation to a common marketing network. Fragmentation of markets means that the effectiveness of a national or even regional price policy will be severely limited. Official efforts to set higher producer prices may filter only marginally to the actual producers.

Foodgrain prices in the Terai appear to have been much influenced by the bordering markets of India. As one study notes,

> "In any normal production year, a supply glut develops in the Terai, especially during the post-harvest season when market arrivals, buttressed by 'distress' sales of small farmers, reach a peak. Export demand, however, is readily forthcoming, particularly from the food deficit Indian states of West Bengal and Bihar and pockets of Uttar Pradesh, where foodgrain prices are usually much higher than in the Terai. This price differential attacts a movement of grain from the Terai into India and prices in the Terai tend to approach those in the bordering Indian markets."(7)

This phenomenon undoubtedly diverts some of Dang District's surplus grain production away from the hill districts of the Rapti Zone.

Agricultural pricing policy in Nepal has been oriented mainly toward maintaining low and stable food prices for consumers. Producer price policy has been directed at subsidizing inputs and, secondarily, fixing minimum support prices for major food grains and cash crops.

Even with market prices that have tended to be higher than minimum support prices, it is not clear that price policy has provided effective incentives to farmers. Also, local levies and restrictions on rice movements imposed by panchayats have tended to reduce the farmgate price. While data on producer margins in the Rapti Zone were not available for this study, some figures for other areas, presented in Appendix Table A.III.18, should be considered representative. The declining margins for paddy and wheat may account significantly for stagnant output observed in Rapti over the years.

Cash crops are more likely to enter into a channelized market. Though still facing an oligopsonistic market, cash crop producers enjoy a bit more competition than food grain producers and hence are in a better position to bargain for more favorable prices. It should be noted, however, that foodgrain producers are also the cash crop producers in most areas. The allocation of land between foodgrains and cash crops is determined and limited by various factors, not the least of which is the tenancy status of the farmer. Sharecroppers and contract farmers are generally obligated to produce foodgrains.

An empirical assessment of the impact of National Food Corporation distribution on prices and producer incentives has not been found. But, a significant adverse effect appears unlikely due to the very small fraction of food requirements that are met by NFC (see Chapter IV).

3. Marketing and Distribution Channels

The hills and the Terai have different marketing systems. According to the IDS marketing study,

> "It is customary to distinguish three tiers in the food marketing system in Nepal's Terai. This same structure can be assumed to operate in Dang. The three tiers are (i) primary level sales by the producers to local shopkeepers/merchants, itinerant traders, or agents; direct sales to consumers are also made in the local rural markets . . . (ii) the secondary market where millowners and wholesalers purchase from the agents involved in the primary market; some direct purchases from large producers are also made; (iii) the final market channel which distributes the processed grain (e.g. rice, flour, etc.) through wholesalers and retailers to final consumers (including the government and export shipment)".(8)

Foodgrain trading channels in the hills are simpler. Because of a lack of traditional markets and constraints on accessibility, non-local traders are few. The fortuitous grain surpluses are often sold directly by producers who carry them to the nearest market or down to the Terai for sale during their seasonal migration. Wholesale supply channels in the hills are limi-

ted. Most of the grain goes to the hills through retailers who bear their own (high) transportation costs. Some of the grain moves to the hills through return trips of traditional seasonal migrants who go down to the Terai with items such as woolen goods, bamboo products, or medicinal herbs. A very few food surplus households in the hills sell directly to persons from other villages who come specifically to purchase grain.

Quoting again from the IDS marketing study,

> "Marketing of livestock products from the hills is even less structured. Some perishable items such as milk or meat are sold locally. Most of the milk surplus is, however, turned into ghee which is then sold over long distances by the producers themselves.
>
> ". . . oilseeds and dried ginger are important cash crops that enter the marketing network in Rapti. Oilseeds are important in Dang only. There is no specific information about the marketing channels for oilseeds, but one can assume that it follows the same pattern of food crops. Due to the limited oil-pressing capacity in Dang or the neighboring districts, oilseeds are exported to India while oil is imported. . . Information on the dry ginger trade is also limited. It is completely export oriented. . . One can assume that the ginger trade parallels that of export-oriented livestock products like ghee."(9)

The Nepal Food Corporation (NFC) and the Ministry of Agriculture's Food and Agricultural Marketing Services Divsion (FAMSD) are the two government entities involved in agricultural marketing. NFC distributes foodgrains to food-deficit areas. FASMD collects price information and analyzes trade patterns. It is also responsible for establishing wholesale markets in the hills, urban public markets, grading standards, and public slaughter houses. Regarding the Sajha cooperatives, the World Bank has observed, "Under present policies the purchase of surplus grain production is the function of Sajha. However, it would appear to place a burden on Sajha which it is not currently capable of fulfilling, particularly since the demands on manpower and expertise are beyond the resources of most societies."(10)

Nepal does not produce any chemical fertilizers and must import all of its requirement. Fertilizer distribution and marketing is handled by the Agricultural Inputs Corporation (AIC). The private sector is not permitted to participate in fertilizer importation. In most cases AIC distributes up to district centers only. From there it relies on Sajhas to retail its fertilizer. In the Rapti Zone, Tusipur and Lamahi in Dang and Chaurjhari in Rukum also serve as AIC distribution points.

In Rapti, AIC has a very limited dealer network (see Appendix Table A.III.19). Out of a total of 32 outlets, 14, all Sajhas, are in Dang. Of the 18 outlets in the hills, nine are Sajhas and nine are private dealers. Eight of the private dealers are in Rolpa; they are operating under a special program (see Chapter V).

4. Marketing Problems and Potential Improvements

In both Dang District and the hills agricultural marketing is hampered by poor marketing information, inadequate storage, and the lack of a standar-

dized system of measurement and grading. Lack of formal sector credit also contributes. In most cases small farmers borrow money from traders or moneylenders against the standing crop and are under obligation to sell the produce to the lender at a predetermined price. In such cases the trader pre-empts the farmer's stock before it arrives in the market at a price even lower than the prevailing post-harvest price. These small farmers have no say in the market. Also, markets are too few and too distant for many of the farmers who want to sell their products in a market. This is the situation in almost all the hill districts. Dang is in a relatively better position.

The IDS marketing study contains several very pertinent conclusions and recommendations. The key finding of the study is that marketing of output is less of a problem than low production stemming from insufficient inputs. As the study points out,

> ". . . agricultural growth and increases in rural incomes within Rapti Zone and the RCUP areas are more efficiently achieved by concentrating on agricultural investments which directly increase the quanity and quality of agricultural inputs. Major investments in marketing infrastructure and innovations in price and marketing policies logically follow after, and not precede, a sustained effort to increase production <above subsistence levels> . . . through . . . expanding access to and adoption of modern inputs and cultivation techniques."(11)

The IDS study's other key recommendations will be quoted here:

> "Focus on technological improvement in the production of the main food crops--paddy, maize, millet--particularly among small farmers. Extra production in food crops can be locally absorbed through extra consumption over the short run in both Rapti and RCUP areas, without recourse to external or inter-regional markets.
>
> "Agricultural investments and programmes designed for a distinct regional pattern of production and specialization with inter-regional trade (e.g. livestock specialization in northern Rapti. . .) are not advisable. Specialized production cannot be supported by local demand and transport costs are and will remain inordinately high.
>
> "Transportation should be improved from the point of view of facilitating local intra-regional marketing and trade. Local market integration can be improved by small scale investments on the main trail networks instead of large scale investments for road construction. <emphasis added>
>
> "Programmes designed to increase off-farm employment will have a favourable impact on food production by stimulating local effective demand.
>
> "Increasing the rate of adoption of modern inputs is critical. The study finds that local availability is the chief constraint to adoption. <The public sector distribution> network is not effective and probably cannot handle increased flows even if revamped. Alternative channels of distribution, including private sector responsibilities, must be explored and adopted.

"Discriminatory price and marketing policies which apply to specific targeted groups of producers are not advised. Leakages abound, and subsequent distortions occur in other sectors and activities.

"High seasonal price fluctuation is a critical problem. Apart from the effect on production, price variability is undesirable from a welfare point of view because small-scale producers are sellers when prices are low (in the after-harvest period) and buyers when prices are higher. Large-scale buffer-stocking operations are not feasible, but efforts should be made to increase on-site storage of grain through modern but cost-effective methods to improve the holding cacacity of the producers. <emphasis added>

"A large scale organized effort must be mounted for the collection and dissemination of agricultural producer prices."(12)

In line with the above, two additional recommendations may be made. First, more widespread availability of institutional credit may improve the marketing situation for some farmers by enabling them to wait for better prices (assuming they have storage) rather than selling immediately after harvest to repay debts to traders or patrons.

Second, the extremely high AIC subsidies for transportation of inputs into the hills should be reduced or eliminated; inputs should be made available from two or three large central warehouses mainly in Dang District; and farmers, either individually or as groups, should be encouraged to come to them to obtain inputs. The funds formerly used for transportation subsidies could be used to subsidize input prices and intensify other production-stimulating activities (distribution of seeds, tools, etc.).

G. LABOR FORCE AND EMPLOYMENT

1. Occupational Structure

At the national level, the percentage of the economically active population engaged in agriculture has hardly changed since 1950, being 94 percent in that year and 93 percent in 1979/80 (see Appendix Table A.III.20). The percentage in manufacturing has remained constant also at a very low two percent or so. The percentage in services stood at four to five percent in 1950, fell to about 3.5 percent in the next two decades, and in the most recent estimates (1979/80) rose to five percent.

Given this national pattern, it is hardly surprising that the occupational distribution of economically active population in the Rapti Zone is almost wholly rural/farm oriented (Appendix Table A.III.21). In 1981, 96 percent of Rapti's labor force was classified as farm workers, compared to 91 percent for the Kingdom as a whole. In terms of sectoral distribution of economically active population, the same percentages apply: 96 percent of Rapti's workers were in agriculture in 1981. Among sectors, commerce and service workers are concentrated in Dang District. Of the approximately 3,000 commerce workers in 1981, 2,000 were in Dang. Of the 6,000 service workers, 3,000 were in Dang. The occupational data also show that produc-

tion/labor workers, those most associated with industry, also predominate in Dang, with about 2,000 of the 3,500 such workers in 1981.

The 1977 NPC survey also produced data showing that about six percent of the labor force in the Far Western Development Region was unemployed (Appendix Table A.III.22). Actually, unemployment statistics mean very little. It is when one turns to underemployment (Appendix Table A.III.23) that the startling magnitude of the problem becomes apparent. In the Far Western Development Region male rural workers were underemployed 61 percent of the time and female workers 63 percent. The male underemployment rate in the FWDR was the highest of the four regions; the female rate was the lowest.

2. Labor Force Projections

Population projections for the Rapti Zone by district have been made by the Central Bureau of Statistics. These, together with information on trends in participation rates, made it possible to estimate increases in the labor force by district for various periods under alternative assumptions of population growth. Appendix Table A.III.24 gives a summary of these projections (Appendix Tables A.III.25-30 provide more detailed data). It must be kept in mind that these projections are probably overestimates, as they do not take permanent migration into account. As the next section of this chapter shows, permanent migration is a major factor in the economics of the Rapti Zone.

There is a high degree of consistency among the hill districts of Rapti with respect to the range of possible labor force growth:

Hill District Potential Labor Force Growth (thousands)

1981-1996	Rukum	Rolpa	Salyan	Pyuthan
Range	17-29	18-31	18-30	16-29
Midpoint	23	24.5	24	22.5

Source: Appendix Table A.III.24

There is a sharp contrast between the hill districts and Dang District in the range of potential labor force increase. This partially indicates the differing intensity of pressure on the two areas to absorb the increase:

Rapti Potential Labor Force Growth (thousands)

	1981-86		1981-96	
Area	Range	Midpoint	Range	Midpoint
Hills	29-37	33	69-119	94
Dang	13-17	15	36-59	47.5
Rapti	41-52	46.5	103-177	140

Source: Appendix Table A.III.24

If one takes into consideration the fact that between 1971 and 1981 nearly 50,000 people migrated permanently from the five Rapti hill districts to Dang District (see next section), the labor absorption situation becomes

quite stark. Assuming a continuation of past migration trends, the majority of potential labor force growth for the next decade in the hills is likely to disappear, and the pressure on Dang will shoot up much higher.

The magnitude of the likely growth in the labor force cannot be accomodated by either the services or the manufacturing sectors. These sectors are presently so small that even an extraordinary performance by them with respect to output and employment growth would absorb but a small fraction of the new job-seekers. The real issue is whether the agricultural and rural sectors will absorb the increase in a productive way or as the residual source of employment. There is little doubt, however, that the rural sector in the Rapti Zone is already carrying a substantial amount of underemployment.

3. Traditional Labor Patterns

Outside of the major bazaar settlements there is very little full-time non-farm employment except among occupational castes (tailors, leatherworkers, blacksmiths, and the like). However, most people from these castes also engage in some agricultural labor or small-scale farming. A large percentage of the rural adult population performs seasonal off-farm labor. Some go to the Terai, others to India. Others work in portering or construction of roads or buildings. None of this labor is available all year long, however. During the rainy season virtually all all available labor is engaged in agriculture. As a result, it is sometimes difficult to operate an industry throughout the year. Because of the social, cultural, and economic importance of land itself, coupled with the subsistence nature of the rural economy, the farms of rural people's families take precedence over other jobs.

During the peak agricultural work season, every family must rely on extra-household labor. While wealthier and landowning families can afford to hire labor, small farmers cannot. The exchange labor system exists to meet this need. Under this system, one household will lend laborers and/or bullocks to another household for a certain period of time; this labor must then be reciprocated. In this way no wage is paid. Food must be provided to the exhange workers by the receiving family.

It becomes apparent that under such conditions a large family is an extremely valuable asset. The side effect, of course, is high population growth. Large families also make it possible, when the household is seasonally low on food, for one or more members to leave to earn income elsewhere and bring money back.

Local works such as bridges, irrigation canals, trail improvements, and public buildings used to be built mainly through voluntary labor. During the slack agricultural season each household would provide a certain number of days of labor for whatever project the village leaders had chosen. The arrival of development projects has meant that people in many areas are now reluctant to contribute volunteer labor since project funds can now provide monetary compensation for at least some of the labor performed. Magar villages are are in general more willing to contribute volunteer labor than villages with a caste Hindu population. The Tharus of Dang District have also contributed a good deal of labor. People in the wealthier and more

accessible areas are geneally more difficult to mobilize without compensation.

4. Lack of Skills

It is generally recognized that Nepalese workers are ill-equipped to compete with Indian workers for non-farm, semi-skilled, and skilled jobs. According to data presented at a seminar last year (Workshop on Manpower Development for Urban Jobs, Seminar on Strategies for Urban Development), skilled labor currently accounts for only seven to ten percent of Nepal's labor force. Despite the existence of laws requiring the training of Nepalese labor, establishments using skilled labor employ up to 70 percent foreign workers. To some extent the problem stems from inedequate primary education, especially in rural areas.

5. Observations

A widening gap between the supply and demand for labor in agriculture will bring about declining real wages. Wages are an important source of income for small-farm households. The number of landless laborers may increase both absolutely and as a proportion of the agricultural population as families owning a small amount of land are forced to sell it. Even if land sales do not lead to landlessness, they nevertheless make the distribution of land less equal.

Given these constraints, the following opportunities must be taken advantage of to the greatest extent possible:

- Opening up uncultivated arable land in Dang (see Chapter II) to farming.

- Greater integration and intensification of crop, livestock, and horticultural production in the hills.

- Creating a truly effective and large-scale program to provide training, technical assistance, and credit for small-scale industries catering to basic needs. The training must be tailored to the goods and services for which markets exist locally.

- Skill training programs urgently need to be improved and expanded. Training should focus on construction and building trades (carpentry, masonry, plastering, etc.), mechanical trades (machining, electricity, plumbing, repair, etc.), and services (transportation, hotel, tourism, food, sanitation, hygiene, etc.). Trainees from the Rapti Zone could be sent in groups to strengthened existing training centers in the major Terai cities (new training centers should not necessarily be built in Rapti).

H. MIGRATION

Migration is treated as part of the Rapti Zone's economic situation because labor is one of the chief exports of the Zone, especially of the four hill districts. Hill district households in the Rapti Zone have responded to a deteriorating situation by various forms of migration: seasonal migration

to Dang District and to India for agricultural labor; and permanent migration to Dang, other parts of Nepal, and India.

1. Seasonal Migration

The Rapti Baseline Survey (1978) is the only direct source of data on migration for the Zone (other than indirect calculations based on Census data; see below) and is the basis for the following discussion of seasonal migration.

Characterizing seasonal migrants by sex shows a predominantly male component: 72 percent of seasonally migrating people in Rapti were men in 1978. The proportion of males is fairly constant across the five districts, the range being 60 percent in Salyan to 81 percent in Dang.

The characterization of seasonal migration by destination is difficult because a large number of respondents in the Baseline Survey (37.4 percent) were unable or unwilling to disclose their destinations. It is apparent, however, that locations outside the Zone draw the bulk of Rapti's seasonal migrants and that within this category international destinations predominate.

Spatial patterns of seasonal migration assume three major forms: within the Zone, between the Zone and the rest of Nepal, and to other countries (overwhelmingly India). The first of these accounted for just over one-tenth of responses in the Baseline Survey. Dang District received the majority of intra-zone migrants. These were mainly landless and small landholders in search of daily wage labor.

The second major pattern, seasonal migration between the Zone and other places in Nepal, accounted for 11.7 percent of responses in the Baseline Survey. Kathmandu and urban Terai destinations received the majority of these migrants. Much of this flow may accounted for by members of large landholding families from Dang district who go to the towns for education and social purposes.

Seasonal migration to international destinations was the most significant category in the Baseline Survey (40.3 percent of respondents). Almost all of this migration was to India. The bulk of the hill people migrating seasonally to India were in search of work of an "unspecified nature".

2. Permanent Migration

The significance of migration for Terai population growth in Nepal is substantial and increasing. In 1971, 15.5 percent of the Terai's total population consisted of in-migrants; by 1981 the percentage had risen to 38.5. (This and the conclusions that follow are taken from Task Force on Migration, National Commission on Population, Internal and International Migration in Nepal, August 1983.)

Two major flows dominate: 1) north to south, essentially internal migration from the hills, and 2) south to north, essentially international in-migration from India. The underlying cause of the north-to-south migration is regional disparity in resources and development opportunities in the hills.

Migration to the Terai (both internal and international) has had a major urban component: 41.5 percent of all migrants went to urban areas in 1981.

Nepalese permanent migrants are generally from farm backgrounds and unskilled. Indian migrants tend to possess entrepreneurial and service skills which are in demand in the Terai towns. Nepalese migrants are at a distinct disadvantage in the urban job markets where they have to compete with Indians (see previous section on labor force).

Permanent migrants to the Terai tend to bring their families; thus, characterizing them by sex is of no consequence since theirs is esentially a household demographic profile which differs little from the mean.

Table III.11, in addition to showing 1971-81 population figures for the five districts of the Rapti Zone, also presents estimates of net migration during the decade using the national growth rate method. This is a crude but useful method. For a given geographic subdivision, a rate of population growth greater than the national average is interpreted as in-migration, and a rate lower than the national average as out-migration. Estimates of the amount of net migration can be computed as shown in Table III.11. The method yields net migration estimates for each district on the assumption that rates of natural increase and immigration from abroad are the same for all parts of the country.

The table shows that between 1971 and 1981 about 102,000 people left the hill districts of the Rapti Zone permanently. Of these, 48,000 left for Dang District and 54,000 left for other parts of Nepal.

I. CREDIT

Before examining some data on credit flows in the Rapti Zone, it is worthwhile to cite a few general facts about financial markets in Nepal to put the information in context. For a good treatment of Nepalese financial markets, the reader is referred to W.E. James, Domestic Resource Mobilization Through Financial Development, Nepal, Asian Development Bank, 1984, from which this section draws.

The above report states,

> "The absolute size of the financial sector in Nepal, as indicated by the ratio of total assets to GDP, is very small, coming to only 14.6 percent in 1974 and 26 percent in 1979. Though these figures indicate that the financial system has been growing at a higher rate than overall economic activity, it is still comparatively tiny (in Bangladesh, for example, the ratio was more than double that of Nepal).
>
> "The most striking feature of the existing financial institutional structure in Nepal is the absolute predominance of the government. Aside from the Nepal Bank Ltd., which is 'only' 51 percent government-owned, all the other institutions were directly created by the government and are almost wholly government-owned. There is a sharp bifurcation of Nepal's financial system between the heavily-regulated, government-controlled financial institutions and the largely unregulated, private informal sector.

Table III.11

ESTIMATE OF NET MIGRATION, 1971-1981, BY THE NATIONAL GROWTH RATE METHOD FOR NEPAL BY DISTRICTS IN THE RAPTI ZONE

	Population		Population Change 1971-1981		Estimated Net Migration		
	1981 (1)	1971 (2)	Amount (3)	Average Annual Rate of Growth (4)	Rate (5)	Difference in Rate (6)	Amount (7)
Nepal Total	15,020,451	11,555,983	3,464,468	2.66	0.299799	-	-
District/Zone							
Rukum	132,267	107,253 1/	25,014	2.12	0.233224	- 0.066575	- 7,140
Rolpa	169,379	162,955	6,424	0.39	0.039422	- 0.260377	- 42,430
Sallyan	151,569	141,457	10,112	0.69	0.071485	- 0.228314	- 32,297
Pyuthan	157,863	137,338	20,525	1.40	0.149449	- 0.150350	- 20,649
Dang	266,247	167,820	98,427	4.72	0.586503	0.286704	48,115
Rapti Zone	877,325	716,823	160,502	2.04	0.223907	- 0.075892	- 54,401

1/ This figure (and only this figure) was revised from 96,243 based on analyses done at U.S.AID Nepal.

Note: Col. (3) = (1) - (2); Col. (5) = (3) ÷ (2); Col. (6) = district (Zonal) rate in Col. (5) minus national rate; Col. (7) = (2) x (6).

Source: Population Censuses of 1981, 1971 Central Bureau of Statistics; revised figures.

"Most of household credit needs, especially in rural areas, are met by private sector 'financiers'--money lenders, extended family or acquaintances, agricultural traders and merchants, and the class of landowners. The 'Agricultural Credit Review Survey' commissioned by NRB <Nepal Rastra Bank> in 1976/77 reported that 76 percent of the rural households that has borrowed did so from informal sector lenders. In terms of credit amounts in rupee terms, the private informal sector supplied over 50 percent in 1976/77."(13)

Data from various sources indicate that formal sector credit for agriculture has increased substantially in absolute terms over the last 15 years. However, this expansion has not been matched by increased agricultural output. A study cited by James carried out in one district in Nepal found that the amount of formal sector credit was positively associated with farmers' net incomes, but not associated at all with the adoption of new methods or inputs.

Interest rates in the informal sector tend to be higher than those in the formal sector, with rates charged by moneylenders, merchants, and traders especially high. Data collected for the Rapti IRDP Baseline Survey indicate that informal sector interest rates are about 50 percent higher in the hill districts than in Dang.

The reliance of local people on moneylenders and/or landlords for credit has as much to do with social and cultural factors as financial ones. For one thing, the paperwork involved in obtaining a loan from an official source is often beyond the capacity of usually illiterate small farmers. Second, informal credit is obtained from persons well-known to the farmer and is often based on long-standing patron-client relationships (which patrons encourage). Third, informal credit is relatively easy to obtain, schedules are more flexible, and it is possible to obtain loans in kind (grain), which are sometimes needed more than cash. Fourth, traditionally the landlord or patron was the only security available to peasants in times of need; to bypass this link runs the risk of severing these ties, including loss of tenancy rights on the landlord's land. Fifth, informal sources are willing to provide loans for special social events such as weddings, something official sources do not do. Sixth, loans from landlords can often be paid off by performing labor in lieu of paying in money or in kind; labor is the one thing the poor always have available.

Table III.12 shows the amount of credit provided by the three major institutional lenders of Nepal in the Rapti Zone between 1981 and 1984. The total amount of credit has grown substantially, with the greatest share of the increase attributable to the Agricultural Development Bank of Nepal. ADB/N loan volume grew in the Zone from Rs. 5 million in 1981 to Rs. 16 million in 1984. Total credit in the Zone grew from Rs. 30 million in 1981 to Rs. 58 million in 1984. Lending expansion by the ADB/N and the Nepal Bank Ltd. has been significant in all five districts. While the Nepal Bank continues to be the dominant institutional lender in the Zone (61 percent of the total in 1984), its share has been falling, and that of the ADB/N increasing.

The volume of ADB/N lending in the Rapti Zone over the last four years is shown in Appendix Table A.III.31. The figures are broken down by Small

Table III.12

AMOUNT OF CREDIT PROVIDED
BY MAJOR FINANCIAL INSTITUTIONS IN RAPTI ZONE, 1981 - 84
(Thousands of Current Rs.)

District	2038 1981	2039 1982	2040 1983	2041 1984
Dang				
ADB/N	2,923	8,004	8,775	9,612
Nepal Bank	7,619	8,301	7,389	10,227
R.B. Bank	2,304	2,340	2,936	5,344
Total	12,846	18,645	19,100	25,183
Percent of Zone	(43.5)	(45.8)	(46.7)	(43.8)
Pyuthan[1/]				
ADB/N	911	1,395	1,295	1,842
Nepal Bank	7,084	8,158	7,255	10,945
Total	7,995	9,553	8,550	12,787
Percent of Zone	(27.0)	(23.4)	(20.9)	(22.2)
Rolpa				
ADB/N	406	1,160	945	1,389
Nepal Bank	4,125	5,496	5,821	7,143
R.B. Bank	-	-	203	814
Total	4,531	6,656	6,969	9,346
Percent of Zone	(15.3)	(16.3)	(17.0)	(16.2)
Salyan[1/]				
ADB/N	675	986	1,183	2,282
Nepal Bank	1,160	1,408	1,414	2,210
Total	1,835	2,394	2,597	4,492
Percent of Zone	(6.2)	(5.9)	(6.4)	(7.8)

(Continued....)

	2038 1981		2039 1982		2040 1983		2041 1984	
Rukum								
ADB/N	172		357		655		1,223	
Nepal Bank	2,174		3,128		3,011		4,364	
R.B. Bank	-		-		-		128	
Total	2,346		3,485		3,666		5,715	
Percent of Zone	(7.9)		(8.6)		(9.0)		(9.9)	
Rapti Zone		%		%		%		%
ADB/N	5,087	17.2	11,902	29.2	12,853	31.4	16,348	28.4
Nepal Bank	22,162	75.0	26,491	65.0	24,890	60.9	34,889	60.7
R.B. Bank	2,304	7.8	2,340	5.8	3,139	7.7	6,286	10.9
Total Zone	29,553	100.0	40,733	100.0	40,882	100.0	57,523	100.0

1/ No lending by R.B. Bank.

Abbreviations: ADB/N = Agricultural Development Bank of Nepal
Nepal Bank = Nepal Bank Limited
R.B. Bank = Rastriya Banijya Bank

Source: The cited institutions.

Farmer Development Program and all other lending. In the Zone overall, the volume of lending through the SFDP increased 10-fold between 1981/82 and 1984/85, from Rs. 392 thousand to Rs. 3,974 thousand. In the hill districts there was a sharp increase in 1982/83 and 1983/84 in the share of loans going to the SFDP. But, 1984/85 shows a significant decline from the previous year's levels in the hills. In Dang District, the SFDP percentage has remained much lower but on a rising trend.

Appendix Table A.III.32 presents a breakdown of total ADB/N lending in the Zone by type of loan. Production loans account for the highest share of lending--about one third of the total. Livestock lending is the second most important in terms of volume, and agro and cottage industry is the third. Together, these three types accounted for almost three quarters of the total volume of ADB/N lending in 1984/85. The fastest-growing lending areas have been agricultural inputs and marketing, farm mechnization, and irrigation.

Appendix Table A.III.33 gives the same data as the previous table, but only for the Small Farmer Development Program. By far the dominant SFDP loan type is livestock, which accounts for half the volume of lending. The SFDP groups in Rapti are particularly keen on procuring female buffaloes, which enhance income through the sale of milk and ghee. Other significant loan types for SFDP groups are farm mechanization, production, and agro and cottage industry.

As of March 1985 there were 378 Small Farmer Development Program groups in the Rapti Zone, with a total membership of 3,821. This represents about three percent of the farm households (assuming no household has more than one SFDP member) in the Zone. Rapti accounts for about 10 percent of the total number of groups and 11 percent of the total membership in Nepal, which is higher than its share of national population (six percent). Rapti has 64 percent of the groups and 67 percent of the members in the Mid-Western Development Region.

The district-wise distribution of SFDP groups and members is as follows:

	Number of SFDP Groups	Number of SFDP Members
Dang	92	905
Salyan	86	698
Rukum	69	706
Pyuthan	68	746
Rolpa	63	766
Total	378	3,821

Female membership is about 6.5 percent of the total. With the exception of Salyan, there is substantially more female participation in the hill districts than in Dang.

J. PUBLIC EXPENDITURE PATTERNS

The study team was able to obtain time series data on actual public expenditures by district in the Rapti Zone for every economic and social sector except health. These data were obtained directly from the funding agencies: line ministries and donors. In all cases the data were examined in consultation with agency financial personnel to make sure that they were complete and covered actual expenditures, not budget targets.

The expenditure data give a picture of spending priorities and trends. The data presented here are total expenditures; time did not permit a disaggregation of development vs. regular (or program vs. operating) expenditures. In many cases, such a disaggregation appeared difficult to make, in part because the criteria for differentiating expenditure categories vary from sector to sector and between HMG and donor-funded programs. Given sufficient time, an analysis of program/development vs. regular/operating expend-itures would be worthwhile, if only for certain sectors.

Table III.13 presents actual yearly public economic and social expenditures in the Rapti Zone in current Rupees. Two important expenditure categories are missing because data could not be obtained in time: the health sector and the expenditures on the East-West Highway in Dang District. Even without the latter, the dominance of road expenditures in Table III.13 stands out vividly. The World Bank, AID, and HMG have been financing road construction in the Zone, and these projects have accounted for between 30 and 60 percent of all economic/social spending over the last four years. If the East-West Highway were added, the proportion dedicated to roads would totally dwarf everything else; however this would be somewhat misleading because the East-West Highway benefits the entire nation, especially the Midwestern and Far Western Regions, not just the Rapti Zone.

The second largest expenditure category by a wide margin is drinking water. Four different sources have been financing drinking water schemes in the Zone: the Rapti IRDP, UNICEF/HMG, the HMG Department of Water Supply and Sewerage, and MPLD grants-in-aid. Drinking water expenditures have grown considerably, to the point where they accounted for over 20 percent of all economic/ social spending in 1983/84.

The other 10 sectors in Table III.13 have shares of total public spending ranging from less than one percent to six percent. There has been an "evening out" of expenditure shares over the four-year period, with agriculture, livestock, forestry, and drinking water gaining somewhat larger shares and medium irrigation, communications/postal, and other small works reducing their shares.

Cottage industry, soil conservation, forestry, and education are notable for the small proportions of total public expenditures they have.

The trend of public expenditures in real terms (constant Rupees) is shown in Appendix Table A.III.34. Between 1980/81 and 1983/84 real public economic and social expenditures (not counting health) increased by 131 percent overall, thanks basically to the Rapti IRDP. It is interesting to note that real growth in expenditures has declined markedly each year: growth was 84 percent in 1981/82 when the Rapti IRDP was initiated; 21 percent in 1982/83; and barely four percent in 1983/84. Real expenditures actually

Table III.13

ACTUAL PUBLIC EXPENDITURES IN RAPTI ZONE FOR ECONOMIC AND SOCIAL SECTORS

1980/81 - 1983/84

(Thousands of Current Rs.)

	1980/81		1981/82		1982/83		1983/84	
	Expenditure	Percent	Expenditure	Percent	Expenditure	Percent	Expenditure	Percent
Agriculture 1/	380	1.6	2,692	5.7	3,441	5.3	3,287	4.6
Livestock	258	1.1	1,222	2.6	2,499	3.8	2,573	3.6
Medium Irrigation	2,929	12.5	3,792	8.0	1,892	2.9	4,313	6.0
Cottage Industry	202	0.9	259	0.5	390	0.6	449	0.6
Forestry	52	0.2	210	0.4	997	1.5	1,707	2.4
Soil Conservation	-	-	652	1.4	1,420	2.2	1,033	1.4
Communications/Postal 2/	2,192	9.4	3,340	7.1	3,497	5.4	3,705	5.2
Roads 3/	13,950	59.6	18,770	39.8	20,110	30.9	30,090	41.9
Electricity 4/	907	3.9	3,670	7.8	5,545	8.5	4,210	5.9
Education	920	3.9	1,372	2.9	3,378	5.2	1,913	2.7
Drinking Water 5/	1,623 6/	6.9	8,831	18.7	19,458	29.9	17,103	23.8
Other Small Works 7/	NA	NA	2,386	5.0	2,386	3.7	1,402 8/	1.9
Total	23,413	100.0	47,196	100.0	65,013	100.0	71,785	100.0

Note: Health is excluded due to unavailability of data.

1/ Includes Vegetable Seed Production Center in Rukum from 1981/82 onwards.

2/ Telecommunications in Dang District only. 1981/82 expenditures include Rs.80,000 per district from GTZ for Wireless Sets.

3/ Does not include expenditures on the East-West Highway.

4/ Power is generated only in Dang District.

5/ Includes expenditures for four programs: HMG Department of Water Supply and Sewerage; Rapti IRDP; MPLD Grant-in-Aid; and UNICEF/HMG.

6/ MPLD Grant-in-Aid data not included because unavailable for this year.

7/ MPLD Grants-in-Aid for small irrigation, Suspension bridges, and panchayat buildings.

8/ Data for Rukum not included because unavailable for this year.

Sources: HMG Line Agencies
Rapti IRDP Project Coordination Office
District and Zonal Sector Offices
USAID/Nepal
UNICEF

declined in most sectors in 1983/84; significant increases that year occurred only in medium irrigation, forestry, and roads.

Over the four-year period (1980/81 to 1983/84) the sectors experiencing the largest expenditure growth were agriculture, livestock, forestry, electricity, and drinking water. The Rapti IRDP was directly or indirectly responsible for most of the growth in these sectors. However, expenditure trends over time must be interpreted cautiously. Wide year-to-year variations can occur simply because of difficulties with budget releases and thus do not necessarily reflect policy or priority changes.

A breakdown of public expenditures by district in the Rapti Zone for 1982/83 and 1983/84 appears in Appendix Table A.III.35. District-wise shares of spending were remarkably stable over the two years. Shares for drinking water and other small works shifted greatly, but the net effect was to even out district expenditure shares on these items over the two-year period. Expenditures for agriculture, livestock, communications/postal, education, and small works (including drinking water) are spread more or less equally among the five districts.

Cottage industry expenditures have been concentrated in Salyan and Rolpa, perhaps because staff in those districts have been more capable of implementing their programs. Forestry expenditures have been concentrated in Dang, Salyan, and Pyuthan, consistent with the fact that these three districts have the worst forestry problems. Soil conservation expenditures have been concentrated overwhelmingly in Dang, partly because of extremely limited funds and staff and partly because Dang has some of the most extensive erosion problems in the Zone, if not the nation. The year-to-year variations in district drinking water and small works expenditures reflect differing rates of implementation of physical projects (other works include suspension bridges, irrigation projects, and government buildings).

K. REVENUE GENERATION

The Rapti Zone is a net gainer of public expenditures. In 1983/84 the Rapti Zone generated about Rs. 16 million in tax revenues (see Table III.14). This is about 22 percent of the Rs. 72 million (not including health and the East-West Highway) spent for economic and social services in the Zone in that year (according to the figures in Table III.13). At the national level, tax revenues were 46.6 percent of economic and social services expenditures by the government in 1983/84. The remainder consisted of domestic and foreign borrowing, foreign grants, and non-tax revenue (mainly government sales of goods and services, loan repayments, and fees and fines).

The figures in Table III.14 cover all taxes collected by HMG except customs taxes, which from the Rapti Zone are negligible (the border town of Koilabas in Dang District has no significant commercial flows). At the national level customs taxes are the second-largest tax revenue source, generating about 28 percent of the total. All the taxes shown in Table III.14 are collected by the central government.

The land registration tax is the leading source of tax revenue in the Zone, accounting for over one third of the total collected. This tax is propor-

Table III.14

TAX COLLECTION IN RAPTI ZONE

FROM MAJOR REVENUE SOURCES

(Thousands of Current Rs.)

	1980/81 2037/38	1981/82 2038/39	1982/83 2039/40	1983/84 2040/41
Income Tax	802	910	1,268	1,417
Sales Tax	391	584	913	758
Contract Tax	776	808	1,607	2,383
Vehicle Tax	-	6	89	156
Excise Tax	3,080	4,460	3,303	3,636
Alcohol Dang	(1,514)	(1,894)	(1,714)	(1,967)
Alcohol Hills	(1,164)	(1,054)	(910)	(871)
Industry Dang	(402)	(1,512)	(679)	(798)
Land Tax	NA	NA	NA	2,187
Dang District	NA	(1,857)	(1,700)	(2,150)
Hill Districts	NA	NA	NA	(37)
Land Registration Tax	NA	NA	NA	5,479
Dang District	NA	(2,288)	(3,174)	(3,867)
Hill Districts	NA	NA	NA	(1,612)

NA = Not Available.

Sources: Zonal Excise Tax Office, Tulsipur.

District Land Tax Office, Ghorahi.

District Tax Offices, Sallyan, Rolpa, Rukum, Pyuthan.

Ministry of Finance, Economic Survey, 1983-84, Table 9.2.

Population figures from Chapter III of this report.

tionately much more important in Rapti than at the national level, where it contributes only 5.6 percent of total tax revenue. Dang District generates over two thirds of Rapti's land registration tax money.

The second most important source of tax revenue in the Zone is the excise tax, which accounts for about 23 percent of the total. The vast bulk of the Rapti excise tax, which is levied on industrial output, comes from alcoholic beverage production. There are relatively few industries in the Zone large enough to be taxed. At the national level, excise taxes generate only about 15 percent of total taxes.

In the last four years the contract tax has grown into a major revenue source in the Rapti Zone, due to the heavy donor funding of development projects. These projects include a large volume of private contracts that are taxable. The contract tax accounts for about 15 percent of the total collected in the Zone.

The land tax, a type of property tax, is the fourth major tax revenue source in the Zone, amounting to about 14 percent of the total. Dang District generates virtually all the land taxes collected, for several reasons: 1) the tax rate is based on land quality, which is much lower in the hills; 2) tax rates for similar-quality lands are lower in the hills than in the Terai, and Terai rates are applied in the Dang and Deokhuri Valleys; 3) taxes are only applied to land for which a cadastral survey has been done, and this is generally not the case in the hills. At the national level, the land tax is a very minor revenue source.

Information on district and panchayat taxation--taxes collected and retained at the local level--is difficult to obtain, and none was collected for this study. Localities do levy various types of fees and taxes, but their nature and application vary greatly. One widely used instrument is a toll charged by panchayats on people, animals, and goods traveling on roads and trails through their jurisdictions. Other types of local levies in use are ferry taxes, mining taxes, and fees for use of publicly-built shop stalls.

Under the 1982 Decentralization Act and its subsequent Rules and Regulations, districts and panchayats are authorized to impose a Panchayat Development and Land Tax, the proceeds of which are to be retained locally. The PDLT is reportedly supposed to be a tax on the value of agricultural production from land. So far no localities have implemented this tax, for several reasons: 1) it is not clear whether this tax would replace or be in addition to the existing Land Tax, which is based on land quality; 2) it is difficult for local governments to administer a tax of this magnitude; 3) local panchayats must obtain approval for levying the PDLT from both the District Panchayat and the central government through a cumbersome process; and 4) the tax is politically controversial. A local panchayat wishing to apply the PDLT must prepare a specific plan, and this plan must be approved by a two thirds majority of the total members of the Village or Town Assemby. If any PDLT were levied, 85 percent of the proceeds would go to the local panchayat, 10 percent to the district, and five percent to a "consolidated" fund.

L. ROLE OF THE PRIVATE SECTOR

1. Overview

In Nepal the private sector is dominant in small-scale processing, trade, and rural credit. But, it has remained largely unorganized and unable to contribute in major ways to the modernization of the agriculture sector.

Government efforts to modernize an essentially traditional private sector have stressed incentive policies, technical advice, and credit through the Agricultural Development Bank of Nepal, Nepal Industrial Development Corporation, Industrial Service Center, and the Cottage Industries Corporation. However, a well-conceived program for building up private entrepreneurship in traditional and new sectors is lacking. Since 1977, the national share of private sector investment in gross domestic investment has declined significantly, as seen in Table III.15.

Turning to agriculture, fertilizer procurement and distribution are dominated by the public sector, but grain selling is handled mainly by the private sector. Public procurement and sale of foodgrains accounts for less than 15 percent of marketed output. As seen in Section F of this chapter, the grain market is oligopsonistic (few buyers) and dominated by predetermined credit-output relations between small farmers and landlords/traders/moneylenders.

2. Potential Opportunities for Private Sector Development

There is a legitimate case for "privatization" in a mixed conomy like Nepal's. It rests on the presumption that having the private sector compete with the public sector in certain areas will do more to strengthen the latter than continued monopoly. In such a case, everyone stands to gain, especially the ordinary citizen. On the other hand, privatization should not be sought as an end in itself or as a switch from public sector subsidization to private sector subsidization.

In-depth feasibility studies of private sector participation in various Rapti Zone activities were beyond the scope of this project. The following appear to be promising areas of private sector involvement that need fuller investigation:

a. The public sector monopoly of fertilizer distribution should be reassessed and the private sector encouraged to undertake more retail sales of fertilizer and other inputs (see discussion of AIC's ineffectiveness in Chapter V, Part A). Experience indicates that private dealers need to be allowed to earn a sufficient margin in order to operate.

b. The private sector and producer cooperatives should be given incentives to invest in food storage and preservation facilities.

c. Private construction and technical services firms should be encouraged. The private sector can continue to play a useful role in the transfer of appropriate technologies to farmers.

Table III.15

SHARES OF PRIVATE & GOVERNMENT SECTOR
IN GROSS DOMESTIC INVESTMENT

Year (ending July 15)	Percent Share of: Private Sector	Government Sector
1977	73.6	26.4
1978	66.2	33.8
1979	56.7	43.3
1980	59.8	40.2
1981	61.6	38.4
1982	50.7	49.2

Source: ADB Country Mission Report, August 1983.

d. A great deal of scope exists for private seed production and distribution enterprises.

e. If further exploratory tubewell drilling in Dang District produces positive results, the private sector could become involved in larger-scale development of this technology.

f. The recently-approved "lease forest" rules and regulations should be implemented by giving the program wide publicity and streamlining the cumbersome approval process. This will encourage private forest resources development and soil conservation. Consideration should be given to granting full tenure of forest land to farmers who manage the forest resources properly.

FOOTNOTES CHAPTER III

(1) P. Blaikie, J. Cameron, and D. Seddon, Nepal in Crisis, Delhi: Oxford University Press, 1980, pp. 214-215.

(2) Ibid, pp. 281-284.

(3) Ibid, p. 239, 243.

(4) Sanford S. Smith, Cropping Systems Specialist, Contract Completion Report, Rapti Integrated Rural Development Project, PADCO/Nepal, April 12, 1985.

(5) World Bank, Nepal--Recent Developments and Selected Issues in Trade Promotion, Report No. 4663-NEP, October 14, 1983, pp. 34-38.

(6) Integrated Development Systems, Agricultural Marketing and Price Policy in Rapti Zone and RCUP Areas, USAID/Nepal, December 1984, p. 25.

(7) Bharat B. Karki and Ishwari Neupane, "Production Prices and Marketing of Foodgrains in Nepal", in Food Policy Issues in Nepal, Proceedings of Food Policy Seminar, APROSC/IDRC, 1984, p. 65.

(8) Integrated Development Systems, op. cit., pp. 26-27.

(9) Ibid., pp. 27-28.

(10) World Bank, Nepal Agricultural Sector Review, Report No. 2205-NEP, April 27, 1979, p. 40.

(11) Integrated Development Systems, op. cit., p. 223.

(12) Ibid., pp. 227-229.

(13) W.E. James, Domestic Resource Mobilization Through Financial Development, Nepal, Asian Development Bank, 1984.

IV. SETTLEMENT SYSTEM AND SPATIAL CONSIDERATIONS

A. SPATIAL DISTRIBUTION OF POPULATION

1. Generalities

Chapter II, Section A discussed population distribution and trends on a district basis within the zone. It was noted tht the hill districts of Salyan, Rukum, Rolpa, and Pyuthan registered either no population growth or rates lower than the natural rate of growth during the period 1971-1981. During the same period, Dang had a growth rate equal to about double the natural growth rate due to migration from the hill districts.

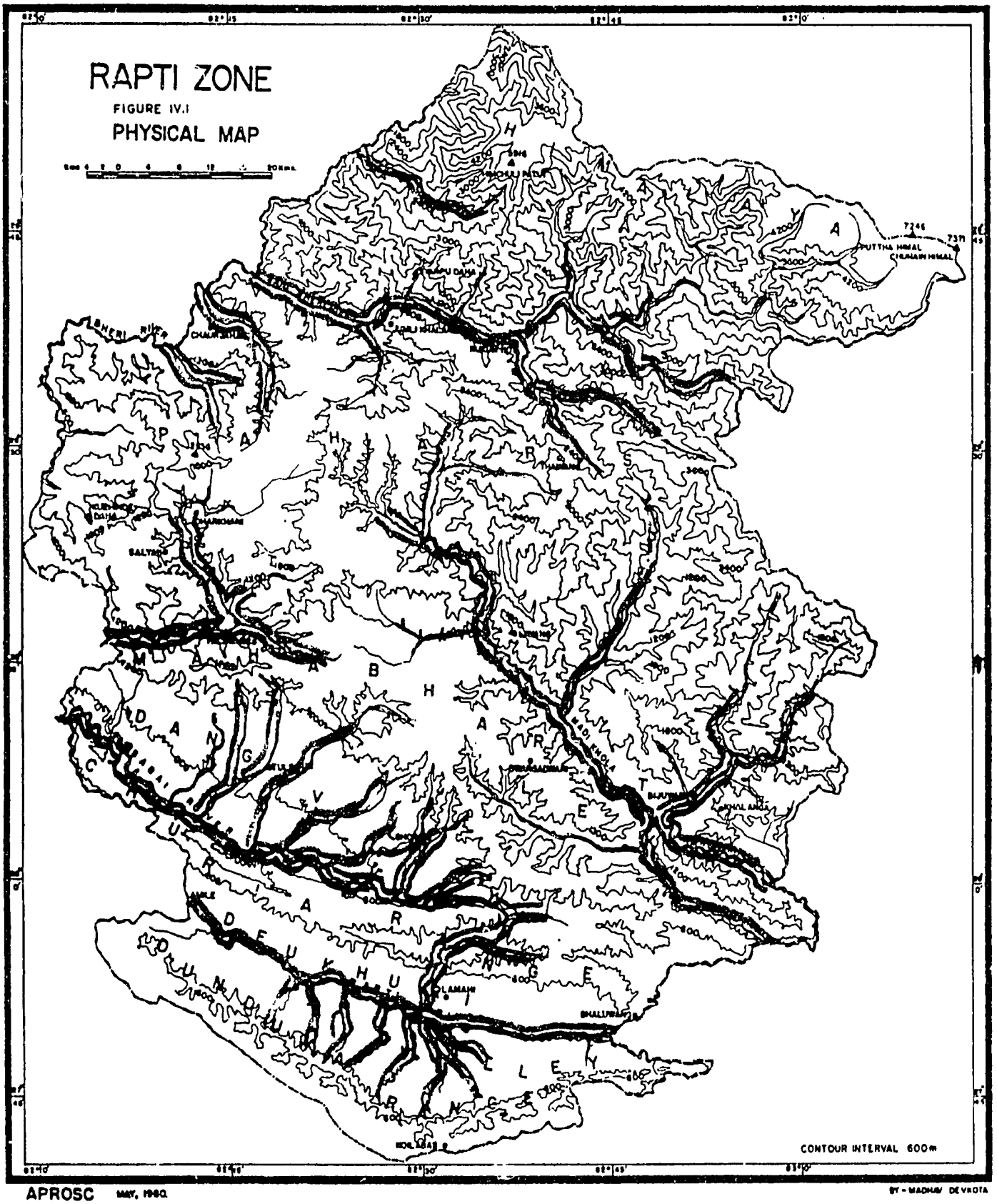
Geographically, the distribution of population within the zone appears to be closely related to locations of cultivable land, rivers, and waterways. Figure IV.1 indicates the locations of the principal river valleys and adjacent cultivable land. As a rule, the most fertile and productive agricultural land is located in close proximity to the waterways. Figure IV.2 shows the distribution of village panchayat densities for the zone in 1979. Overlaying these two figures demonstrates a close correlation between the locations of the most dense panchayats and the waterways. In addition, topography, concentrations of forested areas, and soil quality are other factors which affect population densities within the zone.

Figure IV.3 presents the Rapti Zone in its geographical context; principal routes and neighboring settlements are shown for reference. Figure IV.4 shows the distribution of selected setlements and size within the zone. Not suprisingly, the locations and distribution of settlements are closely related to panchayat densities and the factors discussed above. As a consequence, though settlements are widely distributed within the zone and districts, they are relatively more concentrated in proximity to the river valleys. However, river valley settlement in the hill districts is a relatively new phenomenon brought about by malaria control programs within the past twenty years. Generally in the hill districts, settlements are located on hillsides and hilltops wherever the land is suitable for cultivation, as well as in proximity to the river valleys.

In the Inner Terai areas of Dang district, settlement and densification has also been conditioned by malaria control programs, deforestation, quality of soil, and access to water. As in the case of river valley settlements, densification of Inner Terai (Dang district) by hill migrants is a relatively new and important phenomenon. However, data limitations did not permit an analysis long these lines.

2. Distribution of Population by Settlement and Size

Reliable data on settlement size consisting of the population or houses in a contiguously built-up area (bazaar) proved difficult to acquire. However, on the basis of that data which could be collected, as well as estimates given by numerous individuals who had conducted extensive field work in the zone, an approximate distribution of settlements by number of houses was prepared as indicated in Figures IV.5-IV.9.



APROSC MAY, 1980.

BY - MADHAV DEVKOTA

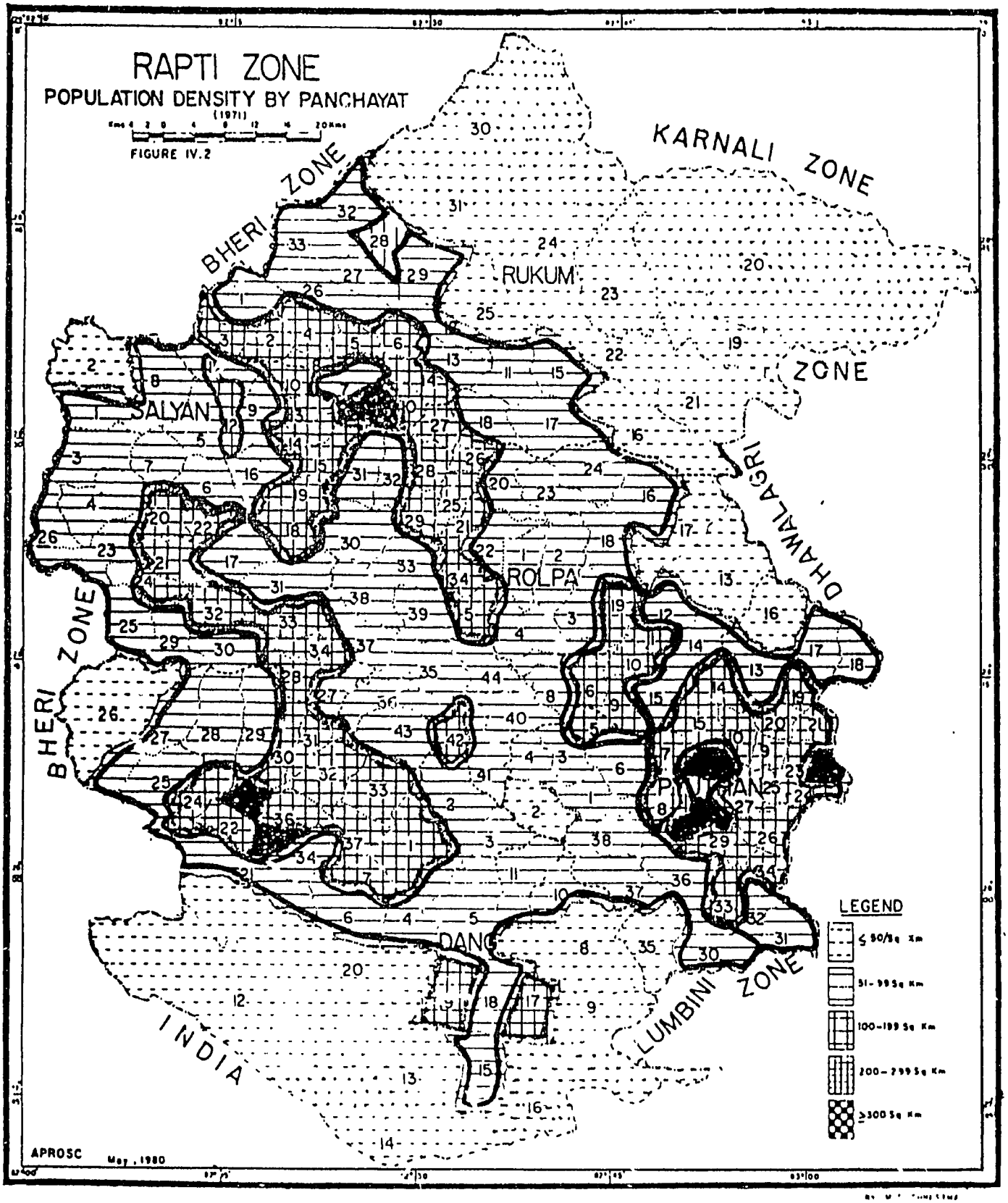
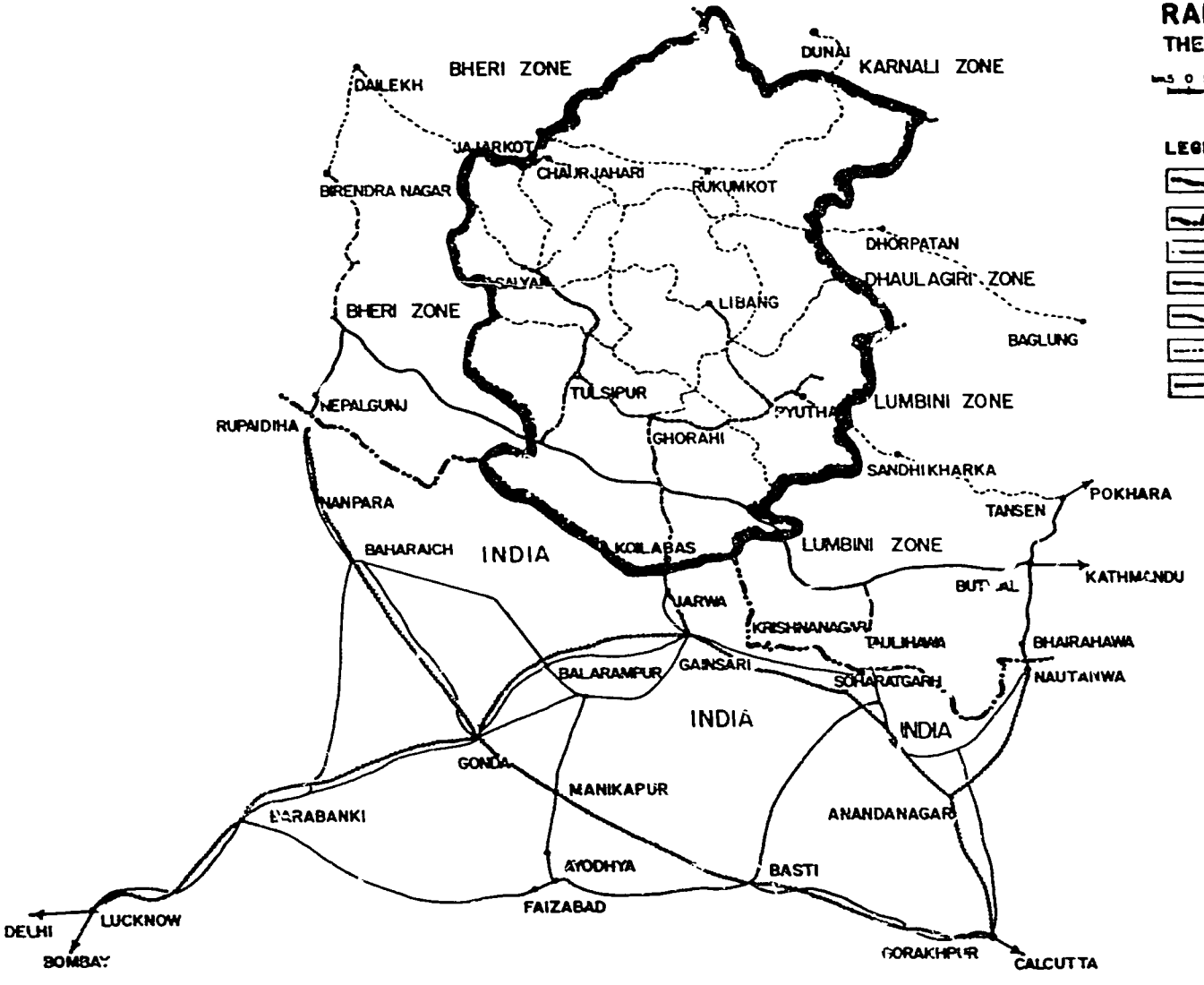

RAPTI ZONE
POPULATION DENSITY BY PANCHAYAT
(1971)
FIGURE IV.2
KARNALI ZONE
BHERI ZONE
RUKUM
ZONE
SALYAN
DHAWALAGIRI
ROLPA
BHERI ZONE
DANG
LUMBINI ZONE
INDIA
LEGEND
≤ 50/Sq Km
51-99 Sq Km
100-199 Sq Km
200-299 Sq Km
≥300 Sq Km
APROSC
May, 1980

FIGURE IV 3

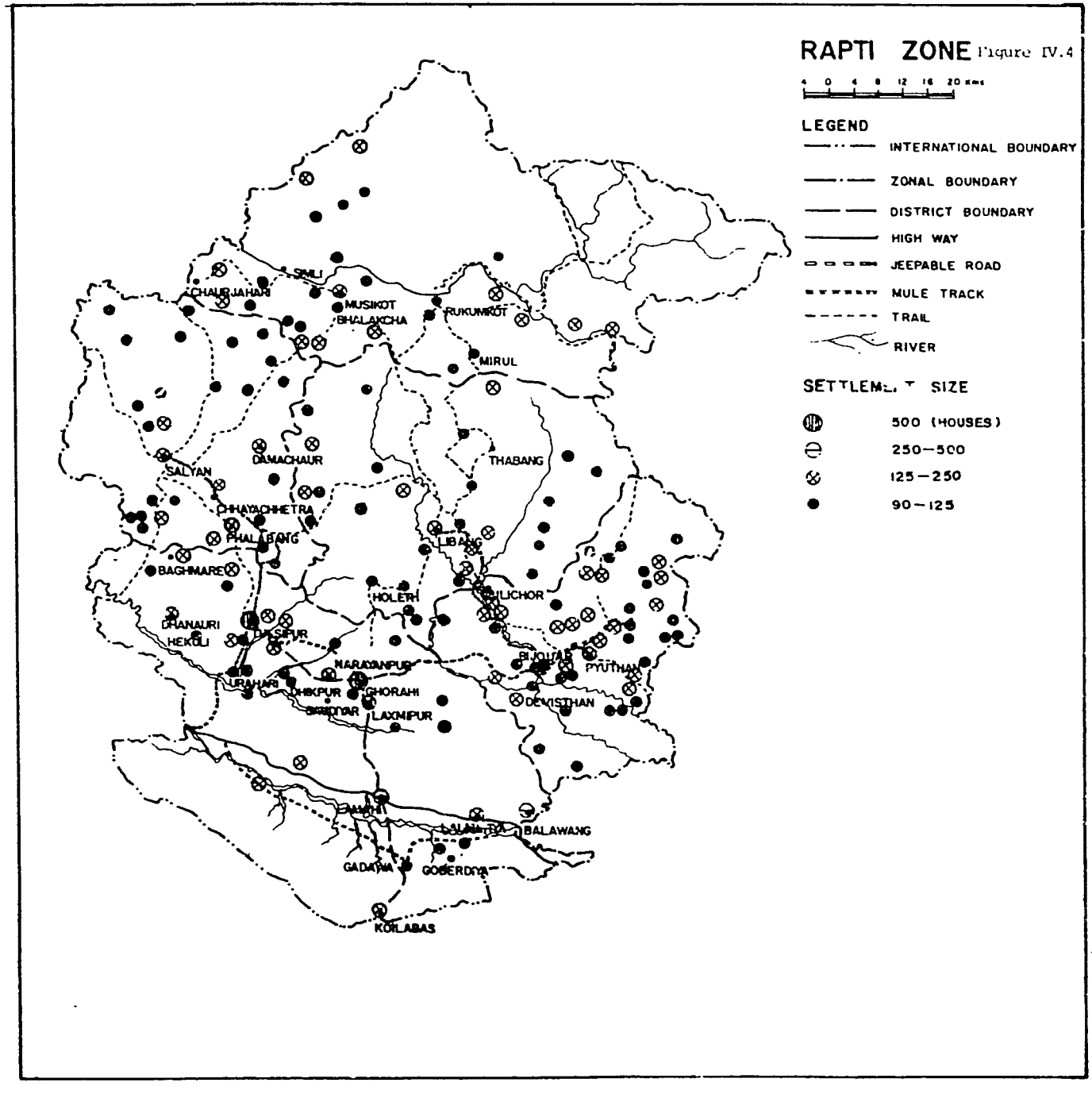
RAPTI ZONE

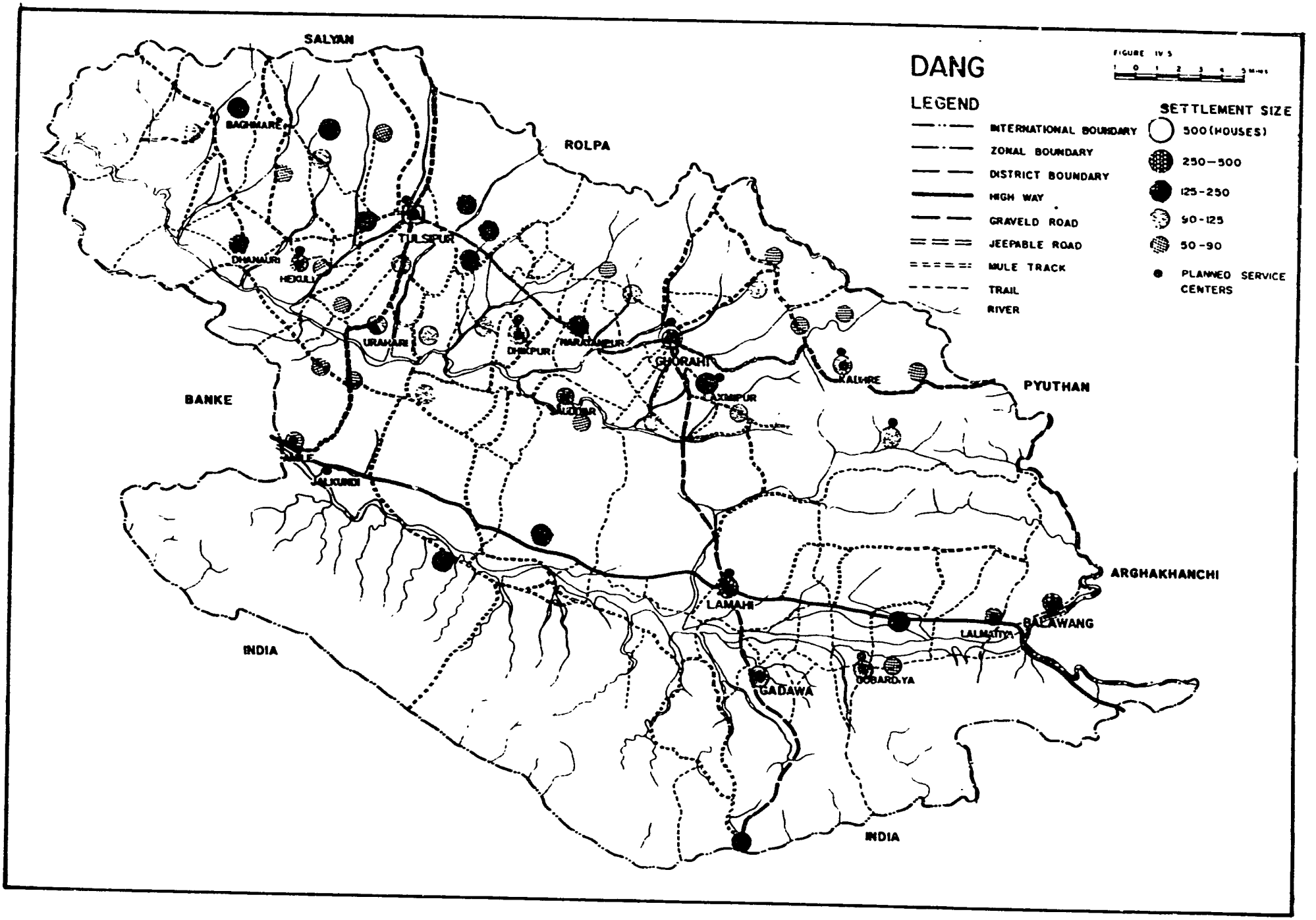
THE REGIONAL CONTEXT

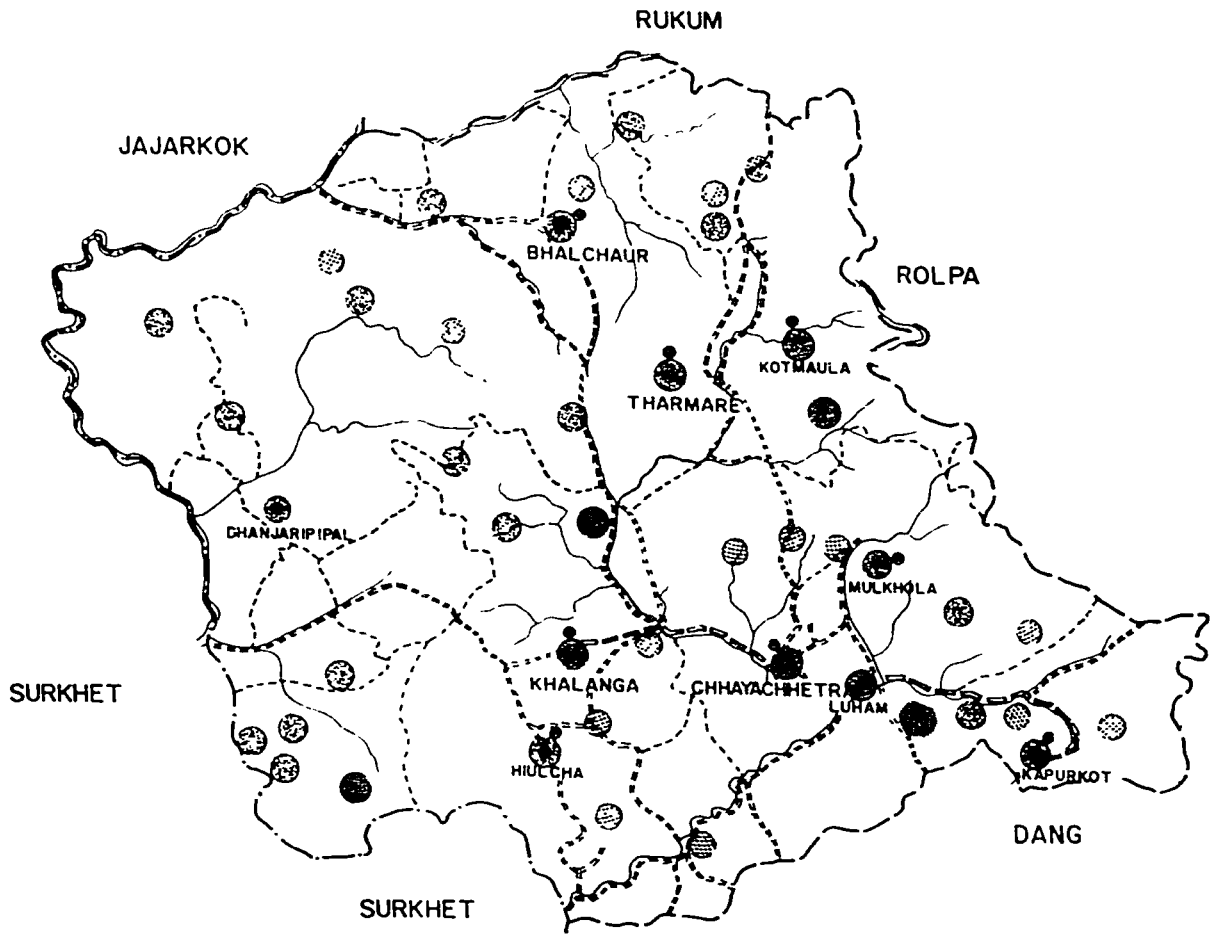


LEGEND

- INTERNATIONAL BOUNDARY
- ZONAL BOUNDARY
- METALLED ROAD
- GRAVEL ROAD
- JEEPABLE ROAD
- TRAIL
- RAILWAY


RAPTI ZONE Figure IV.4
LEGEND
INTERNATIONAL BOUNDARY
ZONAL BOUNDARY
DISTRICT BOUNDARY
HIGH WAY
JEEPABLE ROAD
MULE TRACK
TRAIL
RIVER
SETTLEMENT SIZE
500 (HOUSES)
250—500
125—250
90—125
CHAURJAHARI
MUSIKOT
BHALAKCHA
RUKUMKOT
MIRUL
THABANG
SALYAN
DAMACHAUR
CHHAYACHHETRA
PHALABANG
LIBANG
BAGHMARE
HOLERI
DHANAURI
HEKULI
TULSIPUR
NARAYANPUR
URAHARI
GHORAHI
LAXMIPUR
DEVISTHAN
PYUTHAN
BALAWANG
GADAWA
GOBERDIYA
KOILABAS


DANG
FIGURE IV 5
LEGEND
INTERNATIONAL BOUNDARY
ZONAL BOUNDARY
DISTRICT BOUNDARY
HIGH WAY
GRAVELD ROAD
JEEPABLE ROAD
MULE TRACK
TRAIL
RIVER
SETTLEMENT SIZE
500 (HOUSES)
250-500
125-250
90-125
50-90
PLANNED SERVICE CENTERS
SALYAN
ROLPA
BANKE
PYUTHAN
ARGHAKHANCHI
INDIA
INDIA
BAGMARE
DHANAURI
HEKULI
TULSIPUR
URAHARI
DHIKPUR
NARAYANPUR
GHORAHI
KALIRE
LAXMIPUR
NAUTAR
JALKUNDI
LAMAHI
LALMATIYA
BALAWANG
GADAWA
DOBARDIYA



SALYAN

FIGURE IV 6

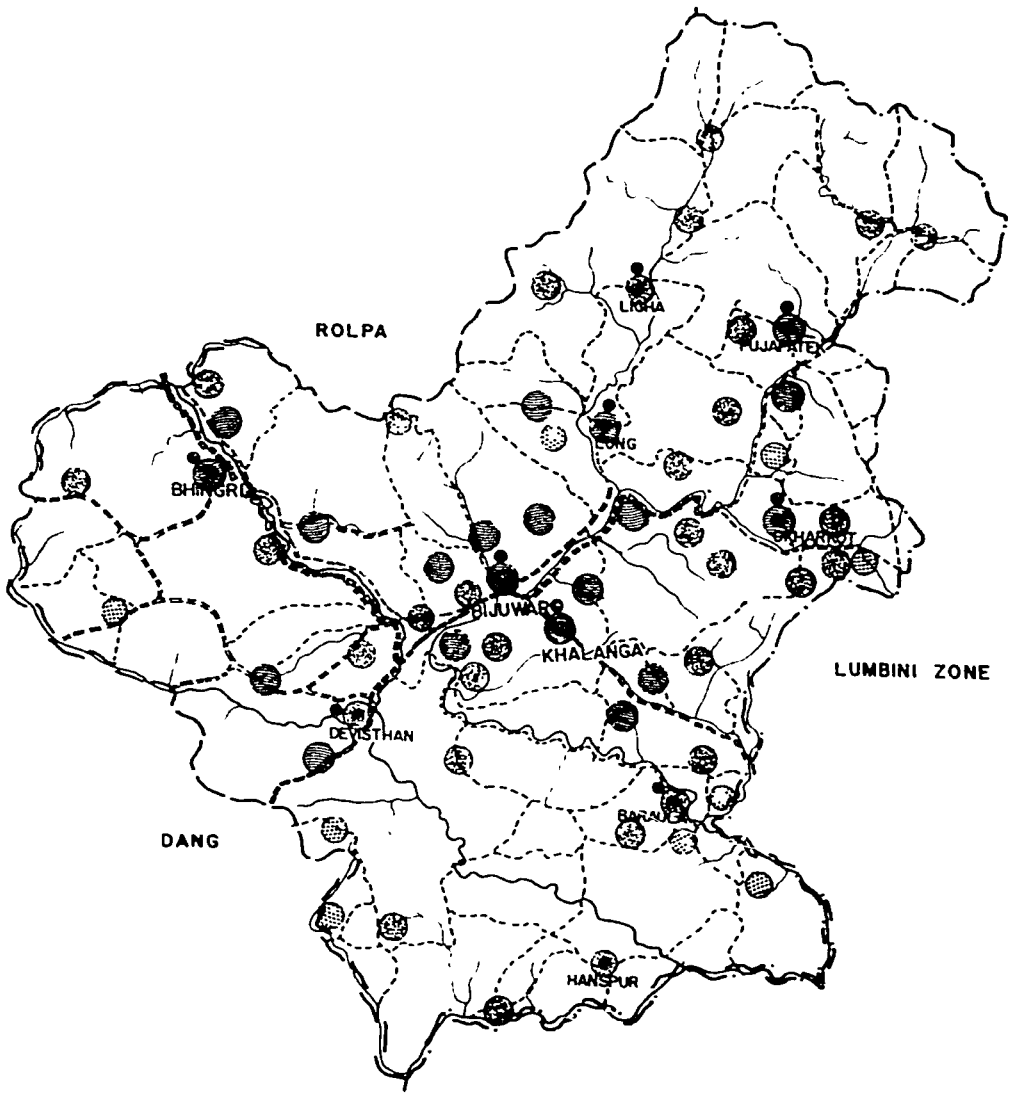
1 0 1 2 3 4 5 6 7 Miles

LEGEND

- ZONAL BOUNDARY
- DISTRICT BOUNDARY
- JEEPABLE ROAD
- MULE TRACK
- TRAIL

SETTLEMENT SIZE

- 125 - 250 (HOUSES)
- 90 — 125
- 50 — 90
- PLANNED SERVICE CENTERS



PYUTHAN

FIGURE N. 7

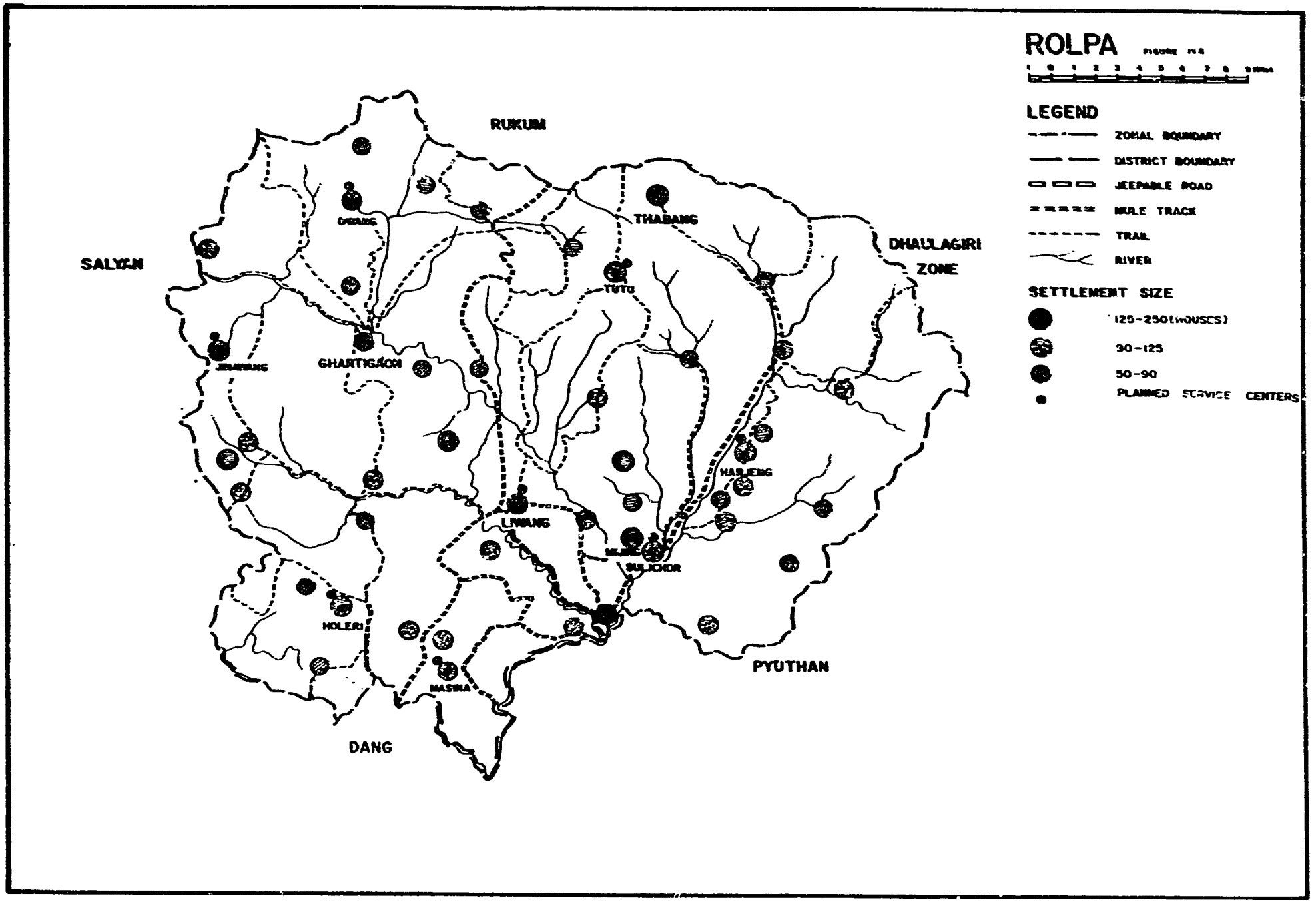
1 0 1 2 3 4 5 Miles

LEGEND

- ZONAL BOUNDARY
- DISTRICT BOUNDARY
- JEEPABLE ROAD
- MULE TRACK
- TRAIL
- RIVER

SETTLEMENT SIZE

- 125-250 (HOUSES)
- 90-125
- 50-90
- PLANNED SERVICE CENTERS


ROLPA
LEGEND
ZONAL BOUNDARY
DISTRICT BOUNDARY
JEEPABLE ROAD
MULE TRACK
TRAIL
RIVER
SETTLEMENT SIZE
125-250 (HOUSES)
90-125
50-90
PLANNED SERVICE CENTERS
RUKUM
SALYAN
DHAULAGIRI ZONE
PYUTHAN
DANG
THABANG
TUTU
GHARTIGAON
LIWANG
SULICHOR
HOLERI
MASINA

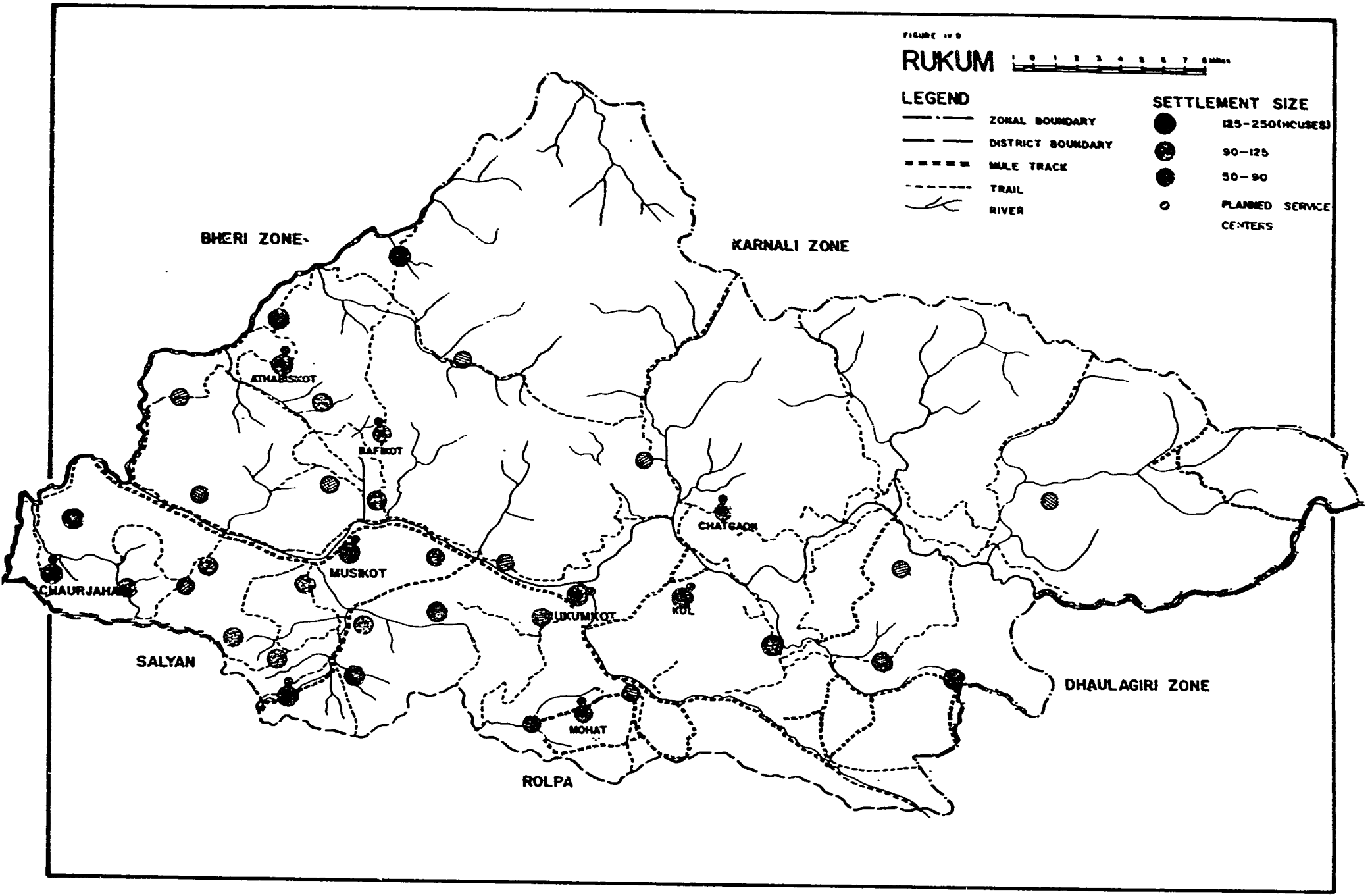


FIGURE IV 8
RUKUM
LEGEND
ZONAL BOUNDARY
DISTRICT BOUNDARY
MULE TRACK
TRAIL
RIVER
SETTLEMENT SIZE
125-250(HOUSES)
90-125
50-90
PLANNED SERVICE CENTERS
BHERI ZONE
KARNALI ZONE
ATHABISKOT
BAFIKOT
CHATGAON
MUSIKOT
CHAURJAHARI
RUKUMKOT
KOL
SALYAN
DHAULAGIRI ZONE
MOHAT
ROLPA

Though this information is approximate, the following general conclusions can be drawn:

- The vast majority of settlements have populations of less than 2,500 and most are below 1,000 population.
- The majority of the largest 20-25 settlements in all the districts range between 1,000-2000 population.
- The two largest settlements (Tulsipur and Ghorahi) are located in Dang district.
- In the hills, the district centers are not the largest settlements in their respective districts.
- Larger settlements (in excess of 90 houses) are more numerous and concentrated in the Hill districts than in Dang.
- Pyuthan district, followed by Salyan district, has the highest concentration of larger settlements and those which are the most evenly distributed spatially.
- In Dang district, the larger settlements are distributed linearly, through the Dang valley, and along the East-West highway and Ghorahi-Koilabas road in Deokhuri.
- Settlement concentrations in Rolpa are primarily in proximity to Pyuthan district while those in Rukum are in proximity to Salyan; relatively few settlements are located in northeastern Rolpa and Rukum.

As was pointed out above, settlements are often concentrated at the subdistrict level in proximity to waterways and prime cultivable areas. Settlement concentration, however, varies considerably among the districts. In Pyuthan, it appears that most of the settlements with more than 90 houses are within 1-2 hours walk from one another while in Salyan these settlements are about 4 hours apart generally. In northern Rukum, larger settlements appear to be about 1 day's walk apart but within 2-4 hours walk in the southwestern sector. In Rolpa, larger settlements in the southeastern sector are within about four hours walk apart, but in the remainder of the district about one day's distance apart.

3. Settlement Growth Trends

For the purpose of assessing respective growth rates of settlements in Rapti there is very little comparative time-series data. However, on the basis of what data exists (Table IV.1) and field observations, it would appear that the fastest growing settlements in the zone which have added 1,000 population or more in the past five years include Lamahi, Tulsipur, Ghorahi, Balawang and Chaujahari. Chaujahari, Rukum is situated in a large river valley in the hills, but the remainder are located in the inner terai. There are indications that other river valley settlements in the hills, such as Bijouar and Chhayachhetra have also been growing significantly. However summit settlements in the hills appear to be remaining stable in population. All of the district centers and Rukumkot, for exam-

Table IV.1

ESTIMATED GROWTH OF SELECTED SETTLEMENTS IN RAPTI ZONE

Settlement	Population 1979 1/	Population 1985 2/	Observation
Ghorahi	4,000	5,500	Growth
Koilabas	3,000	3,000	No Growth
Tulsipur	1,200	3,000 - 3,500	Major Growth
Sàlyan Khalanga	2,000	2,000	No Growth
Chaujahari	1,200	2,500	Major Growth
Musikot	500	625	Growth
Rukumkot	1,500	1,500	No Growth
Libang	2,000	2,000	No Growth
Pyuthan Khalanga	1,000	1,500	Growth

1/ Data from Rapti IRDP feasibility study, Volume III, Annex 8, Table

2/ PADCO estimates based on house counts and average household sizes.

ple, have shown little or no increase in population over the past five years, though some increase in commercial activity has occurred. Of these, only Pyuthan Khalanga appears to have increased in population.

In the Inner Terai, completion of the East-West Highway has had a notable impact on the settlement system in the Deokhuri valley. Koilabas, previously the principal point of entry for goods entering the zone from India actually appears to have decreased in size, while Lamahi and Balawang have notably grown. Given the high growth rate of Dang during 1971-1981 (nearly 5 percent per annum) caused by rural hill out-migration, it might be assumed that this population has been absorbed in the rural areas of Dang and generally distributed among the settlements. However, Ghorahi and Tulsipur have high incidences of squatters (about 200 households each) from these rural areas.

In a larger geographical context, Butwal, Bhairawa, and Nepalgunj are the higher order centers linked to the Rapti Zone. In 1981 and between 1971 and 1981, these three towns had populations and growth rates of 22,600 (5.8%), 30,100 (5.7%), and 34,000 (3.7%) respectively. The next order of magnitude of settlements would be Ghorahi and Tulsipur followed by Balawang and Lamahi. The remainder of the settlements are situated in the hierarchy as shown in figures IV.3-9.

On the basis of observed trends, it is anticipated that over the next 10 years the population shift of hill to terai and hill summit to valley will continue with increasing population within settlements in these locations. Terai settlements are expected to continue to increase in size over hill settlements. Rapid growth in Tulsipur is expected to continue and accelerate when the Tulsipur-Amile road is completed. Lamahi and Balawang, among the fastest growing settlements in the Zone, are expected to continue rapid rates of growth due to their strategic locations. In the larger context, continued population dominance by Nepalgunj and Butwal/Bhairawa is anticipated. Those settlements with rapid rates of growth at the regional and zonal level require proper planning if haphazard and inefficient development is to be avoided. For further reference, summary development plans for Tulsipur and Ghorahi were prepared in March 1985 for the Rapti IRD Project. These documents provide more specific data for these settlements than can be presented in the main text of this report.

4. Labor Force and Income

With the exception of Ghorahi, no settlement income and labor force data exists. As the rural population is primarily settlement based, it can be expected that the labor force and income data discussed in Chapter III would be applicable to the settlements in general. However, in district and commercial centers the labor force engaged as office workers and in services and commerce can be assumed to be of a higher proportion than that of other settlements. Outside of these centers, in both Dang and Hill districts, few commercial and service activities are found. On the basis of the number of government offices, there are approximately 400-500 HMG related staff in Tulsipur, 600-700 in Ghorahi, and about 300 in each of the district centers. In each case, the staff account for about 10 percent of the population of each settlement and a higher proportion of the labor force. In the case of commerce and services, about 16 percent of Ghorahi's

population would appear to be fully or partly engaged in this activity, 8 percent in Tulipur, and about 5 percent in the hill district centers.

Even in rural areas the labor force structure is difficult to quantify. As was discussed in Chapter III, income from agricultural activities only represents about one-half of rural household income, underemployment is very high, and households are required to find other sources of income such as portering, handicrafts, and construction and services in order to supplement their agricultural income. Many of these activities are settlement based, but they are also very mobile in nature. Roof thatchers, for example, are known to travel among settlements to work their craft as do the more skilled construction workers.

As urban incomes are higher than rural incomes nationally, this would suggest that those places with larger populations and more diversified local economies would also have higher incomes and purchasing power. Unfortunately, no comprehensive data by settlement in Rapti exists.

In the larger geographical context, according to a 1977 Household Budget Survey in Bhairawa, about 6 percent of the active population were HMG office workers, about 26 percent were in the commercial and services sectors and 14 percent were engaged in production, transport and construction. In Nepalgunj, about 10 percent of the active population was engaged as HMG office workers, 43 percent were engaged in commerce and services, and 17 percent were engaged in production, construction, and transport. According to the same survey, in Ghorahi about 7 percent were engaged as office (HMG) workers, 16.5 percent in commerce and services, and only 2.8 percent in production, transport, and construction.

B. ROLES OF SETTLEMENTS IN THE SETTLEMENT SYSTEM

1. The Settlement System's Functional Structure

This section describes six functional categories of settlements in or linked to the Rapti Zone. It is based on analyses which follow in subsequent sections.

a. High order settlements

The higher order settlements which affect the Rapti Zone in a larger geographicl context are Nepalgunj and Butwal/Bhairawa. Each of these settlements provides a higher order of economic and public services than that which can be found within the Rapti Zone itself. Most commodities which are distributed in the Rapti Zone come from these settlements, and most of the exports from the zone to Nepal and the exterior are channeled through these localities. In addition, both public and private services are more abundant and of higher quality than those which are being provided within the zone. For example, for serious ailments patients from the zone frequent facilities in Nepalgunj if proper treatment cannot be provided in Ghorahi.

In addition, more specialized mechanical and other services can be found in these larger Terai settlements. These towns also have a more diversified economy and employment structure than can be found in the zone. For exam-

ple, most of the manufacturing establishments in proximity to the Rapti Zone are concentrated in these towns. It can be inferred that settlements such as Nepalgunj and Bhairawa/Butwal serve a hinterland much greater than the Rapti Zone--covering most of the Western and Mid-Western Development Regions. It may also be assumed that these services and economic activities are closely tied to the marketing potential and demand of these larger hinterlnds and as a consequence it is not likely that any settlement in the Rapti Zone could fulfill a similar role under present circumstances.

With respect to public administrative services, Nepalgunj and Bhairawa/ Butwal do not offer any higher level of services than can be found in the Zone. The next higher order center is Kathmandu.

b. Zonal order centers

Within the Rapti Zone, only Tulsupur and Ghorahi can be classified as zonal order centers. Historically this rank was unique to Ghorahi which remains the more dominant of the two. However, Tulsipur is rapidly rising to a par with Ghorahi for many of the functions which these settlements have to offer. As a general rule, Tulsipur serves as a supply and marketing center for the western portion of the zone from the Dang Valley north, while Ghorahi serves the central and western portions of the zone. As prices are generally lower in Ghorahi, and economic activities are more diversified, it tends to attract consumers from a wider hinterland. Whether for supply or marketing of commodities, these settlements attract people from the Dang valley and northern extremities of the zone--more than a week's distance in walking time. On the other hand, the higher order settlements also draw on this clientele, often causing Tulsipur and Ghorahi to be by-passed altogether.

Tulsipur and Ghorahi also offer a zonal level of public services which cannot be found in the districts. However, most public service requirements are satisfied at the district level.

c. District order centers

In Dang Valley, Ghorahi and Tulsipur dominate all other settlements. However, in the Deokhuri Valley, Lamahi and Balawang appear to be the only settlements with hinterlands for the valley as a whole. This function was traditionally played by Koilabas but in recent years with the construction of the East-West highway its position has weakened with respect to Lamahi. In turn, Lamahi also appears to have weakened Ghorahi's dominant district role just as Tulsipur has done. Balawang, in addition to serving the eastern portion of Deokhuri, also serves as a supply point to Pyuthan District.

In the hills, the provision of commercial and public services is dominated by the district centers. However, the district centers are neither the largest settlements population-wise nor the most strategically placed. Nevertheless, they tend to dominate activities at the district level because of their administrative service functions rather than economic roles per se. Those commercial and service activities which are found in the district centers serve a relatively small hinterland with the exception of occasional consumers who visit the centers for administrative and development services. It appears that the district centers play no significant

marketing function for agricultural commodities and only a limited role in the provision of most commodities. Most hill district residents appear to purchase the bulk of their supplies in Ghorahi, Tulsipur or outside the zone. In the hill districts, among non-district headquarters, only Chaujahari can be classified as a district order center. It serves the western portion of Rukum as well as adjoining territories outside the disrict. As it is located on a major north-south trade route, it also benefits from the activities which traffic on this route generates.

d. Sub-district centers

In the Dang Valley, there are virtually no sub-district centers due to the strong dominance of Tulsipur and Ghorahi. Only a very limited number of services and commercial activities can be found in other settlements in the valley. In Deokhuri, however, Koilabas and Ghadawa serve areas greater than their own panchayats.

In the hill districts, purchasing power is low and the number of commercial establishments is limited. Furthermore, the prices of goods are such that households prefer to travel long distances to Ghorahi and Tulsipur or beyond for major purchases of consumer goods. Nevertheless, there is a distinct pattern of sub-district centers which have emerged. As in the case of the district centers, activities in sub-districts are largely a function of the administrative services which are offerred. However, at the sub-district level, factors such as strategic location on trade routes are also a factor. Holeri, in Rolpa District, for example, consists of only about 25 houses but it has about 26 commercial and service establishments due to the fact that about 100 persons per day travel through Holeri from the north to Ghorahi. This also appears to be the case in Sulichor, also in Rolpa District, and those settlements along trade routes in other districts.

e. Panchayat order centers

In these settlements, whether in Dang or the hill districts, a few commercial and service activities serve a small hinterland relatively equivalent to the panchayat area.

f. Sub-panchayat order centers

Many settlements are without any formal commercial or service activities at all. However, traditional bartering, money lending, and other forms of activities may be found in these settlements.

2. Economic Roles of Settlements and Linkages

a. Trade: Spatial characteristics of major commodity flows

There is virtually no trading of major commodities among the hill districts. Whatever is produced within the districts is either consumed there or makes its way to the Terai market centers. The main marketing centers for the hill people of Rapti Zone are Nepalgunj and Butwal. Intermediary marketing centers include Ghorahi, Tulsipur, Surkhet, Tansen, Lamahi, and Balawang. These centers are also supply points for imports into the Rapti

Zone. Other intermediary exchanges in these flows appear to be very limited.

As a general rule, farmers transport their own commodities to the marketing centers and return with other goods for household consumption. Sometimes they barter one commodity for another, other times they buy and sell. In either case, these transactions are difficult to quantify.

District-wise the trading link of eastern Rukum is mainly through Ghorahi and partly through Tansen/Butwal. The rest of Rukum trades primarily with Nepalgunj via Chaujahari and Surkhet (where motorized transport can be found). The people of Rukum export products like ghee, medicinal herbs, dried ginger and chilli. In return, they bring back salt, cloth, kerosene, sugar and other general goods for household consumption. Foodgrains are generally imported from Dang.

Salyan, like western Rukum, has traditionally traded mainly with Nepalgunj. However, since the completion of the East-West Highway, a shift in trade in favor of Dang is noticeable. Completion of a tractorable road to Tulsipur from Salyan and eventually the Amile-Tulsipur road would appreciably strengthen this linkage. Major exports from Salyan include dried ginger, ghee, medicinal herbs and chillies. In return, items imported include foodgrains, salt, cloth, kerosene, sugar and other household goods.

Rolpa District mainly trades with Ghorahi and Butwal. The commodities to export to Ghorahi are ghee, herbs, honey, woolen blankets, baskets and goats. To Butwal, they mainly export ghee. In return, foodgrains, salt, cloth, kerosene, and other household goods are imported.

Pyuthan trades with Balawang, Ghorahi, Tansen, and Butwal. Salt, kerosene, rice and sugar are mainly imported from Ghorahi and Balawang, while light commodities such as cloth and manufactured goods are imported from Tansen and Butwal. According to APROSC's Reconnsaissance Survey in the Rapti Zone (1977):

> "While the markets at Ghorahi are controlled predominantly by people of Indian origin, the market of Tansen is controlled by the Newar Community who are of the same ethnic group as the traders of Pyuthan. Belonging to the same ethnic group the Newar traders in Tansen give away goods in credit to the buyers of Pyuthan under the shadow of trust and goodwill. It is because of this fact that the people of Pyuthan prefer to go to Tansen for marketing purposes in spite of the fact that it is twice as far as Ghorahi. Thus, this social linkage seems to influence the direction of trade in Pyuthan toward Tansen."

With the completion of the Pyuthan-Ghorahi motorable road, this linkage has surely been weakened in favor of Ghorahi. However, social linkages such as those mentioned were found to be common throughout the settlement system among merchants and traders.

Dang District exports mainly surplus foodgrains (to the hill districts as well as to other parts of Nepal and India) and mustard seed which is exported to India via Nepalgunj. Generally, most of the exports of the hill districts also make their way to India through the Terai marketing centers. The supply of most manufactured goods which are imported into

Rapti also originate in India. However, Butwal supplies Chinese goods for the Rapti market as well.

Table IV.2 and Figure IV.10 illustrate the direction of flows for major commodity types in and with the Rapti Zone. Among the various commodity flows it would appear that foodgrains heavily dominate other items as is indicated in Table IV.3.

b. Commerce and services

Linkages: Commodity flows via commercial establishments in the settlement system behave in a similar pattern as that discussed above. However, in this case it is the merchants and traders rather than individuals who seek goods for distribution within the zone. During the field work for this analysis, indicative surveys were conducted in selected settlements throughout the zone. In Tables IV.4 and IV.5, the sources of commodities, transport costs, consumer areas, volume of sales, and profits are presented for four types of commercial establishsments in Ghorahi and Tulsipur respectively. The tables indicate the diversity of supply sources which are used by these establishments and the variations of transport costs to each settlement supply point. As a general rule, it can be assumed that the lower the transport costs to the supply center the higher the volume of commodities purchased. However, specialization of different types of articles requires a wide base of settlement supply. The tables also indicate that commercial establishments in Ghorahi and Tulsipur have a sphere of influence which covers all districts in the zone as well as points further north. Tulsipur supplies goods to consusmers in all districts with the exception of Pyuthan, while Ghorahi supplies all districts but fewer consumers in Salyan. However, according to shopkeepers interviewed in these two settlements, most of their clientele come from within 5-6 hours walking distance (see Figure IV.12 for spheres of influence for selected settlements). Sales figures for selected shops also indicate a considerble dynamism particularly when compared with other settlements within the zone.

In Table IV.6 similar data are presented for other settlements within the zone. Generally, shops in these settlements are supplied by fewer points than Ghorahi and Tulsipur from outside the zone, and they are usually also supplied by one or both of these settlements.

Effects of transport costs on commercial linkages: Commercial supply sources are a function of transportation costs and the prices of goods within alternative supply settlements. For example, it was noted that Pyuthan Khalanga primarily uses Butwal as a source of goods despite the proximity of Ghorahi. This is because the price of a commodity in Ghorahi is greater than the cost of the same commodity in Butwal plus the transport cost between the two settlements. In addition, there are more wholesalers in Butwal than Ghorahi and competition there keeps the prices lower. The same phenomenon is true for Tulsipur as well. As a consequence, many merchants by-passd Tulsipur and Ghorahi altogether and go to one of the larger, less expensive points of supply outside the zone. Because of high underemployment in the zone, it appearss that the people of Rapti have a high propensity to substitute time for money by traveling long distances to purchase goods at a lower cost.

Table IV.2

DIRECTION OF FLOW OF MAJOR COMMODITY TYPES

BETWEEN RAPTI DISTRICTS AND OTHER AREAS

From \ To	Rukum	Rolpa	Salyan	Pyuthan	Dang: Intermediate Trade	Dang: Final Consumption	Rest of Nepal: Intermediate Trade	Rest of Nepal: Final Consumption	India
Rukum		Veg. Seed	Veg. Seed	Veg. Seed	Ghee, Herbs, Potatoes	Ghee, Potatoes, Veg. Seed	Ghee, Herbs, Woolen Goods, Dried ginger, Chilly	Ghee, Woolen goods, Chilly, Veg. Seed	Ghee, Herbs, Dried ginger Chilly, Woolen goods
Rolpa	-		-	-	Ghee, Herbs, Honey, Woolen blankets, Baskets	Ghee, Honey, Baskets	Ghee	Ghee, Honey, Baskets, Woolen blankets	Ghee, Herbs, Honey, Woolen blankets
Salyan	-	-		-	Dried ginger, Ghee	Fresh fruits	Dried ginger, Ghee, Medicinal herbs, Dried chillies	Ghee, Dried chilly	Ghee, Dried ginger, Medicinal herbs, Dried chilly.
Pyuthan	Raksi	Raksi	Raksi		Ghee, Herbs, Woolen goods	Ghee, Woolen goods	Ghee	Ghee	Ghee, Herbs, Woolen goods
Dang	Foodgrains, Salt, Clothes, Sugar, Kerosene Pottery	Foodgrains, Salt, Clothes, Sugar. Kerosene Pottery	Foodgrains, Salt, Clothes, Sugar, Kerosene Pottery	Foodgrains, Salt, Clothes Sugar, Kerosene Pottery			Mustard seeds, Ghee, Pottery	Foodgrains, Mustard seeds, Ghee, Chilly, Pottery	Mustard seeds, Ghee, Herbs, Foodgrains
Rest of Nepal	Foodgrains, Salt, Clothes, Sugar, Kerosene oil etc.	Foodgrains, Salt, Clothes, Sugar, Kerosene oil etc.	Foodgrains, Salt, Clothes, Sugar, Kerosene oil etc.	Foodgrains, Salt, Clothes, Sugar, Kerosene oil etc.	Salt, Sugar Household goods, Animals	Salt, Sugar Household goods, Animals			

Source: PADCO analysis.

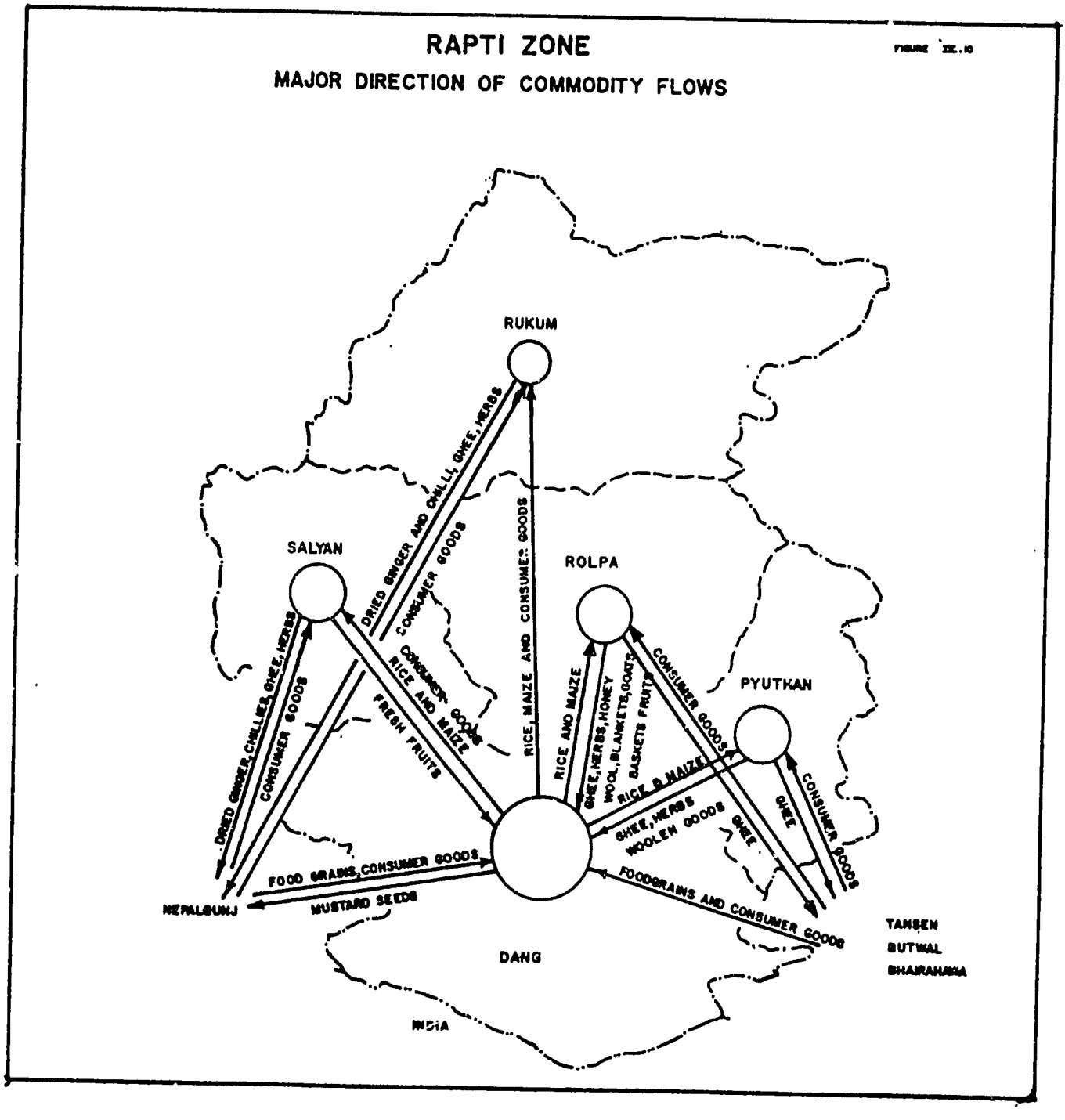

RAPTI ZONE
MAJOR DIRECTION OF COMMODITY FLOWS
FIGURE IX.10
RUKUM
SALYAN
ROLPA
PYUTHAN
DANG
NEPALGUNJ
TANSEN
BUTWAL
BHAIRAHAWA
INDIA
DRIED GINGER AND CHILLI, GHEE, HERBS
CONSUMER GOODS
RICE, MAIZE AND CONSUMER GOODS
DRIED GINGER, CHILLES, GHEE, HERBS
CONSUMER GOODS
RICE AND MAIZE
FRESH FRUITS
RICE AND MAIZE
GHEE, HERBS, HONEY
WOOL, BLANKETS, GOATS
BASKETS FRUITS
CONSUMER GOODS
RICE & MAIZE
GHEE, HERBS
WOOLEN GOODS
GHEE
GHEE
CONSUMER GOODS
FOOD GRAINS, CONSUMER GOODS
MUSTARD SEEDS
FOODGRAINS AND CONSUMER GOODS

Table IV.3

DISTRIBUTION OF COMMODITY FLOW BY WEIGHT (KG.)

ON SEVERAL MAIN ROUTES OF RAPTI ZONE, 1985

(Percentages)

Routes	Food-grains	Ginger	Ghee	Potato	Ferti-lizer	Others[1/]	Total
Tulsipur - Salyan Road	93.6	3.8	0.8	-	-	1.8	100.0
Ghorahi-Libang Trail	70.9	-	-	-	5.4	23.7	100.0
Ghorahi-Pyuthan Road	92.2	-	-	6.8	-	1.0	100.0
Chakchake -Rolpa Road	91.8	-	-	-	-	8.2	100.0

1/ Salt, cigarettes, kerosene, clothing, sugar but not including cement or pipes.

Note: Data based on survey carried out during one week.

Source: Tabulated from data in Louis Berger International, Inc., Preliminary Report of Transport Economics, Rapti Road Assessment Project Technical Memorandum No. 4, May, 1985.

Table IV.4

SOURCES OF SUPPLY, TRANSPORT COSTS, CONSUMER LOCATIONS AND VOLUMES OF SALES FOR SELECTED SHOPS (1985)

GHORAHI

Cloth: 41 Shops			Household Goods: 145		350–450 Retail Rice/Wheat= 50 Wholesale		Houseware = 14 Shops		Kerosene	
Sources	Transport Cost Rs./qt. Normal	Monsoon	Sources	Transport Cost Rs./qt.	Sources	Transport Cost Rs./qt.	Sources	Transport Cost Rs./qt.	Sources	Transport Cost Rs.
Butwal	25–35	50–65	Nepalgunj	30/qt. 0.6/kg.	Nepalgunj	18/qt.	Bhairahawa	0.40/kg.	Krishna-Nagar, Gorakh-pur	Rs.60/drum
Bhairahawa	25–35	50–65	Butwal	30/qt.	Taulihawa	27/qt.	Biratnagar	1/kg.	Basti	60/drum
Kathmandu	250		Bhairahawa	30/qt. 0.6/kg.	Krishna Nagar	18/qt.	Butwal	0.40/kg.	Bhaira-hawa	30/drum
Koilabas	40–45	70–75	Kathmandu	1.5/kg.						
Kanpur	40–45	70–75	Birgunj	1.5/kg.						
Aamdabad	3/kg.		Kanpur/Koi-labas	50–75/qt. 50–55						
Bombay	4/kg.		Manglon	50–55						
			Chainpur	50–55						
Consumer Locations			Consumer Locations		Consumer Locations		Consumer Locations		Consumer Locations	
Rukum	Jajarkot		Dang (6 hours walk)		Dang (6 hours walk)		Dang (6 hours walk)		Dang	
Rolpa	Dang		Rolpa	Lamalu	Rolpa		Salyan		Salyan	
Pyuthan	Deukhuri		Pyuthan	Baluwang	Pyuthan		Deukhori		Pyuthan	
Maikot					Rukum		Rolpa		Rolpa	
Sales/month	Profit		Sales/month	Profit	Sales	Profit	Sales/month	Profit	Sales Month	Profit
Rs. 40,000–60,000	5–15%		Rs.50,000	10,000–20,000	70–80 qt./mo total sold 500–800 qt./day Mangsir-Asad	15–20%	Rs. 15,000–60,000	10%	Kerosene 6,000 litres Diesel 9,000 litres Gasoline 1,500 litres	3.5%

Source: PADCO Survey, May, 1985

Table IV.5

SOURCES OF SUPPLY, TRANSPORT COSTS, CONSUMER LOCATIONS, AND VOLUME OF SALES FOR SELECTED SHOPS 1985

TULSIPUR

Cloths: 40 Shops		Household Goods: 61		6 Wholesale Foodgrain Shops = 9 Retail		Hardware/ Houseware: 10 Shops		Kerosene 55 Shops	
Sources	Transport Cost Rs.	Sources	Transport Cost Rs.	Sources	Transport Cost Rs.	Source	Transport Cost Rs.	Sources	Transport Cost Rs.
Bhairahawa	50/qt.	Bhairahawa/ Butwal	1.5/kg.	Dang	-	Butwal	30/qt.	Butwal	90-100/drum
Butwal	50/qt.	Lakhanow	2/kg.	Nepalgunj	22-24/qt.	Biratnagar	6/kg.	Koilabas	90-100/drum
Kathmandu	90/qt.	Kanpur	2/kg.	Bhairahawa	25/qt.	Kathmandu	100/qt.	Bhairahawa	90-100/drum
Nepalgunj	40			Taulihawa	20-22/qt.		3.5/kg. (plane)		
Kanpur	75-100			Krishna Nagar	20-22/qt.	Birgunj	6/kg.		
Meroth	80					Bhairahawa	60/qt.		
							2.6/kg. (plane)		
Soharatgad	150-200					Kanpur	50/qt.		
Consumer Locations:		Consumer Locations		Consumer Locations		Consumer Locations		Consumer Locations	
Dang (5-6 hrs. dist.)		Dang (6 hrs. dist.)		Salyan		Dang	-	Dang	
Salyan		Salyan		Rukum		Salyan		Salyan	
Rukum		Rolpa		Rolpa		Rolpa		Rolpa	
Rolpa		Rukum		Dang		Rukum		-	
Sales	Profit			Sales/month	Profit	Sales/month	Profit	Sales	Profit
Retail 15,000 - 75,000	10%			Wholesale 75-100/qt./day	Rs.4-5/qt.	Wholesale	2%	400 litres	800-1,000/day
Wholesales 20,000-25,000	5%			Rs.1,147,500/ no.	Rs.10,800	Retail 24,000-30,000	4-10%		
				Retail Rs.15,000 - 18,000	Rs.5/qt.				

Source: PADCO Survey 1985

Table IV.6

SOURCE OF SUPPLY, TRANSPORT COSTS, CONSUMER LOCATIONS, AND VOLUMES OF SALE FOR FOR SELECTED SETTLEMENTS AND SHOP TYPES

Salyan Khalanga : Cloth Shop		Salyan Khalanga: Household Goods Shop		Pyuthan Khalanga: Household Goods Shop		Pyuthan Khalanga: Cloth Shop		Chaujahari Household Goods Shop	
Supply Source	Transport Cost Rs.	Supply Source	Transport Cost Rs.	Supply Source	Transport Cost Rs.	Supply Source	Transport Cost Rs.	Supply Source	Transport Cost Rs.
Tulsipur Ghorahi	1.6/kg.	Ghorahi Butwal Bhairawa		Butwal -75% Ghorahi-25%	Porter: 70/qt Tractor: 35/qt	Butwal Ghorahi	Truck - 85-120 Porter - 200 Tractor - 35 Porter - 70	Dang Nepalgunj (Most)	Plane 4/kq Porter 5/kg
Consumer Location		Consumer Location		Consumer Location		Consumer Location		Consumer Location	
75% ≤ 2 Hours Walk 10% HMG Staff 15% Salyan		< 2 Hours Walk		< 4 Hours Walk		< 2 Hours Normally up to 9 Hours Walk		Most 1½ Hours Walker up to 1 day Many from Rolpa	
Sales (Rs)	Profit	Sales (Rs)	Profit	Sales (Rs)	Profit	Sales (Rs)	Profit	Sales (Rs)	Profit
200 Customers 2500/month	20%		30%	1.12000-15000/mo 2.30,000/mo.	10% 10-15%	12,000-15,000/mo	10%	6,000-12,000/mo	25%

Musikot Khalanga: Household Goods		Libang: Cloth Shop		Libang: Household Goods		Rukumkot: Household goods		Chaujahari Cloth Shop	
Supply Source	Transport Cost Rs.	Supply Source	Transport Cost Rs.	Supply Source	Transport Cost Rs.	Supply Source	Transport Cost Rs.	Supply Source:	Transport Cost Rs.
Tuisipur Ghorahi	4.0/kg (9 days)	Ghorahi - 75% Butwal - 25%	2.0/kg	Ghorahi Butwal Bhairahwa	2/kg.	Ghorahi Bhairahwa Nepalgunj (Most) Tansen Kathmandu		Nepalgunj	5/kg. (10-12 days)
Consumer Location		Consumer Location		Consumer Location		Consumer Location		Consumer Location	
< 2 Hours Walk		< 4 Hours Walk		< 5 Hours Walk		< 2 Hours Walk		Jajai, Jagarkot, Salyan, Jumla	
Sales (Rs)	Profit	Sales (Rs)	Profit	Sales (Rs)	Profit	Sales (Rs)	Profit	Sales (Rs)	Profit
		6,000/month	10%	1.9,000/month 2.12,000-15,000/mo	10% 10%	1. 3,000/month 2. 6,000/month	15% 15%	50,000/mo.	35%

Source: PADCO Survey May 1985.

Transport costs for commodities sold by shops throughout the settlement system in Rapti were found to be highly structured for both porterage and motorized forms of transport (see Appendix Tables A.IV.1-2). Most places within the hill districts do not have access to motorized transport and must rely on porters and ponies to transport goods. In the case of Pyuthan, however, transport costs per kilogram for porters between Pyuthan Khalanga and Ghorahi were found to be 2-3 times more expensive than tractor transport. In addition, it was found that the costs of transporting goods between Butwal and Ghorahi by bus or truck were only about one-half the cost of transport per kilogram by tractor between Pyuthan and Ghorahi.

The road network in Rapti Zone consists of the East-West Highway which links the zone with Nepalgunj and Butwal; the all-weather gravelled road linking Lamahi, Ghorahi and Tulsipur; the Tulsipur-Amile road which is under construction and will eventually provide a shorter link between Tulsipur and Nepalgunj; a seasonal road between Koilabas and Lamahi; and tractorable seasonal roads between Tulsipur and Salyan Khalanga, Ghorahi and Pyuthan Khalanga, and Davistan and Libang. Most of the latter segment, however, is presently not tractorable to Libang. The remainder of the network consists of mule tracks and trails.

Motorable roads in the Terai and plains permit goods to be transported significant distnces at low cost from various supply points, while in the hills very short distances result in extremely high transport costs (see Figure IV.11). For instance, it costs the same amount per kilogram (Rs. 4) to transport cloth from Bombay, India to Ghorahi as it does to transport a kilogram of cloth from Ghorahi to Musikot Khalanga. This is not to suggest that additional roads are required in the hills but rather to illustrate the constraints on commercial development there caused by transport costs. On the basis of field observations, though the tractorable roads permit goods to be transported more cheaply, they do not seem to have a major impact on commercial development at the road head. In addition, the roads also result in a loss of income for porters which is an important consideration in the zone.

Distribution and diversity of commerce and services: To assesss the relative importance of commercial and service development throughout the settlement system in Rapti, a shop count was conducted in 27 settlements throughout the zone. The results by shop and service type are presented in Table IV.7 and Figure IV.12. The table indicates that among the settlements surveyed about 50 percent of the shops and services are concentrated in Ghorahi and Tulsipur and that 68 percent are located in these two settlements plus Lamahi and Balawang. The very strong dominance of these settlements in the Dang and Deokhuri Valleys is illustrated by the very few shops found in other settlements in Dang such as Laxmipur, Saudiyar, Dhanauri, Lalmatya, Jalkundi, Urahari, and Bhagmare. Residents of these areas generally purchase required goods in the dominant towns despite necessary travel time on foot of several hours. In Dang District, only Ghadawa, Koilabas, and Narayanpur appear to have established a commercial base to serve a sub-district hinterland.

In the hill district centers, concentrations of about 40-50 commercial and service establishments were found in each settlement. This suggests a close correlation between the number of shops and services, HMG staff in

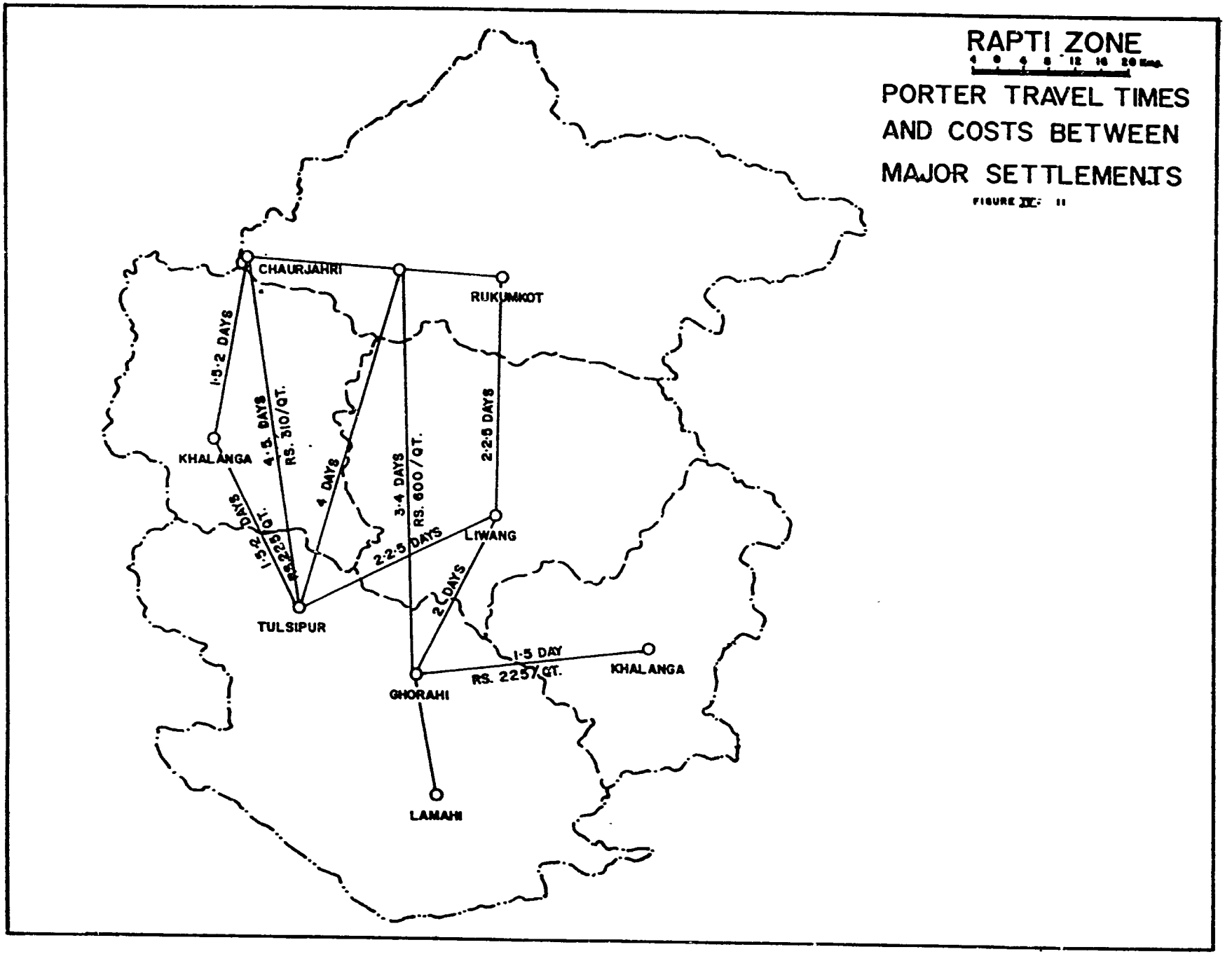

RAPTI ZONE
PORTER TRAVEL TIMES
AND COSTS BETWEEN
MAJOR SETTLEMENTS
FIGURE XV: 11
CHAURJAHRI
RUKUMKOT
KHALANGA
TULSIPUR
LIWANG
GHORAHI
KHALANGA
LAMAHI
1·5-2 DAYS
4·5 DAYS
RS. 310/QT.
4 DAYS
3·4 DAYS
RS. 600/QT.
2·2·5 DAYS
1·5-2 DAYS
RS. 225/QT.
2·2·5 DAYS
2 DAYS
1·5 DAY
RS. 225/QT.

Table IV.7

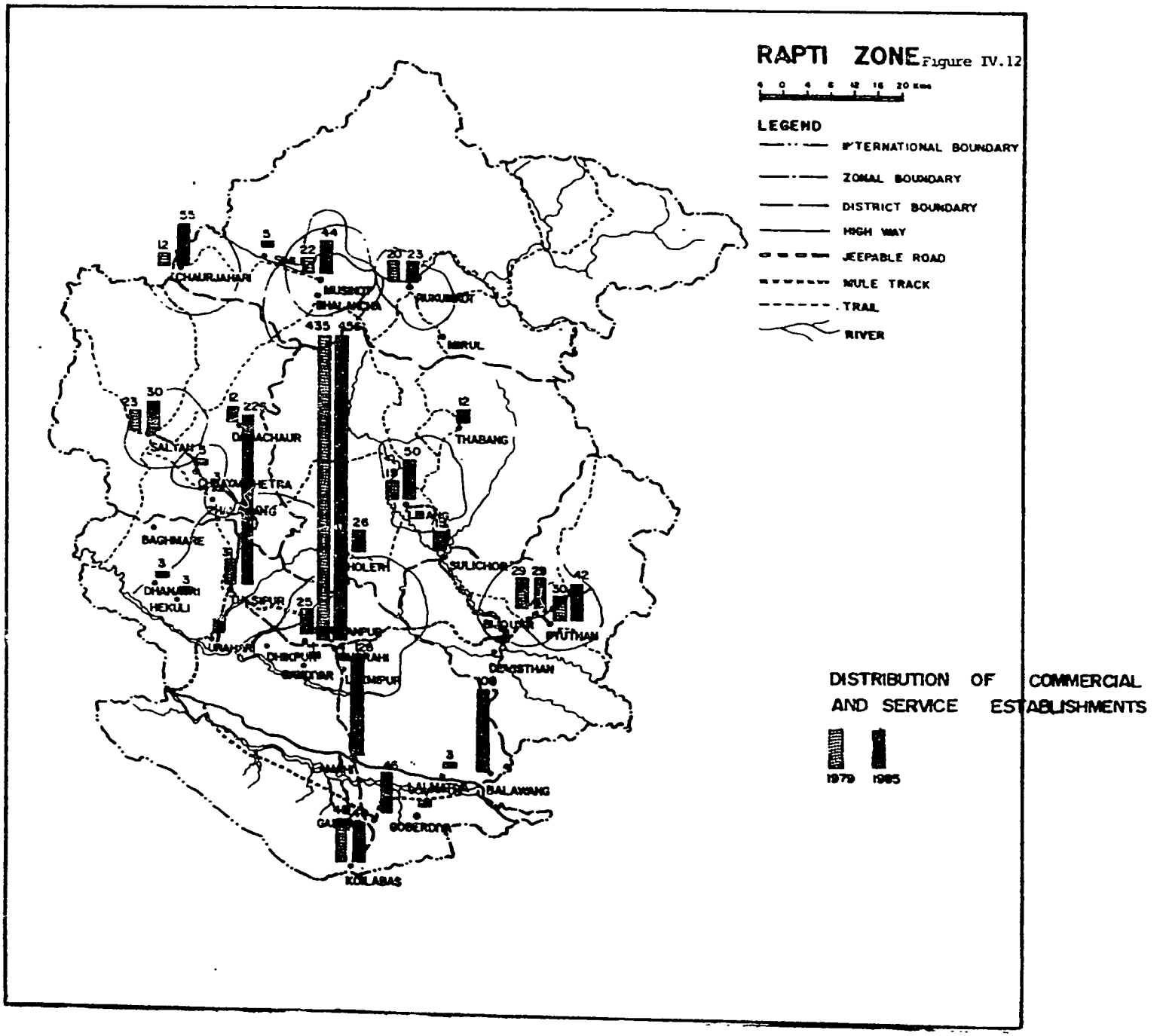
DISTRIBUTION OF COMMERCE AND SERVICES

BY SETTLEMENT, RAPTI ZONE

(May, 1985)*

District	Dang																Rolpa				Pyuthan			Rukum			Sallyan
Settlement	Chorahi	Lamahi	Belawang	Tulsipur	Narayanpur	Laxmipur	Saudiyar	Dhanauri	Hokuli	Bhagawara	Gadawa	Gobardiya	Lalmatiya	Jalkundi	Koilabas	Devisten	Urahari	Sulichor	Thabang	Libang	Pyuthan Khalanga	Bijouar	Holeri	Chaujahari	Rukumkot	Musikot	Sallyan Khalanga
Shop Type																											
Tea/Drinks	31	5	3		6	3		1	1	0	4		1	0	3	2		2		7	6	2	3	5	5	14	2
Food		24	25		4						3							3		5			1	8			2
Household Goods	145	41	17	61	5	1	1	2	2		20	2	2		6		2		3	6	13	7	8	15	7	15	7
Houseware	14	3	2	10							7				5					2	1	3		5	1		1
Pharmacy	9	5	2		1										1		1			1	1		1	1	2	1	3
Vegetables/Fruit	12	4		4											2		10				3	1	2				2
Cloth/Clothing	41	13	8	40	1						7	1			14			3		5	2	7		13	4		3
Cloth/H. Goods	25		10		1													4		10	3		5	1		1	4
Hardware																											
Office Supplies/Bks	6	4																								2	2
Grain/Household Goods	50		22	15	2						2				1		2				5		2			2	
Karosene/Fuel	2	2	1	5											1					1	1				1	1	
Hotel	27	10	3	51												2		3		1	1	1	1	2	1	3	
Handicraft	6			1	2															2		1	1				4
Seamstress/Tailor	14	6	4	8	1							1			6				6-12	4	2	2	2	1		1	
Cobbler	7				1														1	1				1		1	1
Barber	9	2	1	7							1				1												
Furniture	2	1	1	3																				1		1	
Godown		9	4																		1	5			2		
Pots/Tile		3	5																								
Trunks/Metal	5	2		3																					1		
Goldsmith	16	1		6															3	1							
Radio Repair	4	2		2																	1			1		1	
Lawyer/Scribe	2																			3							2
Bike Repair	3	2		3																							
Photo	4	1		5																	1			1		1	3
Tire Repair	2	1																									
Motor Repair	2	2																									
Watch Repair	4			2	1						2									1	1		1				
Other	14																										
	456	128	108	226	25	4	1	3	3	0	46	4	3	0	40	4	15	15	150	50	42	29	26	55	23	44	36

Source: PADCO Survey.


RAPTI ZONE
Figure IV.12
LEGEND
INTERNATIONAL BOUNDARY
ZONAL BOUNDARY
DISTRICT BOUNDARY
HIGH WAY
JEEPABLE ROAD
MULE TRACK
TRAIL
RIVER
DISTRIBUTION OF COMMERCIAL AND SERVICE ESTABLISHMENTS
1979
1985
CHAURJAHARI
MUSIKOT
BHALADEGA
RUKUMKOT
MIRUL
THABANG
SALYAN
DHAKACHAUR
BAGHMARE
DHANGARI
HEKULI
SULICHOR
PHUTHAN
DEVASTHAN
BALAWANG
GOBERDHA
KOLABAS

the district centers, district population (all hill districts have similarly sized populations) and development of these activities. Chaujahari is the only non-district center in the hills where commercial and service activities are on the same order as the district centers.

Though a large number of settlements were not surveyed in the hill districts, it was concluded that there is no direct relationship between the settlement population and the number of commercial and service establishments which may be found there. Rather, it would appear that the commercial structure in the hills is closely tied to:

- Dominance by Tulsipur and Ghorahi which can offer a greater range of goods and services at a lower price than can be provided in the hill districts.
- Concentrations of public services and HMG staff, particularly in the district centers.
- Spheres of influence of less than 2-4 hours walking distance for most district centers and 1-2 hours for other towns (see Table III.6 and Figure III.12)
- The low purchasing power of the populace.
- Proximity to trade routes.
- The prices of goods in respective centers.
- Households' seasonal availability of sufficient time to travel long distances to purchase goods.

Table IV.7 presents the number of shops and service establishments that were found in those settlements surveyed. Among the settlements, it is not unusual that the diversity of shops and services is a function of the economic role played by the settlement and the number of establishments which can be found. Generally in dominant places such as Tulsipur, Ghorahi, Balawang, and Lamahi a greater variety and specialization of establishment types can be found. In smaller places, it is the shops themselves which offer a greater variety of goods in order to attract consumers. For instance, in most small settlements shops offering household consumer goods will each provide some other goods such as foodgrains, vegetables, cloth, and kerosene.

The distribution of services among the settlements surveyed also follows a similar pattern. There is more diversity and specialization in the larger economic centers and less in the smaller ones. Thus, Nepalgunj and Butwal/Bhairawa can be expected to provide a higher order of services than Ghorahi and Tulsipur, but the latter settlements dominate other service activity in the zone. For instance, Butwal has developed as a high order center for maintenance of vehicles and machinery while such facilities and services are less available in Ghorahi.

At the zonal level, service requirements in Dang differ considerably from those in the hills. Nevertheless, a number of traditional service occupations are commonly found throughout all the districts such as cobblers,

blacksmiths, goldsmiths, and barbers. In the larger settlements these activities are established in permanent places while in the hills and smaller settlements these activities appear to be mobile in nature. A cobbler in the hills, for example, may travel from one village to another to repair footware. As a consequence, services such as these could not be accurately surveyed.

In general, the private commercial and services sector was found to be quite responsive to demand and market conditins. For example, in district centers where tea is popular and photographs are required for official business a high proportion of tea shops and a number of photoshops have been established as have stationery stores. The number of pharmacies spread among the settlements also indicates a positive commercial response to an important need.

Growth of commerce and services: There is very little comparative time-series data for evaluating growth in this sector. However, some comparative data from the Rapti IRDP Baseline and Feasibility Studies is available for selected settlements. On the basis of this data, which is presented in Table IV.8, there was no major growth in commercial and service establishments in Ghorahi. Between 1979 and 1985, it is very likely that some of Ghorahi's potential growth in this sector was sapped by Tulsipur and Lamahi. Since 1979, the number of shops in Tulsipur increased from 31 to 226. Furthermore, though there is no 1979 data for Lamahi, apparently the number of shops has increased from only a few several years ago to about 130 small and large shops and services at the present time. It appears that Lamahi has sapped some commercial growth potential from Koilabas as well. Koilabas is the only settlement among those for which data is available which has shown a decline in business activity. Lamahi's rapid growth may be attributed to its central position in Deokhuri, access to the East-West highway (recently completed to Nepalgunj) and access to Ghorahi and Tulsipur. Field observations also suggest that Balawang is also benefitting from its access to the highway as a large number of activities catering to highway traffic have sprung up.

The only hill settlement which has shown very rapid growth in commerce and service is Chaujahari. Chaujahari is situated in a large irrigable valley along the Bheri River in Rukum. It also lies along a major trade route from other northern hill districts to the Terai. As an indication of the marketing potential of Chaujahari's hinterland, it was found that about 30 percent of the shopkeepers had migrated from India. This is quite uncharacteristic of the other hill settlements in Rapti.

Significant growth has also occurred in the hill district centers of Libang and Musikoit Khalanga where the numbner of establishments increased by 163 and 91 percent respectively over a five year period. Salyan and Pyuthan Khalanga had lower rates of growth, but shops still increased by 57 and 40 percent respectively over the same period.

On the basis of roughly two jobs per commercial and service establishment, roughly 965 jobs were added to the eight settlements in Table III.8 or about 193 jobs per year. If one takes into the account the jobs created in rapidly growing settlements such as Lamahi and Balawang, the opportunities for employment generation in this sector cannot be ignored.

Table IV.8

INCREASES IN SHOPS AND EMPLOYMENT

FOR SELECTED SETTLEMENTS

Selected Settlements	No. of Shops 1979 1/	No. of Shops 1985 2/	Increase No. of Shops	Increase % Change	Increase % Change Year	Increase No. of Jobs
Koilabas	48	40	-8	-20		-24
Ghorahi	435	457	22	5	-1.6	-44
Tulsipur	31	226	195	629	125.2	585
Salyan Khalanga	23	36	13	37	11.4	39
Chaujahari	12	55	43	358	71.6	129
Musikot	23	44	21	91.3	118.2	63
Pyuthan Khalanga	30	42	12	40	8.6	36
Bijouar	29	29	-			0
		Total	298	Total		965

1/ Source: Rapti IRDP Feasibility Study, Volume III, Annex 8, Table 2.

2/ Shop counts from PADCO Survey, May 1985.

The effects of prices on commercial development: The price of goods offered for sale in shops is largely a function of transport costs, demand, and location. As illustrated in Table IV.6 and Figure IV.11, transport costs are extremely high throughout the hill districts and have a significant impact on prices as shown in Table IV.9. The table shows how the prices of a wide range of commodities vary throughout the settlements surveyed. For example, the price of a liter of kerosene varies from a low of Rs. 5-6 in Balawang and Ghorahi to a high of Rs. 14-16 in Musikot Khalanga and Rukumkot, while thongs (chapals) vary from Rs.17-18 in Lamahi to Rs. 30-32 in Musikot and Rukumkot. A significant and gradual south to north rise in prices is characteristic of most commodities surveyed with the exception of those goods which are sold by dealerships such as biscuits, soap, and cigarettes. However, even prices of these goods may vary: Yak cigarettes can be purchased for Rs. 7.5 in Dang but sell for Rs. 8-10 in the northern settlements.

Unexpectedly, the price of goods was found to vary significantly even in Dang, which is not affected by topography. For example, the price of kerosene varies from Rs. 6.5-8 between Ghorahi and Dhanauri, and battery costs vary from Rs. 8 to Rs. 12 between Balawang and Dhanauri. Though access is certainly a contributing factor to increased prices, other factors must also be responsible. For instance, in Narayanpur, which is situated mid-way between Ghorahi and Tulsipur, thongs cost one-third more than they do in its larger neighbors. Thus, it can be assumed that shops in Narayanpur largely serve the immediate or urgent needs of local consumers permitting higher prices to be charged. On the other hand, the few shops located in other settlements in Dang indicate that the populace largely satisfies its less immediate needs for goods in Tulsipur or Ghorahi. Presumably, the pricing pattern of goods and distribution of commercial activities in the hills would follow a similar pattern as they do in Dang. Davistan is more accessible than Pyuthan Khalanga and Libang, but the prices of batteries and toothbrushes there are higher than in the latter two settlements.

Because the price of commodities in the northern districts and remote settlements are so much higher than those in the large Terai settlements, one would expect that a higher percentage of hill income is spent to satisfy household consumer needs. In addition, incomes could be expected to be lower in these areas. However, evidence suggests that the hill households largely purchase goods outside of their respective districts as was discussed earlier.

c. Manufacturing and cottage industry

Manufacturing: In a larger geographical context, the bulk of large and medium sized manufacturing establishments are concentrated in Butwal/ Bhairawa (Rupandehi District) and Nepalgunj (Banke District). It would appear that the manufacturing establishments in these places satisfy most of the large and medium manufacturing requirements for their respective regions and that the Rapti Zone can be considered only a small part of their respective hinterlands. Each of these settlements enjoys a much more diversified base of skilled labor, access to better infrastructure and

Table IV.9

PRICES (RS.) OF COMMERCIAL GOODS
BY SETTLEMENT, RAPTI ZONE
(MAY, 1985)

District	Dang															Rolpa			Pyuthan		Salyan	Rukum		
Settlement / Commodity / Unit	Ghorahi	Lamahi	Balawang	Tulsipur	Bhalwa	Narayanpur	Laxmipur	Saudiyar	Hekuli	Dhanauri	Gadawa	Lalmatiya	Kotlabas	Gobardiya	Urahari	Holeri	Sulichor	Libang	Pyuthan Khalanga	Deviatan	Salyan Khalanga	Musikot	Chaujahari	Rukumkot
Rice/kg	5-5.5	4-5	4-5.6	5-6	-	4.4	4.4	-	-	4	5	5	4.4	6-	5.5	6-8	12	-	5.4-7.5	5.5	--	-	-	
Sugar/kg	10.25	9-10	10	10.5	-	12.5	13.	-	-	-	12	14	-	-	14/kg	12	15	11	12	11.5-12	-	-	-	20
Kerosene/ltr.	6.5	7	6.5	6.6	7-7.5	7	7	-	-	8	6.5	6.5	5.8	-	-	9-9.5	10	11	8	8	10	14-15	14	15-16
Tea / 100g	8.5	7	5	7	-	7	7	7	10	7.5	7	7	7	8	9	-	6	7.5	7	8.6	-	8	-	10
Thongs(Chapal)	18-20	17-18	18	17	20	24-25	24	-	-	22	20	19	18	20	22	22	24	27	20	20	28	30	20	32
Matches(12)	3.6	3.5	3.5	-	-	3.5	3.5	4	3.5	4	3.5	4	3.5	4	6	4	5.5	4	3.5-4	4	-	5	5	5.5
Batteries (2)	10	10	8	10-11	12	10	9	11	11	11-12	11	9	10	11	12	12	11-12	12	11	12	12	12	13	14
Rara Soap	5	5	5	5	-	-	-	-	-	-	-	-	-	-	5	5	-	5.5	5	5.5	5	-	5	5
Cooking Oil/ Litre	19	20	18	22	-	22	25	-	-	-	20	20	20	20	22	25	24-25	26	21	23	20	30	30	32
Everest Toothpaste 50g	6.5	7	5	5	5	7	8	-	-	-	7	-	-	7	-	7	8	6-7	6.5	-	-	10	-	-
Toothbrush	3-5	3-4	2.5-3.5	2.5-4.5	3-3.5	3-4	-	-	-	2.5	3	3	3-4	3-4	-	4-5	4	3-3.5	3-3.5	4-5	-	4.5	-	5-7
Salt/kg	1	1	1	1	1	1.25	1.25	-	-	1.8	1.25	1	-	1.2	-	1.5	-	-	2.25	-	-	-	-	4
Dal (Lentils)/kg	8	9	5-6	8-12	4-4.5	7-8	8	-	-	-	7	5	8	10	7	12-16	10-12	-	-	-	-		-	-
Cheapest Cloth/Meter	8	8-10	5	-	-	8-10	-	-	-	-	8	-	6	12	15	-	-	4	-	-	-	-	-	8
Torch Light/ Chinese	24	20	22	24	-	25	-	-	-	-	22	25	22	25	-	-	28	28	25	-	-	28	25	22
Khaini Tobacco	2	1	1.5	-	-	2	2	2	-	-	1.5	1.75	2	2	-	-	-	2	2	2	-	2.5	2	-
Yak Cigarettes	7.5	7.5	7.5	-	9	7.5	7.5	8	8	8	7.5	7.75	7.5	8	-	8	8.5	8.5	7.5	8	7.5	7.5	8	8
Small Cookies (Super)	1	1	1	1	1.5	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	-	1	-	-
Mebico Cookies	3	2.5	2.5	2.5	3.5	2.5	3	-	-	-	-	-	2.5	-	3	-	-	-	2.5	-	3	2.5	3-4	3-5
Fire Wood	10	8	4	-	-	10-12	10	8	-	-	3-4	-	6-7	-	5	-	6	-	-	-	12	-	-	-
Chinese Tennis Shoes	-	-	-	50-135	-	-	-	-	-	-	50	-	40	-	-	-	-	75	-	-	-	-	-	55
Umbrella	-	-	-	38-42	-	40	-	-	-	-	35	-	32	-	-	40-45	-	40-85	35	-	-	-	-	-
Bidi Cigarettes	-	-	-	15	-	16	18-19	17	18	16.5	16	16	16.5	18	-	-	-	-	16.5	22	-	18	-	-
Glucose Cookies	-	-	-	-	3.5	2.5	3	3	3	2.5	3	3	-	3	-	3	-	3	3-4.5	2	-	-	-	-
Polyester Cloth		-	-	-	-	52	-	-	-	-	-	-	35	-	-	-	100	50	40	-	-	-	-	-
Laltrine Light		-	-	-	-	-	-	-	-	50	-		-	-	-	-	-	60	-	-	-	-	-	50

Source: PADCO Survey

supply and marketing systems, and access to resources than do any settlements in Rapti.

On a district basis, industrial types and employment for all Rapti districts as well as Rupendehi and Banke are presented in Table IV.10. As the table indicates, the highest levels of manufacturing establishments and jobs are found in Banke (Nepalgunj), Rupandehi (Butwal/Bhairawa), and Dang Districts. Out of a total of about 4,970 manufacturing jobs in these districts, about 42 percent were located in Banke, 39 percent in Rupandehi, and 17 percent in Dang. The hill districts of Rapti had very low percentages of industrial establishments and employment. No industries were found in Rukum and only 3-5 were found in the other hill districts. Employment in oil and grain mills strongly dominates industrial employment in all districts followed by bidi-making (traditional cigarettes) and furniture.

As appendix Table A.IV.3 shows, within the Rapti Zone there were 60 manufacturing establishments in 1976/77, of which about 95 percent were found in Dang. By 1981/1982, the number of industries increased to 79, of which about 85 percent were located in Dang. Most of the new industries added were oil and grain mills. Some industries inventoried in 1977 do not appear in the inventory of 1981/82. For instance, a yarn and textile industry and a brick and tile industry disappeared from Dang; and yarn and textile, furniture, and paper industries disappeared in Rolpa.

On a settlement basis, industry and employment figures from the Industrial Service Center data for 1983 are presented in Appendix Table A.IV.4. Among those manufacturing establishments with fixed assets greater than Rs. 2,000, all such establishments were found in either Butwal, Nepalgunj, or Bhairawa. Furthermore, when small industries are considered, only one of the 47 industries inventoried is located in Rapti (Tulsipur). Nepalgunj has the largest industrial base with 57 percent of the establishments located there.

The types of manufacturing and amounts of employment found in each of these settlements is presented in Table IV.11. The dominant industry of all types was oil and grains which also dominated industrial activity in Nepalgunj, Butwal, and Tulsipur. On the average about 43 persons are employed in each oil and grain industry in Nepalgunj.

Despite the fact that most large industries are concentrated in Nepalgunj, Butwal, and Bhairawa, there is not much diversification in their respective industrial bases. In order to illustrate this point, a comparison was made with data available for similar settlements in the neighboring Indian towns of Uttar Pradesh and Punjab (varying between 20,000 and 50,000 in population) as presented in Table IV.12. Firstly, all of the industries found in Nepalgunj and Bhairawa/Butwal are found in the settlements of Uttar Pradesh and Punjab with similar populations. However, in the Indian settlements greater diversity is shown. Those industries which do not appear in either Nepalgunj, Bhairawa, or Dang include: cold storage and ice making; canning and preservation of fruit; beverages; pottery, china and earthware; woolen textiles; paper and paper products; chemical and chemical products; glass

Table IV.10

DISTRIBUTION OF MANUFACTURING ESTABLISHMENTS AND NUMBER OF PERSONS ENGAGED BY DISTRICT, 1981/82

Type of Industries	Banke		Rupandehi		Dang		Salyan		Rolpa		Pyuthan	
	Number	Persons	Number	Persons	Number	Persons	Number	Persons	Number	Persons	Number	Persons
Bakery Products	-	-	10	269	-	-	-	-	-	-	-	-
Bidi Making *	5	676	1	135	-	-	-	-	-	-	-	-
Furniture (Wood)	8	108	16	215	-	-	-	-	-	-	-	-
Ice & Ice Cream	1	6	2	11	-	-	-	-	-	-	1	6
Knitting Mills	1	38	-	-	-	-	-	-	-	-	-	-
Metallic Vessals	2	56	1	28	-	-	-	-	-	-	-	-
Oil . Grain Mills	72	330	169	774	65	298	4	18	5	15	1	5
Printing Press	3	56	7	180	-	-	-	-	-	-	-	-
Repairing Works	-	-	7	89	-	-	-	-	-	-	-	-
Saw Mills	3	46	1	15	-	-	-	-	-	-	-	-
Yarn & Textile	1	21	-	-	-	-	-	-	-	-	-	-
Iron & Iron Prod.	7	231	2	66	1	33	-	-	-	-	-	-
Others	16	535	11	180	1	505	-	-	-	-	1	24
Total	119	21013	227	1962	67	836	4	18	5	15	3	35

* Local cigarettes

Note: The numbers of persons engaged are assigned according to the national average figure of persons engaged in particular industry groups.

Source: Central Bureau of Statistics. Census of Manufacturing Establishment of Nepal 1981/82.

Table IV.11

DISTRIBUTION OF INDUSTRIES LOCATED IN NEPALGUNJ, BHAIRAHWA, TULISPUR AND BUTWAL BY TYPE

Type of Industry	Nepalgunj		Bhairawa		Butwal		Tulsipur	
	Number	Employment	Number	Employment	Number	Employment	Number	Employment
Oil and Grains	8	347	1	36	2	30	1	8
Iron & Iron Products	3	-	2	-	1	-	-	-
Bakery	1	-	2	-	-	-	-	-
Textile	2	-	-	-	-	-	-	-
Matches	1	159	1	105	-	-	-	-
Dairy Products	1	17	-	-	1	12	-	-
Furniture	2	-	-	-	-	-	-	-
Plastic	3	-	1	20	-	-	-	-
Others	6	-	2	-	6	-	-	-
Total	27	-	9	-	10	-	1	-

Note: As of 1983, industries under construction and not in operation are excluded.

Soruces: 1. Department of Industries Industrial Profile (Manufacturing Industries), 1982/83, Department of Industries Kathmandu.

2. Industrial Services Center, Present Status of Industries in Industrial Districts of Nepal, 1983.

Table IV.12

VARIATION OF INDUSTRY TYPES AMONG SIMILARLY SIZED SETTLEMENTS IN BANKE, RUPANDEHI AND DANG DISTRICTS AND UTTAR PRADESH AND PUNJAB INDIA

Type of Industries	India at Locations with Population Size 20,000-50,000		Banke	Rupandehi (Bhairahwa) & Butwal	Dang
	Uttar Pradesh	Punjab			
Dairy, Products	●	●	●	●	
Canning, Preserving Fruits	●				
Rice, Flour Mills	●	●	●	●	●
Bakery Products		●	●	●	
Sugar Factories/Refineries	●	●		●	
Confectionary/Chocolate				●	
Cold Storage, Ice Making	●	●			
Beverage	●				
Soft Drink					
Tobacco Manufacture	●		●	●	
Cotton Textile	●	●	●	●	
Woolen Textile	●				
Knitting Mills	●		●		
Foot Wear and Other Wearing Goods					
Manufacture of Wood Except Furniture	●	●	●	●	
Furniture & Fixture	●	●	●	●	
Paper and Paper Production	●				
Printing, Publishing	●	●	●	●	
Leather (Except Foot Wear)		●		●	
Rubber Products	●	●	●	●	
Chemical & Chemical Products (Paints, Varnishes)		●			
Non Metallic minerals (Glass & Glass Products)	●				
Pottery, China Earthen Ware	●	●			
Metal Products (Except Machinery)	●	●			
Machinery (Except (Electrical)	●	●	●	●	●
Electrical Machinery	●	●		●	
Cycles & Motorcycles		●			

Sources: List of Registered Factories, Uttar Pradesh and Punjab, 1965; HMG Department of Industries; HMG Industrial Services Center.

and glass products; and metal products. Thus, there may be some scope for these industries within the Nepali settlements discussed. In none of the Indian or Nepali settlements studied do wearing apparel industries and soft drink industries appear.

Cottage industries: Analysis of cottage industries is restricted to the Rapti Zone. The distribution of cottage industry types and employment by district and panchayat (excluding Pyuthan) is presented in Appendix Tables A.IV.5-8. No data were available for Pyuthan. In 1983/84 there were 242 establishments and 1,250 employees in Salyan, Dang, Rukum, and Rolpa as recorded by the Ministry of Industry. Cottage industry employment distribution by district was found as follows: Rolpa, 40 percent; Salyan, 35 percent; Dang, 17 percent; and Rukum, 8 percent.

On a district basis, the distribution of cottage industry employment was found to be highly concentrated in a few panchayats, particularly the district centers. For instance, in Salyan 50 percent of all establishments were found in Khalanga panchayat. Other Salyan panchayats where cottage industry employment was concentrated were Chhayachhetra (11 percent) and Phalabang (8 percent). In Dang district, 13 percent of employment was concentrated in Tulsipur panchayat, 14 percent in Amritpur, and 10 percent in Manpur panchayat. In Rukum, 33 percent of cottage industry employment was found concentrated in Khalanga panchayat, 12 percent in Magma, 11 percent in Shakha, and 10 percent in Bafikot panchayat. In Rolpa district, 27 percent of cottage industry employment was found in Libang, 17 percent in Ghodagaon, and 12 percent in Haama panchayat.

More than 17 different types of cottage industries were found in the four districts. The most important of these in terms of total cottage industry employment include: cotton goods, 24 percent; woolen goods, 16 percent; oil and grain millss, 16 percent; and furniture, 14 percent.

On a district basis, the most important cottage industries measured in percent of employment by cottage industry type include:

- Dang: oil and grain mills (35 percent); brick and tile (24 percent); and other (12 percent).
- Rolpa: woolen goods (31 percent); cotton textiles (28 percent); and furniture (11 percent).
- Rukum: cotton textiles (68 percent); oil and grain mills (13 percent); and furniture (11 percent).
- Salyan: cotton textiles (33 percent); oil and grain mills (12 percent); furniture (13 percent); construction (11 percent); and others (9 percent).

The distribution of principal types of cottage industry appears to be closely tied to the resources available within the districts as well as to principal settlements in each district.

3. Public Service Roles of Settlements

a. Distribution of public services

Public service is a key function of settlements throughout the Rapti Zone. Administratively, the Zonal Headquarters is situated in Tulsipur, while district headquarters are located as follows: Salyan, Khalanga; Rukum, Musikot; Rolpa, Libang; Pyuthan, Khalanga; and Dang, Ghorahi (Tribuvan Nagar). A wide range and significant number of HMG offices are distributed among the settlements of Rapti as is illustrated in Table IV.13 and Figure IV.13. Among the 41 settlements for which data were collected, 440 different HMG or related offices were found in about 50 functional categories throughout the settlement system. Thus, considerable emphasis has been placed by the HMG on establishing an institutional infrastructure for administration and development. On the whole, these offices were found to be better distributed in the zone than commercial and service establishments (Figure IV.12). However, about 37 percent of the offices were found in Dang with the remainder distributed relatively evenly among the other four districts. About 23 percent of the HMG offices were found in Ghorahi and Tulsipur alone, largely due to their roles as zonal and district headquarters.

In the hill districts, each district center has about 30 HMG office types which represent about one-half the office functions found in each district. However, offices were found to be most concentrated in Salyan Khalanga (64 percent) and least concentrated in Musikot (36 percent). In the case of Rukum, almost all the offices were located in either Musikot, Chaujahari, or Rukumkot. Generally, Libang, Salyan Khalanga, and Pyuthan Khalanga are centrally located within their respective districts. Ghorahi and Musikot, on the other hand, are conspicuously located to the north and south respectively. Nevertheless they are well located with respect to population concentration in their districts.

Those settlements which offer a secondary order of public services in the zone include Koilabas, Lamahi, Chaujahari, and Rukumkot, where 11-17 offices are located in each settlement. Most other smaller non-district centers have between 4-7 functions such as post offices, health centers/posts, agriculture and veterinary sub-centers, police sub-centers, and high schools. It should be noted that the majority of the settlements throughout the zone rely on those settlements presented in Table IV.13 for public services.

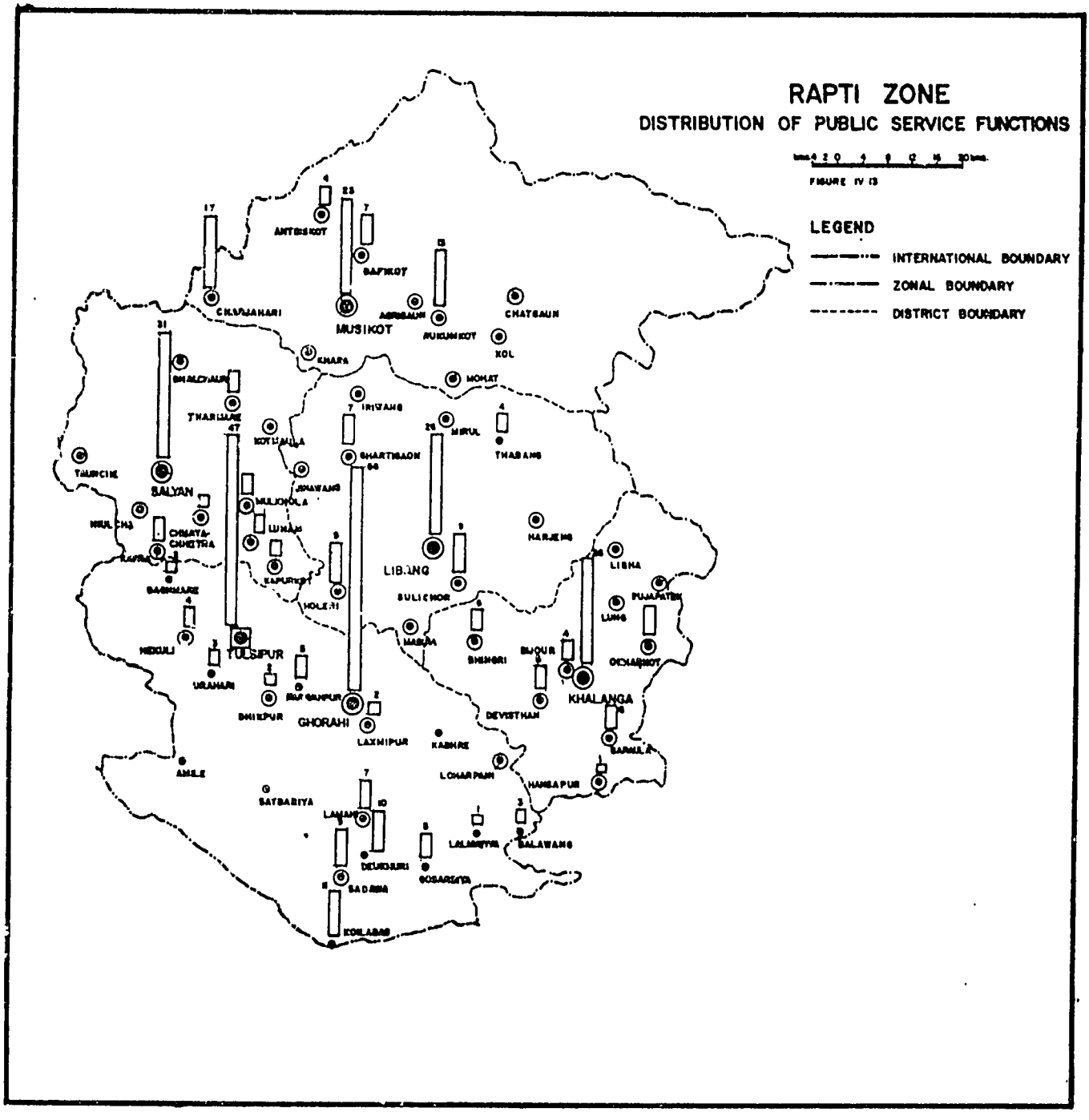
b. Impact of public services on the settlement system

District headquarters are a long-standing institution in Nepal. The present configuration stems from the national district reorganization which was undertaken in 1961 after which Rolpa District was created. Salyan and Pyuthan Khalangas have been district headquarters for several decades but Rukumkot was formerly the district headquarters before this function was shifted to Musikot. Historically, Salyan Khalanga, Pyuthan Khalanga, Musikot, and Rukumkot were principalities during the feudal period. For better defense and healthier climates, they were situated on hill tops (kots or khalangas). Subsequent HMG investment in institutional infrastructure has reinforced these centers despite social and economic changes which have occurred in the past decades. For example, there are indications that

RAPTI ZONE

TABLE IV 13

GOVERNMENT SERVICES OFFICES	DANG														SALYAN							PYUTHAN							ROLPA					RUKUM				
	CHORAHI	LAMAHI	BALAWANG	TULSIPUR	GOBARDIYA	KOILABAS	GADAWA	URAHARI	NARAYANPUR	LAXMIPUR	HEKULI	BAGHMARE	DEUKHURI	LALMATIYA	KHALANGA	LUHAN	CHATYACHETRA	KAPURKOT	THARMARE	MULKHOLA	KABRA	KHALANGA	OKHARKOT	BIJUWAR	BHINGRI	DEVISTHAN	BARAULA	HANGAPUR	LIBANG	HOLERI	THABANG	SULICHAUR	GHARTIGAON	MUSIKOT	RUKUMKOT	BAFIKOT	CHAURJHARI	ATHBISKOT
ZONAL HEADQUARTER				●																																		
DISTRICT HEADQUARTER	●														●							●							●					●				
—PANCHAYAT TRAINNING				●											●														●									
POLICE	●			●											●							●							●					●				
—POLICE SUB		●	●			●	●		●				●			●							●		●	●				●	●	●	●		●	●		
MILITARY	●																					●																
JAIL	●			●											●							●							●					●				
COURT	●			●											●							●							●					●				
TAX	●			●											●							●							●					●				
TREASURY/FININCE	●			●											●							●							●					●				
CUSTOMS						●																																
LAND REFORM	●			●											●							●							●									
RESOURCE CONSERVATION	●			●																									●									
TECHNICAL OFFICE	●			●											●							●							●									
WATER SUPPLY	●			●	●																								●					●				
ROAD DEPARTMENT	●			●																															●		●	
ELECTRICITY OFFICE	●					●						●																								●	●	
IRRIGATION				●	●														●																		●	●
AGRICULTURE OFFICE	●														●							●							●					●				
—AG SUB		●		●			●						●					●	●	●	●		●		●	●	●			●		●	●		●	●	●	
—SFDP	●							●					●							●	●				●		●											
—CROPPING SYSTEMS	●														●	●																●			●		●	●
VETERINARY OFFICE	●														●							●							●					●				
—VETERINARY SUB		●		●		●	●				●							●	●	●	●		●		●	●	●			●		●	●		●		●	●
FORESTRY OFFICE	●			●											●							●							●					●				
—FORESTRY SUB/NURSERY						●													●							●				●			●		●			
TELECOMMUNICATION OFFICE	●			●		●	●								●							●							●									
EDUCATION OFFICE	●														●							●							●					●				
—TEACHER TRAINING	●			●											●																							
—CAMPUS	●														●									●										●				
—HIGH SCHOOL	●	●		●	●		●		●		●			●	●	●			●			●	●	●	●				●	●		●	●	●	●	●	●	
—MIDDLE SCHOOL	●					●				●					●						●						●	●			●							
COTTAGE INDUSTRY	●												●		●							●							●					●				
—COTTAGE SUB	●																													●								
—WOMAN DEVELOPMENT	●														●																							
HEALTH OFFICE	●														●																							
—HOSPITAL	●														●									●					●					●				
—HEALTH POST/CTR	●			●	●	●	●		●	●	●		●		●				●			●	●			●				●	●	●	●	●	●	●	●	
—TRADITIONAL MEDICINE	●			●	●										●														●									
—LEPROSY HOSPITAL	●																																					
—MALARIA CONTROL	●			●			●	●					●																									
FAMILY PLANNING	●			●									●		●							●							●									
POST OFFICE	●	●	●	●		●	●		●		●	●			●	●	●	●				●	●		●		●		●		●	●		●	●	●	●	●
NATIONAL TRADING	●																																					
SAJHA COOPERATIVE	●			●			●	●	●				●		●							●													●		●
AIC	●	●		●											●							●													●		●
NEPAL FOOD CROP	●			●									●		●							●		●					●					●			●
—TIMBER CROP													●									●							●	●		●		●	●		●
J. CIGARETTE OFFICE	●			●		●							●																									
NEPAL BANK/COMM BANK	●	●	●	●		●									●				●			●							●	●			●	●	●	●	●	
ADB	●			●									●		●							●							●					●	●		●	
RNAC				●																												●					●	


RAPTI ZONE
DISTRIBUTION OF PUBLIC SERVICE FUNCTIONS
FIGURE IV 13
LEGEND
INTERNATIONAL BOUNDARY
ZONAL BOUNDARY
DISTRICT BOUNDARY
MUSIKOT
SALYAN
LIBANG
TULSIPUR
GHORAHI
KHALANGA

service delivery is less desirable in hill top settlements because of problems of accessibility. Bijouar and Sittelpatti in Pyuthan and Salyan Districts, for example, are more accessible valley settlements in proximity to their respective district centers, and some services have been recently located there.

The district center offers a wide range of administrative and development services which are not duplicated elsewhere in the district. As a consequence, the whole district serves as its hinterland for these purposes. People travel to the district headquarters from all parts of the district to settle disputes, pay taxes, sell and register land, and a host of other reasons. It appears that they combine these trips with shopping and take orders from other villagers before their departure. As a consequence, the attraction of the district centers for administrative purposes also stimulates commercial development in the headquarters. In non-district centers the same principle would seem to apply although area and population served would be smaller.

The district centers also house relatively large concentrations of HMG related staff which help support commercial activity in these settlements. In Tulsipur and Ghorahi there are roughly 400 and 600 HMG staff respectively, while the other district centers have roughly 300 staff members each. Undoubtedly, the presence of these government workers provides a guaranteed market and some stability for local commercial and service establishments.

Another important impact of the public services sector is in construction. Throughout the zone, hospitals and health centers, government offices, schools, and other types of construction are occurring. In recent years, there seems to have been a trend away from facilities which have been rented from private groups and towards government constructed building. The older facilities currently in use are often 20-50 years old and constructed of traditional materials such as wood, mud-brick or stone. The newer facilities have a high component of imported materials such as cement, reinforcing iron, etc. and are considerably more expensive than their traditional counterparts. For instance, in Salyan and Pyuthan Khalanga houses of traditional materials are being constructed for about Rs.1,000-1,200 per square meter despite the high cost of wood. The District Technical Offices built of stone, mortar, and steel, by contrast, are estimated at Rs. 2,100-3,000 per square meter, while hospitals will cost about Rs. 4,200 per square meter to construct.

Certainly the type of construction which is suitable for each government function will vary, and the need for some type of proper facilities to attract government workers to remote ares is a problem. Nevertheless, it would appear that the HMG should reconsider its building policy. The traditional type of construction appears to be satisfactory for staff offices and quarters generally. According to one LDO who was interviewed in the zone, the districts have had little choice as to the design and type of construction carried out in their districts. Decisions on these matters are apparently handled at the central level. As a consequence, the more remote districts are penalized since the high costs of transport, cement, and other materials reduces the number of new buildings and facilities which can be built with the same amount of funds.

Furthermore, there is some question as to how much the public building construction scheme actually benefits inhabitants of the distict and zone. Modern construction generally requires higher grade and more specialized skills than are available in the traditional sector. The PCO complex for the Rapti IRDP in Dang, for example, was built by a contractor from outside the zone who largely employed a pool of Indian labor for skilled construction works.

c. Service delivery in settlements

Service delivery in the Rapti Zone as a whole is treated in Chapter V. As most of the public services which are provided to the general populace are located within settlements, the service delivery indicators which are discussed in that Chapter are relevant to this section as well.

Generally, the types of services which are provided in settlements can be broken down into administrative and developmental services. This report will deal with the latter. Among the developmental services, virtually all require some type of programming, budgeting, and monitoring which are controlled by the district center and which seem to require most of the time and resources available by the staff. With respect to service implementation there are two distinct types: 1) those services operating out of a facility to which the populace comes for service and 2) extension services where the goal is to bring the service to the population at large. Among the former type, the required distribution of service is dependent on the nature of the service which is being offered. For instance, primary schools, health posts, veterinary services, etc. must be in relative proximity to the population being served. Distribution of agricultural inputs, food grains, etc. do not require such close proximity to the groups being served. These types of functions might best be provided out of zonal facilities in Ghorahi and Tulsipur. As was noted previously in the commerce and services section, the people of Rapti are extremely mobile and will travel long distances to market their goods and purchase necessary items. Mobility patterns must be taken into account when deciding how and where service delivery should occur.

As Chapter V illustrates, actual service delivery as opposed to distribution of service facilities is relatively poor among many of the sectors studied. For instance, the AIC facility in Sheri Gaun (Musikot) reported that it served about 250 farmers per year within a distance of 4-5 days walk, which is roughly equivalent to the entire distict. If this is the case, only about 1.1 percent of the Rukum households are being served at the district level by this facility. In Pyuthan's branches of the AIC, reportedly 175 farmers are served per year, or less than one percent of households in that district. Service delivery in other sectors also leaves much to be desired.

Fundamentally, the institutions responsible for implementing service delivery do not utilize adequate indicators to study the impact on the population to be served. AIC and the NFC provide data on the tonnage of inputs and food provided but not on the number of beneficiaries. The ADB can provide total loan amounts by loan type but not the number of loans. Progress towards development plans are measured in terms of health units, schools, and other facilities which have been constructed. Clearly, more emphasis should be placed on measuring the quality of service delivery and

impact on the population of the areas to be served, on reduced expenditure for building public facilities, and on more expenditure for service inputs (medicine, teaching material, staffing, training, and other inputs to make existing facilities more effective). Without service delivery improvement, construction of new facilities at considerble cost may only marginally benefit the population at large.

d. Service centers

An evaluation of existing proposals: Service centers will add another layer of institutional infrastructure within the zone and districts. According to the Decentralization Act and Bylaws, nine service centers will be established in each district, or one in each Ilaka. The criteria which are to be employed in selecting sites for each service center are as follows:

- Places located in proximity to the majority of the population to be served.
- Places with adequate access to transport routes and travelers.
- Places where other commercial and service activities are found.
- Places where partially or fully developed community service facilities such as schools, health posts, postal service, police station, godowns, and cooperatives are found.
- Places where the HMG has already established an investment program.

The Decentralization Rules and Regulations (2040/1983) note that if it is not possible to establish a service center in all areas it may be necessary to service two areas with one center. The rules also suggest that each development office will be encouraged to establish branch offices in each service center, but that because of resource constraints it may be necessary to establish branch offices to serve two or more Ilakas initially.

Finally, current HMG thinking is that three grades of service centers will be established. The highest level, Grade A, would be at the district center level. Grade B centers would consist of a wide array of different functions but less well developed than in the district centers. The lowest level, Grade C, would offer only those types of services which are appropriate to the localities in question, such as post offices, veterinary subcenters, etc.

In Figure IV.13 and Table IV.14, the locations of service centers as suggested by geographers of the NPC and MPLD are presented, together with the locations of service centers which have either been constructed or are planned by the Rapti IRDP. In order to assess how well these locations correspond to the criteria established above, a number of analyses were used. First of all, these locations were compared to the population density map presented in Figure IV.2 Notably, it was found that the suggested service center locations are closely related to the concentrations of population within the district and zone. However, it was found that

TABLE IV. 14

SUGGESTED HIERARCHY OF SERVICE CENTERS

ZONAL ORDER	TYPES OF PUBLIC SERVICES
- Ghorahi - Tulsipur	Existing offices, with better and more specialized health care;education and skill training and credit facilities; direct distribution of NFC food grains; and AIC inputs to people of the zone.
DISTRICT ORDER - Salyan-Khalanga (Sittelpati) - Pyuthan-Khalanga (Bijouar) - Libang - Musikot	Existing offices with ATU,better health care, education, and extension services.Location of hospitals and other services requiring easy access in valley/trail areas in proximity to district headquarters. Less emphasis on distribution of AIC and NFC inputs from district locations (focus of efforts at zonal level).
SUB-DISTRICT ORDER	RECOMMENDED ADDITIONS (OVER TIME)
Dang-Lamahi or Ghadawa	CSS,SFDP,cottage ind.,police, middle school, health center, family planning, women development, forestry (sub)
Salyan-Thamare	CSS,SFDP, veterinary (sub), cottage ind, police, post office, middle school, health center, family planning, forestry (sub)
Pyuthan-Bhingri	CSS, veterinary (sub), forestry sub, ADB, middle school, health center, family planning, cottage ind., women development.
Rolpa-Ghartigaon	SFDP, CSS, family planning, forestry (sub), women development, post office, ADB, middle school, health center.
Rukum-Chaujahari	Family planning, forestry (sub), cottage ind., middle school, health center.
	Rental of facilities or construction using traditional materials suggested for all new offices (also case for district centers)

TABLE IV, 14 / contd...

ILAKA ORDER		MAY SERVE MORE THAN 1 ILAKA
Dang	- Gobardiya Hekuli Loharpani Balwang	Emphasis in all settlements on agriculture, veterinary, forestry and other extension services, post office, health post and middle schools. These actvities to be added where non existent.
Salyan	- Chhayachhetra Balachaur Kavre Taunche Kafalpani	Permanent or periodic services to be provided. Sectoral operation out of common facilities recommended. Rental or construction of facilities out of traditional materials suggested.
Rolpa	- Thabang Holeri Harjeng	
Rukum	Rukumkot Ahtbiskot	
Pyuthan	Okharkot Ligna Hansapur or Bhairola	

PANCHAYAT ORDER		TO SERVE MORE THAN 1 PANCHAYAT
Dang	- Dhikpur Narayanpur Phulbari	Provision of extension services and provision of health post and post office where existent and feasible. Services suggested on periodic basis, use of rental facilities or construction in traditional materials suggested.
Salyan	- Mulkhola Kotmaula Dimure Hiulcha Kapurkot Sulichor Powang Tutu (Mirul) Friwang Jinawang Masina	
Rukum	Ahtbiskot Bafikot Kol Chatgaun	
Pyuthan	Pujapatek Davistan Baraula or Hansapur	

between Thamare, Salyan and Musikot, Rukum--a densely populated area--no service center had been proposed.

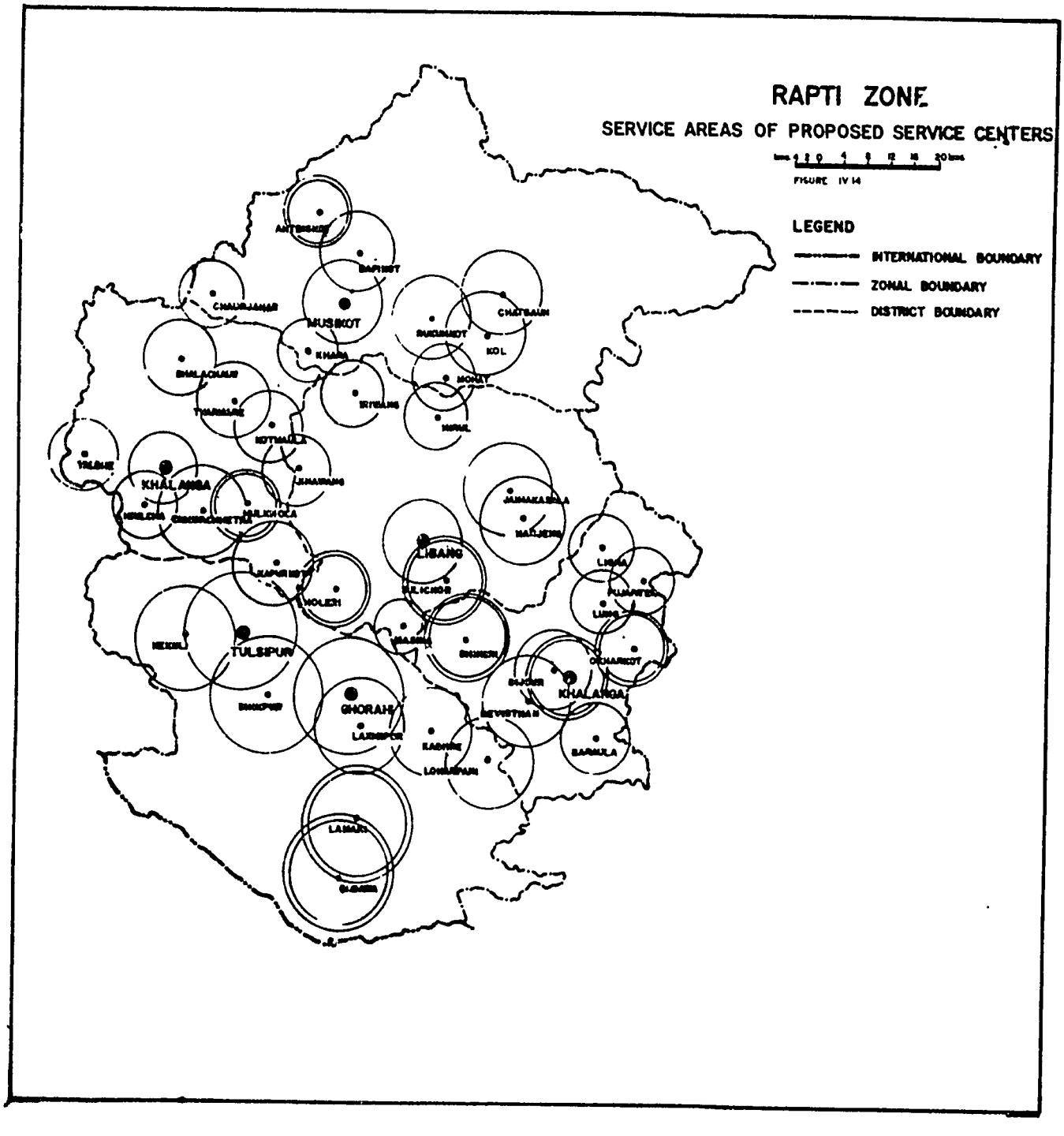
Secondly, the proposed service centers were studied in their relationship to transport routes as presented in Figures IV.3-9 In this case, it was found that the majority of settlements were situated on major routes of the zone. However, the more remote settlements such as Tutu, Harjeng, Mijing, Masina, Taunche, Barula, Pujapatek and Okharkot were situated on secondary routes throughout their sub-district areas. Thirdly, in order to assess the distribution of service centers in the zone, a time-distance graphic was prepared. In Figure IV.14 each of the proposed service centers is circled with a radius equivalent to one-half day's walk. It is assumed that the service area of the service center should be such that those using the center can return to their homes in one day. It should be noted that the diameter of the circle used is a function of the difficulty of access of the settlement. Thus, in Dang, the circles are larger because greater distances can be traveled on foot (or vehicle) than in the hills. On the basis of this analysis, it was found that:

- Service centers are well distributed in Rukum, but no facilities will be provided in the sparsely populated northwest.
- Too much overlap exists in Pyuthan and Dang, where fewer service centers seem required.
- Gaps in service areas seem to exist between Mijing and Lung, Garthigaun and Holeri, Thamare and Musikot, northeastern Rolpa and southeastern Rukum, western and northwestern Salyan, and western Dang (Deokhuri).

The time-distance factor and HMG plans to establish a service center in each Ilaka seem at odds in some places, particularly Dang. As could be seen in the commercial and service analysis, residents of such places as Dhikpur, Laxmipur, and Hekuli in Dang travel distances of several hours in order to purchase their basic necessities in Tulsipur and Ghorahi. Given that Tulsipur and Ghorahi offer a higher level of public services than that which may be available in nearby Dang service centers, it is likely that people will be more inclined to use the higher order services offered in these larger towns. Certainly the types of services offered should be limited to those which require close proximity and convenience to the population concerned. It would be unnecessary to provide a full array of government services within these settlements.

The overlapping of service center areas as shown in Pyuthan raises the issue of phasing. As Figure IV.14 illustrates, the closer concentration of service centers in Pyuthan suggests a higher level of service than will be provided in Rukum. Thus, it would be wise initially to adopt a standard service area (such as one-half day's walk) for the zone as a whole and better distribute the service center locations. A higher number of service centers and facilities should be phased in over time.

If it is desirable to establish a higher order of services in some non-district centers, then the present distribution of public services should be taken into account, since it would require less HMG investment to raise the level of services in those places with existing concentrations of


RAPTI ZONE
SERVICE AREAS OF PROPOSED SERVICE CENTERS
FIGURE IV 14
LEGEND
INTERNATIONAL BOUNDARY
ZONAL BOUNDARY
DISTRICT BOUNDARY
MUSIKOT
KHALANGA
LIBANG
TULSIPUR
GHORAHI
KHALANGA

services. As illustrated in Figure IV.13 and Table IV.13, those non-district centers with the greatest number of existing offices include:

- o Rukum: Chaujahari, Rukumkot, Bafikot, and Ahtbiskot
- o Salyan: Kavra, Thamare
- o Rolpa: Ghartigaon, Tabang, Sulichor, and Holeri
- o Pyuthan: Bhingri, Okarkot, and Bhairola
- o Dang: Lamahi/Deukhuri, Gadhawa, Koilabas, and Gobardiya

Second order, or Grade B service centers should be selected from among these settlements though it is possible that because of a settlement's strategic importance others may also qualify.

On the basis of the above considerations a tentative hierarchy of phased service center development is proposed in Table IV.14. It should be noted that only those centers proposed by the geographers or district centers have been taken into consideration. Furthermore, since service delivery has been shown to be relatively weak in Chapter V, authorities should carefully consider whether greater distribution of service facilities will significantly alter the service delivery impact, or whether scarce resources should be employed to improve service delivery in those places where service is already available.

Observations on service center implementation: The concept of service centers has not been fully grasped by local authorities. For instance, Ghorahi has been suggested as a service center location for IRDP funding despite the fact that it already offers the most diverse and sophisticated levels of service in the zone. In some quarters, a service center is simply another show-case facility to be placed within a selected location. As a consequence, the location of these facilities has become a significant political issue.

The service centers which are being planned or constructed by the Rapti IRDP are all the same prototype, consisting of: a supervisor's office, a visitors office, a meeting and training hall, a post office, an agricultural and veterinary sub-station, a small godown, and staff quarters. These components are considered as a "unit" to be planted in various sites. Places where this unit have been constructed or are under construction include: Holeri, Davistan, Kapurkot, Chaujahari, and Lamahi. Places where service centers are to be built shortly include Rukumkot, Thamare, Sulichor, Bijouar and Kabre. In addition, those places where service centers have been proposed include Ahtbiskot, Mulkhola, Okarkot, and Bhingri.

In the vast mjority of these places the services to be provided by the service center "module" already exist, with the exception of the supervisor's quarters, visitor's office, and meeting hall. Thus the primary contribution of the service centers will be to replace rented quarters with newly constructed government owned facilities. Those places in which new services will be provided include: Holeri, veterinary and post office; Thamare, post office; Bijouar, agriculture and veterinary sub-stations and post office; Kabre (Dang), all services; Ahtbiskot, agriculture and veteri-

nary sub-stations. As between Rs. 1,100,000 and 1,200,00 is being expended for each service center, careful consideration should be given as to whether the expenses being incurred really merit replacement of exisiting facilities. Based on current rental values of private buildings in District centers, rental of facilities such as the service centers would cost about Rs. 4,000 per year. Not factoring in inflation, the service center costs would equal about 300 years of rent for private facilities at current rates. Furthermore, in the case of the Holeri service center, for example, the facility will cover 426 square meters at a cost of Rs. 3,018 per square meter. Traditional construction in Libang costs about Rs. 1,150 per square meter. Thus, considerable savings could be made by constructing facilities with traditional materials.

Given this information, it would be wise to reevaluate the cost effectiveness of the existing building program and decide whether to continue with the service center building schemes. In those cases where services already exist it would be desirable to supplement the services already being offered with new functions such as soil conservation, health centers, etc.

In places where the service centers have not been built, an analysis should be conducted as to whether rental or construction will be more cost effective. Of great concern is whether the actual service delivery will be improved by adding new physical facilities or whether scarce resources should be spent on other service inputs instead. If greater distribution is desired, it may be better to rent facilities, reserving construction to those areas where rental facilities are unavailable. Also, where construction is required the option of using appropriate traditional materials should be given due consideration.

A final issue regarding service centers and facilities is whether the services should be situated in hill top or valley locations. Generally, valley locations are more accessible than hill top areas, as most major routes follow the river valleys. Of importance here is the type of service considered and the relative need for accessibility. Health and education facilities, veterinary and agriculture sub-stations, foodgrain and agricultural input depots would best be located on valley-level trails to reduce the burden on the people to be served. Administrative services such as those found in the district centers may very well remin where they are, while facilities requiring frequent access are located in valley locations in proximity to the centers. The choice of Bijouar in Pyuthan as a service center despite its close proximity to Pyuthan Khalanga and the location of the AIC depot in Sittelpatti, which is in close proximity to Salyan Khalanga, shows that this concept is already being implemented to some degree.

V. SERVICE DELIVERY AND INSTITUTIONAL DEVELOPMENT

A. SERVICE DELIVERY

The notion of providing effective services to beneficiaries versus simply constructing physical facilities or meeting targets is a distinction which this chapter attempts to address. Many of the indicators used for measuring progress in service delivery are inadequate to properly assess the impact of these services on the population. This section will review service coverage and delivery issues for 13 sectors in the Rapti Zone. The indicators used here are based on available data. Better indicators could be developed. Generally, sectoral "progress" data is oriented to internal institutional performance. For example, ADB/N collects data on the total amount loaned by type, but not on the number of loans made; AIC tabulates the tons of agricultural inputs provided rather than numbers of farmers reached; technical and engineering offices list the number of drinking water projects built but not the number actually operating; etc.

Based on the analysis presented below, it appears that service delivery throughout the Rapti Zone is in great need of improvement. It is beyond the scope of this study to conduct a detailed analysis of the institutions concerned; however, where possible some institutional suggestions are provided for consideration.

1. Agriculture

The bulk of the Agriculture Department's work revolves around two programs: the planting of areas with improved varieties of seeds and the implementation of the Cropping Systems program of the Rapti IRDP. Annual district targets for the former tend to be in the thousands of hectares for basic food grains and in the hundreds of hectares for cash crops. The agriculture staff is also involved in promoting the production of certain amounts of crops (targets specified in metric tons) through special programs. In addition, there are various kinds of extension activities, including fairs and exhibitions, demonstrations, contests, and farmers' meetings. Finally, both staff and farmers attend a certain number of training courses each year. Targets are almost always reported as fulfilled 100 percent.

Compared with the targets for the improved seed areas and the Cropping Systems work, the targets for the extension and training activities appear quite low. For example (and this example has been picked at random) the targets for Salyan District in FY 40/41 were as follows:

	Annual Target	Annual Progress
Results Demonstration	60	64
Farmers Day	1	1
Farmers Tours	4	4
Fairs and Exhibitions	3	3
Training for Technical Assistants	8	8
Model Farmers' Training	60	60
Meetings with Farmers	13 meetings held	

(Source: Rapti IRDP Annual Progress Report, 1983-84, p. 16.)

This pattern is similar in other districts. A progress chart on display in the Agriculture Office of Musikot, Rukum in May of this year showed that there had been no farmer contacts, no farmer meetings, three fairs, and no method demonstrations. Sixty farmers had received district level training and eight farmers other types of training; no staff training had occurred. On the other hand, every target for area coverage and production of crops was listed as at least 100 percent accomplished (most showed up at well over 100 percent).

Judging only from the available indicators of Agriculture Office activities, it appears that relatively little effort is being devoted to direct extension work with farmers, in relation to the number of farmers who need assistance. There are undoubtedly numerous explanations for this. The question of whether the priorities of the Agriculture Offices should be changed is beyond the scope of this analysis. It is not clear, for example, whether the improved seed programs and cropping systems programs include extension and information dissemination activities that are not measured in the standard target indicators.

The above samples of progress reports on target fulfillment do suggest, however, that the Agriculture Department places considerable emphasis on crop area and production targets and expects these to be fulfilled, while putting much less emphasis on setting or fulfilling direct extension targets. Some observers have indicated that the Agriculture Department is an example of a line agency in which problems arise because district targets are set by agency headquarters rather than by local staff. According to one report:

> "...the nature of some of these <targets set by line agency headquarters> are a major obstacle to a realistic monitoring system. Area and production targets set by the Department of Agriculture (DOA) are an excellent example of this category. Since present area and production are not known (targets are raised by 10 percent annually irrespective of the actual position), and as achievement cannot in practice be measured, DOA offices regularly report 100 percent progress."(1)

For this study it was not possible to obtain Agriculture Office staffing data for all five districts of the Rapti Zone. Staffing for Dang District was obtained, however. In June of 1985 the Dang office included one Agricultural Development Officer (ADO), two assistant ADOs, 12 Junior Technicians (JT) and 14 Junior Technical Assistants (JTA). This translates into the following ratios of staff per farm household in Dang: one ADO per 34,000 households; one Assistant ADO per 17,000 households; one JT per about 2,800 households, and one JTA per about 2,400 households (the ratio of JTs and JTAs combined is one per 1,300 households). For transporation, the Agricultre Office in Dang had in June of this year one four-wheel vehicle out of commission and two motorcycles, only one working.

Discussions with officials and staff in the Rapti Zone indicate that staffing levels are similar in the other districts.

These figures suggest that, while it would be impossible to reach a majority of famers through direct contact, some type of outreach strategy is critically needed for agricultural services in the district. New approa-

ches must be designed to provide technical assistance, information, and new seeds to a greater number of farmers. One promising method is the organization of farmers' groups, as is being done through the Small Farmer Development Program. It has also been suggested that some of the more capable farmers should themselves be recruited as extension agents. These individuals, it is argued, would be more familiar with local conditions and more interested in the long-term agricultural development of their localities than the average line agency staff member. This idea is worth experimenting with. Finally, information dissemination through various means (e.g. booklets, posters, meetings, etc.) should also be stepped up.

Detailed information on the Rapti IRDP's Cropping Systems program in available in a recent report (Sanford S. Smith, Cropping Systems Specialist, Contract Completion Report, PADCO, Rapti Rural Integrated Development Project, April 12, 1985). According to this report, "The Rapti Zone districts are five years ahead of the other western hill districts in the introduction of the latest improved varieties". The report gives data on marginal benefit cost ratios (MBCR) obtained in the numerous pre-production verification trials conducted over the last two years in all five districts. MCBRs ranged from negative to up to 20, with most above 3 and below 15. These impressive results were accompanied by generally good improvements in yields (25 to 100 percent increases).

The IRDP cropping systems report also provides some useful observations on agricultural development in the five districts of the Rapti Zone. A brief summary of these comments follows.

Dang District generally receives more highly qualified agriculture staff than the hill districts. However, three separate ADOs were transferred from Dang in the last two years. JTs and JTAs transfer away less frequently. Dang's highly unequal land distribution affects the potential for agricultural improvement. Most large land owners in Dang do not appear to be interested in increasing grain production through improved practices, as they tend to have enough for their own consumption and marketing and irrigation prospects are too uncertain. However, landlords show stronger interest in increasing production of cash crops (mustard, linseed, lentils).

Pyuthan District was considered by the Cropping Systems Specialist to have the greatest untapped production potential of the four hill districts. Some of Pyuthan's fertile hill valleys have similar characteristics to the well-irrigated eastern Deokhuri Valley in Dang. There is potential in Pyuthan for increasing the number of crops per year from one to two or from two to three with irrigation. There is a need for greater use of improved varieties and control of open grazing. The agriculture program in Pyuthan has been hampered by weaknesses in staffing.

Rolpa has benefitted from good continuity in staffing, having had the same Assistant ADO over the last four years. Technology adoption in the cropping systems trial areas has been good.

In Salyan the absence of an ADO for one year slowed down the agriculture program considerably. The cropping systems program has had success in promoting the adoption of improved wheat varieties but has been unable to find a suitable maize variety to introduce.

Rukum has always posed the greatest difficulties for agricultural extension, due to its remoteness, topography, and social as well as political factors. Production programs tend to give mixed results, one main reason being the uncertain and uneven supply of inputs from AIC. There is a need in Rukum to focus on improved techniques for using compost and crop varieties with low fertility requirements.

2. Livestock

Development program expenditures for livestock in recent years have been financed almost entirely by the Rapti IRDP. Programs include veterinary treatment, genetic improvement through distribution of new breeds, training and extension, and, to a very limited extent, fodder supply development. In Dang District the Asian Development Bank has for the past three years been financing a vaccination and drenching project limited to the Deokhuri Valley.

By far the greatest amount of effort, as indicated by progress reports on target fulfillment, is devoted to veterinary treatment. Annual targets per district for vaccination are 4-5,000, for first aid 4-8,000, and for parasite control 15-20,000. These targets are always reported at least 100 percent fulfilled and often considerably surpassed (sometimes by very large margins). This study did not obtain evidence to show whether these high numbers of animals are actually being treated or whether treatment is being applied effectively. It is clear, though, that even if actual achievement is lower than reported, the level of effort going into the veterinary program is quite high.

The progress report figures indicate that other livestock activities are quite limited in scope. The genetic improvement program is small, with only around 40 to 50 farm mammals (buffaloes, oxen, donkeys, sheep, goats, and pigs) reportedly distributed per district in 1983-84. Training and extension targets are invariably modest and appear to be always fulfilled but never surpassed; in addition these targets are absolutely identical for every district. In 1983-84 in all five districts, 83 farmers received training, 20 livestock assistants received training, and six fairs, six farmers' tours, five farmers' discussions, and one district farmers' seminar were held.

The program that has truly received short shrift is fodder development. The only measurable achievements reported in 1983-84 were distribution of 5,000 to 6,000 Daali grass saplings per district in Dang, Salyan, Rolpa, and Pyuthan; and the creation of six hectares of pasture land in Salyan. A nursery has been established in Ghorahi to provide forage crop seeds and seedlings. In view of the tremendous overgrazing problems throughout the Rapti Zone (see Chapter II), it seems essential that much higher priority be given to addressing the fodder supply problem. A strategy involving a concerted effort on the part of the Agriculture, Livestock, Forestry, and Soil Conservation Departments would appear necessary. This should have two thrusts: 1) Increasing the supply of fodder plants and trees (the two may be intercropped, with the plants yielding more immediate results) and 2) Strongly promoting the adoption of stall feeding. These efforts should take precedence in resource allocation over the genetic improvement program. Better breeds of animals produce benefits, but they also need to consume more scarce fodder.

Staffing data for livestock offices were not obtainable except in Dang District. In June 1985 the Dang office was staffed by one Livestock Officer, seven Junior Technicians, six Junior Technical Assistants, three Stockmen, and five Vaccinators (the latter funded especially for the ADB project in Deokhuri--see above). There are five livestock subcenters in Dang District, each staffed by a JT and a JTA.

The above staff and facilities are not sufficient to meet the needs and demands for livestock programs in the District. Similar staffing levels are found in the other districts of the Zone. In addition, livestock personnel cite several general problems in service delivery. One is the unavailability of sufficient medicine, especially during epidemics, caused largely by an inefficient procurement system directed by the central headquarters in Kathmandu. Another is the degree of centralized decision-making regarding programming and staffing, which makes it difficult to tailor district programs to local needs and realities.

3. Irrigation

Reliable data on the amount of irrigated agricultural land in the Rapti Zone are very difficult to obtain. Relatively good data can be compiled on the coverage of "modern" irrigation systems (built by the HMG and donor agencies), but there is no reliable information on the scope of "traditional" irrigation in the Zone. The only estimate of the latter is in the Rapti IRDP Feasibility Study, which says that in 1979, about 4,000 to 4,500 hectares in Dang District were irrigated by traditional systems (APROSC, Main Text, p. 58). This would amount to 6.7 percent of Dang's lowland agricultural land as measured by the LRMP. The Feasibility Study does not give an estimate for the hill districts.

Traditional irrigation systems generally consist of temporary diversion structures made of tree branches and flumes made of hollowed logs. A large amount of water in these systems is lost through seepage, and each year the structures need restoration or repair. The traditional irrigation systems are used only in the monsoon period.

Currently it is estimated that about 1,280 ha. of farmland in the Rapti Zone are irrigated by "modern" systems (see Table V.1). This includes the areas irrigated under the 400 ha. Chaurjhari project in Rukum (completed about six years ago), the 200 ha. Kwadi project in Pyuthan, and the small irrigation projects completed with MPLD funding. The district-wise breakdown of this irrigated land is as follows: Dang, 210 ha.; Salyan, 365 ha.; Rukum, 461 ha.; Rolpa, 24 ha.; and Pyuthan, 220 ha.

The figures in Table V.1 suggest that, at least for Dang, the proportion of irrigated land is fairly low, amounting to about seven percent of the District's lowland agricultural land. While modern irrigation covers only 0.3 percent of Dang's lowland agricultural land, it covers 5.2 percent of such land in the hill districts of Rapti (the hills, of course, have a very small proportion of lowland agricultural land to begin with).

Estimates of irrigated areas have been made for USAID by the District Agriculture Offices of the Rapti Zone. These appear in Table V.2. As can be seen in the first two rows of the table, the DAOs have greatly underesti-

Table V.1

AREA UNDER IRRIGATION AND MODERN IRRIGATION AREA UNDER CONSTRUCTION IN RAPTI ZONE, 1985 (HECTARES)

AREA UNDER IRRIGATION

District	Traditional Systems	Modern Systems (Small and Medium)	Total
Dang	4,000-4500	210	4,710
Salyan		365	
Rukum	(Date for hills not available)	461	NA
Rolpa		24	
Pyuthan		220	
Total	NA	1,280	NA
Percent of Total Lowland Agricultural Land Irrigated			
Dang	6.7	0.3	7.0
Hills	NA	5.2	NA
Zone	NA	1.4	NA

MODERN IRRIGATION AREA UNDER CONSTRUCTION

	Small Systems	Medium Systems	Total
Dang	(uncertain)1/	1,817	1,817 (excluding "Small" Scheme)
Salyan	35	-	35
Rukum	35	-	35
Rolpa	51	-	51
Pyuthan	25	340	365
Total	146	2,157	2,403

1/ In Dang there is a very large irrigation upgrading project underway, Tari Gaon Ranigar, which, due to its low cost, is classified as a "Small" Scheme even though it is supposed to irrigate over 3,000 hectares. This has been omitted from the table.

Source: HMG, Department of Irrigation, Hydrology, and Meteorology. Rapti IRD Project Coordination Office, Tulsipur. Rapti IRDP Feasibility Study Vol. I, p. 58.

Table V.2

IRRIGATED AREA IN RAPTI ZONE
AS REPORTED BY DISTRICT AGRICULTURE OFFICES, 1985
(Hectares)

	Dang	Rolpa	Salyan	Pyuthan	Rukum	Rapti Zone
1. Cultivated Area Estimated by DAOs	63,100	9,975	42,554	23,330	10,740	149,699
2. Cultivated Area from LRMP	79,237	52,844	52,674	43,842	45,301	273,098
3. Year-Round Irrigated Area (DAOs)	8,870	1,429	6,777	4,280	1,000	22,356
4. Percent of Year-Round Irrigated Area (3/2)	11	3	13	10	2	8
5. Partially Irrigated Area (DAOs)	9,310	1,000	NA	3,477	700	14,487 1/
6. Percent of Partially Irrigated Area (5/2)	12	2	NA	8	2	7 1/

1/ Excluding Salyan

Sources: Lines 1,3,5: USAID printout compiled from District Agriculture Offices, Rapti Zone

Line 2: Land Resources Mapping Project.

mated the amount of cultivated land, especially in Rolpa, Pyuthan, and Rukum. Overall, the DAO figures understate the area of cultivated land in the Zone by almost half. It was not possible to check the validity of the DAO irrigated area estimates, but, taking them at face value, about eight percent of the total cultivated area of the Rapti Zone is irrigated by year-round systems. About seven percent of the area of all districts except Salyan (for which no data were available) is irrigated by seasonal (partial) systems. Dang, Salyan, and Pyuthan appear to have the highest proportions of year-round irrigated land, with 11, 13, and 10 percent respectively. Rolpa and Rukum have considerably less irrigation, whether year-round or partial. These figures, if reliable, suggest that there is a very substantial amount of traditional irrigation in the Zone, as modern systems cover barely 1,300 hectares.

When the modern irrigation projects currently under construction in the Rapti Zone are completed and functioning, at least 2,400 ha. of newly irrigated land will be added (see Table V.1). This would about triple the area covered by modern irrigation in the Zone. Dang District will gain the most, as four of the five medium irrigation projects awaiting completion are located there.

Of the five medium irrigation projects under construction, four are being financed under the Rapti IRDP: Belghari (326 ha.), Chire Gar (336 ha.), and Gobardiha (455 ha.) in Dang District and Dharmabati (340 ha.) in Pyuthan District. The other project, Gwar Khola in Dang, is being financed by HMG with assistance from the ILO.

The Rapti IRDP originally included three other medium irrigation projects: Saibang (209 ha.) in Rolpa, Kalagaon (225 ha.) in Sallyan/Rukum, and Solabang Masne (112 ha.) in Rukum. These have not been initiated due to a mixture of financing and contracting difficulties.

The Gobardiha project in Dang and the Dharmabati project in Pyuthan were begun three years ago and are both roughly about 70 percent complete. In the Gobardiha project, most of the headworks are finished, but the main canal is incomplete (part of its alignment is being changed). The headworks of the Dharmabati project are not finished, though almost all of the main canal has been completed. Both of these projects have been seriously delayed by inadequate contractor performance. The Belghari and Chire Gar projects were begun only one year ago, and they are unlikely to be completed before 1987 at the earliest. Both of these projects have encountered conflicts with the Forestry Department which have held up progress. In both cases portions of the main canals were designed to pass through officially designated forest areas without obtaining clearance from the Forestry Department beforehand. So far the Forestry Department has not given permission for the works to proceed. Some canal sections passing through non-forest areas have already been dug, however. The Gwar Khola project's head works and main canal are finished, but the secondary canals, which are supposed to be built by the farmers themselves, have not been installed.

As of June 1985 the level of staffing of the Zonal DIHM office in Tulsipur seemed adequate. The office had one Project-in-Charge, four engineers, eight technicians/overseers, one accountant, and five assistant accountants. The projects under construction in the Zone at the moment are relatively accessible. The only major problem was the lack of motorized trans-

portation, as the office's vehicle had been taken by the Zonal Commissioner for other uses.

Besides suffering from contracting and construction delays, all the medium irrigation projects pose unresolved user problems. The lack of secondary irrigation canals, which in Nepal are almost always the responsibility of the farmers, is due to lack of attention to the socio-economic issues surrounding the organization and motivation of beneficiaries. In many cases, as in the Gwar Khola project, there are serious disputes between upstream and downstream users.

A number of reports written by various organizations have documented the problems of implementing large and medium irrigation projects in Nepal.(2) These studies find that large and medium irrigation projects usually take longer to construct than planned, and that even after projects are constructed the water supply is not properly managed. In addition, maintenance of the irrigation infrastructure tends to be highly inadequate, resulting in rapid deterioration of water supply. Finally, even where water does reach the users, lack of complementary inputs and marketing opportunities produces substantially reduced benefits to farmers relative to the original projections.

Some empirical evidence and observations by experienced specialists suggest that small irrigation projects are easier to construct, manage, and maintain; have much greater success in overcoming user problems; and result in higher agricultural production than large or medium sized projects (see Chapter II, Section D). HMG appears to be starting to implement a policy of authorizing water users' committees to collect a water tax and to use the funds collected for maintenance and management of irrigation systems.

Up to now there have been only a handful of experimental tube wells installed in Dang District (none in the hill districts of Rapti), so it is not possible to speak of tube well irrigation service delivery. However, both the Ground Water Resources Development Board and the Agricultural Development Bank have targeted the Dang and Deokhuri Valleys as priority areas for further tube well exploration and development during the Seventh Plan period. These activities will be financed entirely by HMG own resources, so they will be quite limited in scope (see Chapter II, Section D for a discussion of ground water potential). If these exploratory efforts are successful, it would be desirable to examine ways of encouraging the private sector to supply tubewells.

The ADB/N began making loans for shallow tube wells in 1980. It provides loans in the form of equipment (in kind), consisting of pipe, screen, and pump. According to information supplied by ADB/N, the average discharge of water per well is 16 to 26 liters per second, which is sufficient to irrigate about four hectares. The cost of materials totals about Rs. 15,000, and labor costs about Rs. 3,000. Thus the total cost per hectare is about Rs. 4,550, one half to one fifth the cost per hectare of the medium irrigation schemes being constructed in Rapti Zone at the moment. At the same time, the cost of a tubewell is quite high relative to the income of the average farmer. Even with labor costs subsidized under a special HMG program, the Rs. 15,000 equipment cost comes out as a monthly payment of Rs. 338 at the current 11 percent interest rate and five year amortization period. This is not affordable for the vast majority of Rapti's farmers.

The high cost is one probable explanation for the fact that only Rs. 30 million out of Rs. 70 million allocated by ADB/N for tubewell loans in FY41/42 was loaned. Another reason, according to ADB/N officials, was inadequate supplies of equipment.

4. Forestry

The "development" side of forestry is relatively new in the Rapti Zone, reflecting the slow implementation in Nepal as a whole. The basic development activities in forestry are nursery establishment, forest demarcation, Panchayat Forest establishment, Panchayat Protected Forest establishment, seedling production, seedling distribution, training of forestry personnel, and workshops to familiarize people with community forestry. These activities are intended to accomplish the objectives of improving soil conservation and increasing the supply of fuelwood and fodder.

Very good documentation on the accomplishments of the Rapti forestry program and on the forestry issues and problems in the Zone is available in three recent reports by Conley and Upadhya, Lueckel, and Huetteman and Hannafin (3), on which this section has drawn heavily.

All of the development activities in forestry in the Rapti Zone over the past four years have been financed by the Rapti IRDP. The program has had a special acceleration since 1983, due in large part to the efforts of two AID advisers and four forestry Peace Corps Volunteers. Between 1983 and the present, 37 community forestry nurseries were established across the five districts of the Zone. There are also three Panchayat Nurseries. In addition, 53 Panchayat Forest plantations totalling 601 ha. were established in all five districts, with the majority in Dang, Pyuthan, and Salyan. Since 1980, 389 ha. of Divisional Plantations were created in the Zone. Also, 370,000 seedlings have been distributed, most in the past two years. While these numbers are small in absolute terms, they represent a significant initiation of forestry development in the Zone and have substantial value in terms of staff experience and demonstration effects.

The key staff involved in the development aspects of forestry are rangers and assistant rangers. Staffing levels have been improved recently in the Zone. The ratios of panchayats per ranger in mid-1985 were as follows: Dang, 10:1; Pyuthan/Rolpa (considered one area for forestry), 25:1; Salyan, 24:1; and Rukum, 43:1. Panchayats per assistant ranger ratios were: Dang, 4:1; Pyuthan/Rolpa, 9:1; Salyan, 8:1; and Rukum, 11:1.

Much remains to be done to create incentives for panchayats and individuals to cooperate with and undertake forestry development programs. Management and protection of PFs and PPFs is still quite inadequate. Staff work quality needs to be improved in the areas of nursery maintenance, seed treatment, seedling care, and plantation establishment.

Education and training to build up skills, awareness, and motivation are important, but there is also a need to look at the "systemic" issues that hamper forestry development; that is, the existing system of incentives and disincentives for people to address forestry conservation either on an individual or group basis. One basic limitation is the generally negative public image of the HMG Department of Forest. In particular, it is neces-

sary to focus on communal or individual property rights over forests, the security of these rights, and the assigning of accountability for forest management. These are national-level issues too complex to be treated here. A good deal of debate is occurring on them at the moment.

One encouraging development is the announcement by ADB/N that it plans to begin making loans for forestry development on private land as of FY42/43 (85/86). If the plantation is properly managed, the borrower will be entitled to a 50 percent interest rate subsidy.

HMG has recently approved rules and regulations governing "lease forests"; however there has been almost no implementation yet. Under the lease forest concept, private individuals or groups can lease government land to use for forest production (timber, fuelwood, raw materials for industry, fodder, ornamental trees, fruits and nuts). The District Forest Officer must identify areas suitable for lease forests. Interested parties must submit an application/feasibility report to the DFO, and he must send it to the central government for clearance. Lease forests may be harvested only on a sustained yield basis.

The lease forest program is a typical example of a good idea hampered by institutional problems. A memo prepared by a consultant to USAID identified the following constraints on the program:

- District Forest Officers lack the skills and incentives to identify potential lease forest areas.
- Land ownership disputes often interfere with such programs.
- The vast majority of Nepalese farmers lack the literacy, not to mention the technical capacity, to prepare an application for a lease forest plot.
- Centralized review of each application makes for a very inefficient process.

Most of these problems could be addressed through some decen- tralization of authority, training, and technical assistance.

The potential for going beyond the lease forest concept, to a procedure for granting ownership of land to farmers who manage it for forestry purposes, should be explored.

The forestry program in the Rapti Zone has raised a number of issues that are worth reviewing. In Dang District, little or no training in community forestry has been given to intermediate staff (rangers, assistant rangers). Most of the training has been provided to lower level field staff (forest guards, nursery foremen). The result of this is a lag in the technical capacity and motivation of the most important staff for forestry development programs. Intermediate staff have traditionally carried out policing functions in Nepal (protecting public forest lands) and are often ill-equipped to handle development activities. A greater emphasis on community forestry training is needed for this group. In addition, training programs should be organized by outside entities rather than by the top-level local

staff (i.e. the DFC), since this takes a great deal of time away from essential development work.

Late budget releases from HMG are one of the biggest handicaps facing the forestry program in Rapti. In 1983-84 the first four-month release arrived seven months after the beginning of the fiscal year in Dang, Salyan, and Rukum. In 1984-85 the first release arrived six months late in Dang and three months late in Salyan and Rukum. In forestry this is particularly damaging because of the seasonal nature of the work: seedling production starts late; the seedlings are then too small at planting time; the immature seedlings have very high mortality rates when planted. Of course, late budget releases also contribute to lack of planning and ad hoc operation, as is the case in all sectors.

Delayed budget releases also play a role in the lack of emphasis noted by Lueckel on fodder tree development. Seed collection for fodder trees must take place mainly between July and September, when the trees are producing seeds. If budgets are late by more than one or two months, preventing the hiring of staff for seed collection, that year's opportunity for fodder tree production is lost. Another important reason that fodder tree development has been almost nonexistent is that Forest Department program targets do not specify fodder trees. Targets do not differentiate between fuelwood and fodder trees, result being that fuelwood trees receive most emphasis.

Another area that has suffered from lack of emphasis has been preparation of PF and PPF management plans. Only seven of these plans have been produced to date in the Rapti Zone. One reason is that, again, this does not appear in the annual work targets set by the Department of Forest. The second reason is that rangers and assistant rangers lack the technical skills needed to work with panchayats in preparing these plans. Training in this area should be a high priority.

Finally, observers cite the relatively frequent transfer of forestry personnel as a significant limitation to sustained progress in community forestry programs. About every two years the DFC, rangers, and assistant rangers are transferred. While the personnel transfers are, of course, staggered over time, the cumulative loss in effectiveness is considerable.

5. Soil Conservation

The soil conservation program of the Department of Soil Conservation and Watershed Management has been operating in the Rapti Zone since 1981/82. There is one Zonal office located in Tulsipur covering all five districts. The program is financed through the Rapti IRDP. The mandate of the Department is to focus on the most critically eroded and degraded sites. There are six program areas: nursery development, torrent and gully control (check dams), irrigation canal stabilization, roadside stabilization, plantation establishment, and extension. In its first year, 1981/82, the program was limited to Dang District. The next year it expanded into Salyan and Pyuthan. In 1984/85 small activities were added in Rukum and Rolpa. Technical staffing in mid-1985 consisted of one Project-in-Charge, one Attached Officer, and four Technicians.

While the soil conservation projects carried out so far are generally considered effective, the program overall is extremely limited in scope and

cannot be viewed as having had more than a highly localized impact in a few spots in the Zone. The program for 1984/85 consisted of the following:

	Number of Projects				
	Dang	Pyuthan	Salyan	Rolpa	Rukum
Nursery operation	2				
Nursery establishment		1	1	1	
Irrigation canal protection	3		1	1	
Gully control	3	1	1		1
Roadside stabilization (plantation)	1	1			
Water source protection		1			
New plantation	2 (25 ha. each)		1 (10 ha.)		
Extension	X				

According to the head of the Zonal Office, the soil conservation program is formulated mainly on the basis of requests from District Panchayats. Low budget levels--the total budgets for 1983/84 and 1984/85 were slightly over one million rupees per year--and limited staff are the main constraints on the program now.

6. Roads

Road development projects in the Rapti Zone have been funded by the World Bank, the Rapti IRDP, and the HMG Department of Roads. Locations of roads are shown on the maps in Chapter IV. The World Bank has financed the recently-completed all-season gravel Lamahi-Tulsipur road. This road is presently the only motorable entrance to the Dang Valley and points north from the East-West Highway, which traverses the Deokhuri Valley in the sourthernmost part of the Zone. The East-West Highway is completely paved, providing access to Nepalganj to the west and Butwal/Bhairawa to the east. The only bottleneck on the East-West Highway is the Rapti River crossing at the eastern end of the Deokhuri Valley. As the bridge has not been finished, vehicles cannot get across the river during the monsoon season (June-September), preventing access to Butwal/Bhairawa. At other times of the year vehicles can cross even without the bridge via temporary structures. The Rapti River bridge is scheduled to be completed in 1985-86.

The gravel road from Lamahi runs north to Ghorahi, then west from there to Tulsipur. Buses, trucks, and other vehicles regularly ply this road. Occasional landslides or washouts tend to be dealt with quickly by the Roads Department crew stationed in Ghorahi.

A road alignment has been laid out between Tulsipur and Amile, located on the East-West Highway at the western border of the Zone. If completed, this road would reduce the vehicular travel time between Tulsipur and Nepalganj by about three to four hours. Of the 29 km. of this segment, about 10 km. have been gravelled and four more have had culverts and earthworks constructed. The rest remains as a track not accessible to vehicles. Last year the Deprtment of Roads estimated that the total cost of bringing this segment up to gravelled all-season status would be about Rs. 30 million.

The HMG annual budget in recent years for this project has been only about Rs. 1 to 1.5 million; thus the pace of work is very slow.

The HMG Department of Roads has also been working on the improvement of the road from Lamahi to Koilabas (22 km.) on the Indian border. In addition, the Department builds and improves town roads in Ghorahi and Tulsipur.

The Rapti IRDP has been financing work on three road segments leading into the Rapti hill districts. The IRDP budget for roads has been too limited to have produced more than modest improvements in access to the hills, though numerous major works have been constructed. The basic problem is that road-building in the hills is extremely expensive. According to the USAID engineer overseeing this component, the cost of hill roads is roughly Rs. 2.5 million per kilometer, while the IRDP budget came out to only Rs. 150,000 per kilometer.

The entire length of the Ghorahi-Pyuthan segment (74 km.) is jeepable except during the monsoon; however, post-monsoon repairs sometimes are delayed for several months. The segment has been widened to 5.5 m. up to km. 30. After this point widening is not so critical, but some shifts in alignment will be necessary. Several major structural works (retaining walls, etc.) have been built at very critical spots. The first three km. out of Ghorahi have been gravelled.

The second segment starts at km. 52 of the Ghorahi-Pyuthan road and is intended to lead to Libang in Rolpa District. Of the 58 km. of this segment, roughly the first half, up to the Rolpa border at Khungri, is jeepable in the non-monsoon period. The first 18 km. have been widened to 5.5 m., and only a few structures have been built.

The Tulsipur-Salyan segment (61 km.) is jeepable over its entire length except during the monsoon. Landslides and washouts always close the road in the wet season. Forty percent of the IRDP roads budget has been spent on improving this segment. The road has been widened to 5.5 m. up to km. 43; grade has been corrected in several places (not all); various major structural works have been built; and the first 1.3 km. out of Tulsipur have been gravelled.

AID is currently sponsoring a study of the three abovementioned road segments (being done by Louis Berger Intl./East Consult Ltd.). The study includes engineering investigations and socio-economic surveys of the road corridors. The purpose of the study is to provide sufficient data for complete feasibility and cost-benefit analyses to be carried out. It is hoped that the findings may be useful to potential donors interested in financing further work on these roads. The study is scheduled to be completed later this calendar year.

It is worth noting that in addition to the roads described above, there are numerous seasonal tracks located in the Dang and Deokhuri Valleys. These tracks can be traversed by tractors and sometimes jeeps in the dry season. They are scattered all over the two valleys and tend to lead from the main roads.

7. Small Rural Works

a. Drinking water systems

The construction of drinking water projects generates two major types of benefits. First, better health is promoted through tapping cleaner water sources for drinking water systems. Second, much time is saved and hard labor reduced, largely for women and girls, through better access to drinking water sources.

Drinking water projects in the Rapti Zone have been financed by several different sources. In the 1970s the Local Development Department in cooperation with UNICEF installed seven water supply systems in three districts, according to the Rapti IRDP Feasibility Study. These reportedly ran into several serious problems: 1) the projects were not completed due to shortages of funds, 2) the water supply became contaminated in most completed systems, 3) water flow was inadequate during the dry season, and 4) poor operation and maintenance caused systems to break down.

Data are available on the coverage of drinking water systems constructed since 1980 through three of the four current programs: the Rapti IRDP, UNICEF/MPLD; and the Department of Water Supply and Sewerage (DWSS). Data from the fourth program, MPLD Grants-in-Aid to district and and local panchayats, were not available. MPLD gives grants to local governments for a variety of small works, including drinking water systems, trails, and similar projects.

Table V.3 presents drinking water service delivery data for the five districts of the Rapti Zone. Based on design estimates, a total of about 160,000 people have been served by the drinking water schemes built under the three programs mentioned above. This amounts to about 17 percent of the Zone's population. If the MPLD Grant-in-Aid projects were included the percentage might increase by one or two points. Dang District has the highest coverage, with 25 percent of the population served, followed by Rukum with 18 percent. In Rolpa, 13 percent of the population is covered by drinking water schemes, while in Salyan and Pyuthan the figure is just 10 percent.

It is important to note that these coverage estimates are probably optimistic because they assume all drinking water systems keep functioning properly after they are built. In fact, the rate of breakdown of drinking water systems is high, owing to various factors (see below). While no estimate of the number of actually functioning systems is available, it would not be surprising if only two thirds or even one half the intended population is in reality being covered.

As would be expected, the DWSS schemes are much bigger than the Rapti IRDP schemes, as measured by the number of taps per scheme. The DWSS schemes also serve much greater numbers of people per tap, due to the fact that they tend to be located in more densely populated areas.

Clearly, the Rapti Zone has a very long way to go in drinking water supply. The majority of the population continues to get its water from irrigation channels, rivers, seepage wells, and springs. As the Rapti IRDP Feasibility Study put it, these sources are "often inconvenient, almost always pol-

Table V.3

DRINKING WATER PROJECT

SERVICE DELIVERY LEVELS IN RAPTI ZONE 1985

	Dang	Salyan	Rukum	Rolpa	Pyuthan	Rapti Zone
Population Served	81,466	15,401	24,805	22,534	16,159	160,365
Percentage of Total Population Served	25	10	18	13	10	17
Total Numbers of Schemes	12	13	16	12	5	58
- Rapti IRDP	(8)	(6)	(6)	(3)	(2)	(25)
- UNICEF/HMG	-	(5)	(6)	(5)	-	(16)
- DWSS	(4)	(2)	(4)	(4)	(3)	(17)
Number of Taps 1/						
- Rapti IRDP	91	29	31	36	15	202
- DWSS	172	50	75	72	58	427
Average Number of Taps per Scheme 1/						
- Rapti IRDP	11	5	5	12	8	8
- DWSS	43	25	19	18	19	25
Average Number of Persons Served Per Tap 1/						
- Rapti IRDP	131	82	129	136	96	122
- DWSS	404	207	176	175	254	282

1/ Information not available for UNICEF/HMG Projects.

Note: These data cover all projects carried out between 1980/81 and 1984/85. Between 1973 and 1976 HMG/UNICEF/WHO installed seven Water Supply Systems in three districts in the Rapti Zone, but no information was readily available on these.

Sources: Project Coordination Office, Rapti IRDP; UNICEF; HMG, Department of Water Supply and Sewerage.

luted, and undependable as they tend to dry out during the winter". (Vol. V, Annex 17, p.2).

Experience with water supply schemes to date has brought to light a number of difficult problems. One is that many schemes cannot operate continuously during the day in the dry season. Schedules are set for water availability during certain hours only. Many villagers do not have the carrying or storage capacity to rely on water spigots that operate only a few hours per day. As a result, they often go back to relying on the old, unsanitary water sources they used before, defeating the main purpose of the schemes.

Another problem has been the tendency of elite groups and political figures to exert pressure, often successful, to have taps located in places favorable to them. In many cases this manipulation takes place during the construction phase after designs have been completed. According to local engineers, this occurs in over 50 percent of drinking water schemes and has had a demoralizing effect on intended beneficiaries, resulting in occasional sabotage to schemes (e.g. cutting pipes or breaking valves).

Voluntary labor contributions from local people are sought in all Rapti drinking water projects undertaken through the IRDP and UNICEF. Not only is this contribution sometimes difficult to obtain but also the quality of the work is often poor. For example, the standard depth of pipe trenches is one meter, but this standard is seldom met through voluntary labor. As a result, the pipes are in many places easily accessible and subject to vandalism.

Finally, maintenance and repair of drinking water schemes has been inadequate. Part of the problem is simply lack of attention by District Technical Offices to routine maintenance. This is aggravated by deliberate damage done to systems. In addition to the difficulties mentioned above, there is the problem of users breaking down the slab covers to get access to the valves regulating water flow, in hopes of obtaining more water.

As is the case in other sectors, drinking water is a program that needs more careful attention to its non-engineering aspects. First, the social and political factors surrounding location of and access to the schemes need to be considered much more carefully. Second, both incentives and training programs are needed to focus local staff on better maintenance of drinking water systems.

b. Mule tracks

Mule tracks serve as important transportation links in the hills. The Rapti IRDP has been financing the upgrading of a few key mule tracks in all five districts. MPLD also occasionally finances mule track construction through its local government grant-in-aid program. For this section only data on the IRDP projects has been obtained. The district maps in Chapter IV show the locations of the principal tracks and trails.

Since 1980/81 upgrading has been undertaken on seven mule tracks through the IRDP. Three are located in Rukum; each of the other four districts has one. Upgrading works include realigning segments of tracks to improve the grade or avoid slide areas; widening; and construction of new links. A total of 279 km. of trails in the Zone is reported to have been upgraded

through the end of FY85. Projects range in length from around 12 km. to as long as 80 km.

The trails play a significant role in the economy of Rapti. According to a recent study report (4), several of the trails being upgraded are well-used routes despite the fact that alternative motorable roads are available. For example, the Tulsipur-Salyan trail (36 km.) and the Ghorahi-Libang trail (60 km.) are heavily travelled. The main reasons are:

- There are simply too few vehicles in the Zone; most goods are carried by porters and animals. For these modes the older trails are often faster.

- The motorable roads are subject to landslides and washouts in the rainy season which sometimes take months to be repaired; the uncertainty caused by these closings diverts traffic to the trails.

c. Suspension bridges

Both the MPLD and the Rapti IRDP have been financing the construction of suspension bridges since 1980/81. To date 13 bridges have been completed and five more are scheduled to be built in 1985/86. MPLD and the IRDP are each financing half of the 18 bridges. The distribution of bridges among districts is as follows: Salyan, three; Rukum, four; Rolpa, six; Pyuthan, four; and Dang, one. Traffic flows are estimated at around 400 to 700 persons per day in Salyan and Pyuthan and as high as 1,100 to 1,400 for some bridges in Rukum and Rolpa.

The projects undertaken so far have raised a number of issues that are relevant for future planning. First, the greatest difficulty in construction is transporting the wire ropes up to the project sites in the hills. This is usually done by helicopter, an expensive and not always reliable method (aircraft are frequently not available when needed). Second, it appears to be difficult to find capable contractors to build the bridges in remote locations. Contractors often underestimate costs and fail to perform adequately. Third, skilled labor for building the bridges must generally be brought in from outside the Zone (sometimes from India), which also raises costs. Fourth, since the user groups are not localized, it is usually difficult to obtain the customary voluntary labor contribution. Fifth, most projects are subject to delays in land acquisition (small amounts of land are needed for anchoring bridges and rerouting trails to reach brdiges). Sixth, planks, bolts, and other components are often stolen from completed bridges.

These problems all point to the need for exploring potential ways of bringing down the costs of suspension bridges through use of simpler materials and construction techniques.

d. Small hydro power projects

Two small hydro power projects are being constructed by the Small Hydel Development Board at present in Rukum District. These are the first such projects to be undertaken in the Rapti Zone. One is a 200 KW facility located at Serpodah. It is expected to provide power to Rukumkot, Musikot,

and three other settlements, benefitting a total of 6,500 people. The other is a 150 KW installation at Chaurjhari which is supposed to serve Chaurjhari bazaar, Jagarkot bazaar, and a few adjoining villages. About 5,000 people are to benefit.

Studies carried out by the Small Hydel Development Board suggest that the prospects for future projects are not promising (5). Studies in Pyuthan revealed no suitable sites. A 143 KW project evaluated for Rolpa proved to generate insufficient supply for the needs of the district center. The same was true of a 140 KW project studied for Salyan.

Small hydro projects are difficult to build and maintain in Nepal essentially because of their relative sophistication. Some of the problems are the same as those affecting suspension bridges. Costs are high due to transportation difficulties and the need to bring skilled labor in from far away. Capable contractors seem unwilling to undertake such projects in remote areas. Other problems are unique to these types of projects. Engineers qualified to study and design projects are scarce. The financial and economic rates of return are often poor. Personnel qualified to operate and maintain the systems are not available.

A brief analysis of unit costs and district-wise cost variations for small rural works appears in Appendix 3.

8. Health

The distribution of health centers and health posts in the five districts of the Rapti Zone is given in Chapter IV. Among the 38 main towns of the Zone, 22, or about 60 percent, have a health center or health post. The distribution of these town-based health facilities is as follows: Dang, nine; Salyan, two; Pyuthan, three; Rolpa, four; and Rukum, four. Time did not permit collection of data on staffing of these facilities. It appears that health centers and posts are fairly well-distributed throughout the populated areas of the Zone, but whether or not adequate health services are being provided through them is another question that must be studied in greater depth.

The Rapti Baseline Survey of 1979 contains data on the number of households that reported at least one member having visited a health post, health center, or hospital in the past year. Over the Zone as a whole, one quarter of households reported "yes". Dang District had the highest positive response rate, 44 percent. Salyan was next, with 30 percent. In Pyuthan the proportion was 16 percent and in Rolpa and Rukum, 14 percent.

The Rapti Zone contains one 15-bed hospital, located in Ghorahi. Fifteen-bed hospitals are under construction in Salyan Khalanga, Bijuar (Pyuthan), Libang (Rolpa), and Musikot (Rukum). These are scheduled to be operating within the next one to three years. The Ghorahi hospital is staffed by two doctors, for a Zonal ratio of one doctor per about 475,000 people. The hospital also has six nurses. The number of patients seen at the hospital per year has averaged about 15,000, with about 13,500 being outpatients, 900 inpatients, and 600 emergency cases. Talks with residents of the Zone indicate that people in the hills tend to be taken to the hospital only after local health services and traditional medicine have failed to cure them; i.e. when they are extremely ill. This is because of the long distan-

ces that must be traveled to reach Ghorahi. This factor also reportedly causes seriously ill people from the hills to bypass the Ghorahi hospital and go directly to the larger, better-equipped hospitals in the Terai.

Within the health services system of the Rapti Zone, the importance of "traditional" health practitioners cannot be ignored. It is generally reported that most people tend to seek help from traditional medicine before going to "modern" health posts or hospitals. There are several significant traditional health centers in the Zone, three in Dang, one in Salyan, and one in Rolpa, in addition to countless individual practitioners. One of the Dang facilities is an important Ayurvedic hospital, located a short distance east of Tulsipur.

9. Education

Education service delivery can be measured in various ways. The distribution of school buildings is one indicator; this is treated in Chapter IV. However, the existence of a physical facility does not necessarily mean that a service is being adequately provided. This section presents data on enrollment levels and student/teacher ratios for Dang District in an attempt to give a better indication of the basic education situation. Unfortunately time limitations made it impossible to obtain similar data for the other districts of the Rapti Zone. Enrollment levels for 1979 in all five Rapti districts (from the Rapti IRDP Baseline Survey) are discussed in Chapter II, Section A.

All development expenditures for education in Dang District are donor-funded. These development programs include adult education, teacher training, building improvement, and special projects such as the World Bank/UNICEF primary education improvement project which started in Dang District in 1984/85. The HMG operating budget covers teacher and administrative staff salaries and minimal maintenance and operating costs.

According to the head of the District education office, late releases of the development budget are a serious problem (operating budget releases tend to arrive on time). As of June 1985, one month before the end of the fiscal year, the office had received only the first of three four-month development budget releases for the entire year. As in other sectors, the problem stems from a combination of lack of understanding of budget procedures at the local level and highly rigid controls at the central level.

Appendix Table A.V.1 gives data on estimated changes in school enrollment in Dang between 1979 and 1985. Primary and secondary enrollment has increased dramatically. However, lower secondary enrollment has fallen, for unexplained reasons. The number of primary school students has grown by almost 75 percent over the period, with the growth rate for female students outstripping that for males. The number of secondary school students has more than doubled, with female enrollment again growing faster than male. The growth rate in the number of students enrolled far exceeds the annual population growth rate for Dang, an encouraging sign. This is reflected in the figures on apparent enrollment rates. Male enrollment rates remain far above those for females, but the increases are substantial for the primary and secondary levels. Primary enrollment has reached 75 percent, and secondary enrollment 25 percent. There is a need for deeper investigation into

the apparent decline in lower secondary enrollment to determine whether this is a data problem or a real phenomenon.

The data in Table V.4 indicate that Dang District lags behind the national level in percentage of trained teachers, students per teacher, and students per trained teacher. Student/teacher ratios are high but not absurdly so. The real problem is in the number of trained teachers, for which the deficit is extremely high both nationally and in Dang.

10. Agricultural Inputs Corporation

The AIC is designed to provide agricultural inputs to farmers to help them raise yields and production. In Rapti, the AIC has established a network of depots to serve each of the districts. AIC's principal function is to deliver agricultural inputs to each district depot and sales center. Sajha cooperatives distribute the inputs at the sub-district level as do a number of private dealers working on an experimental basis in Rolpa district.

During the period 1979-84, AIC has succeeded in improving its network and capacity of storage facilities. As Appendix Table A.V.2 indicates, the storage capacity of these facilities has been increased by 153 percent. However, when the capacity of these facilities is compared to the yearly distribution of fertilizer and seeds, storage capacity exceeds yearly distribution by a factor of two to six times in its district facilities. Although AIC distributes other inputs as well, it would appear that distribution of inputs has lagged behind AIC's storage capacity program.

Like other sectors, AIC has embarked on a program of replacing rented storage facilities with its own units. The storage facility at Sittelpatti in Salyan (250 metric tons) cost about Rs. 750,000. Though no data on rental costs are available, if rental facilities were to cost Rs. 10,000 per year, it would clearly be the most cost-effective option. However, it should be pointed out that proper storage facilities can help to preserve agricultural inputs, and the investment might be justified on these terms. Nevertheless, the option of rental versus publicly-built facilities should be given greater consideration.

In terms of distribution of inputs, a comparison was made for four years between 1977 and 1983 for the key inputs of fertilizer and seeds. In each case, the tonnage and per capita and household distribution were compared for each district as presented in Table V.5. The table shows that during the period, AIC has progressively increased the metric ton supply of these commodities to all districts. It also shows that the district-wise distribution of these commodities has only improved marginally, as Dang households still received between seven and fourteen times more fertilizer in 1983/84 than their counterparts in the hill districts.

On a per capita and per household basis in the hill districts, the amounts of fertilizer and seed are so low that little or no impact on raising agricultural production could be expected. However, there are indications that the fertilizer and seed which are distributed are supplied to relatively few households, which individually may obtain major impacts on their yields. For instance, the AIC facility in Sheri Gaun (Musikot) reported that it served about 250 farmers per year, usually those within a distance of four to five days' walk--roughly equivalent to the entire district. If

Table V.4

STUDENT-TEACHER RATIOS IN DANG DISTRICT, 1985

	Primary	Lower Secondary	Secondary
Dang District			
Number of Students	29,488	4,048	4,539
Number of Teachers	728	170	107
Number of Trained Teachers	183	55	48
Percent of Trained Teachers	25.1%	32.4%	44.8%
Students per Teacher	40.5	23.8	42.4
Students per Trained Teacher	161.1	73.6	94.6
National Level (1983)			
Percent of Trained Teachers	33.9%	42.6%	58.7%
Students per Teacher	45.4	21.7	34.4
Students per Trained Teacher	134.0	50.9	58.5

Sources: District Panchayat Secretariat, Education Division, Dang District. National level data from Economic Survey 1983-84, Ministry of Finance, Tables 7.1 + 7.2, p.29.

Table V.5

AIC DISTRIBUTION OF FERTILIZER AND SEEDS BY DISTRICT

1977 - 1984

District	Year	Fertilizer Metric Tons	Fertilizer Kilos Per Capita	Fertilizer Kilos Per Household	Seeds Metric Tons	Seeds Kilos Per Capita	Seeds Kilos Per Household
Dang	1977/78	501.4	2.18	17.77	42.3	0.18	1.50
	1978/79	525.0	2.18	17.75	46.6	0.19	1.56
	1982/83	905.8	3.09	25.16	20.78	0.07	0.58
	1983/84	1061.7	3.44	28.0	17.0	0.06	0.45
Salyan	1977/78	35.4	0.23	1.47	3.5	0.02	0.15
	1978/79	46.5	0.31	1.94	1.5	0.009	0.06
	1982/83	88.35	0.53	3.68	10.14	0.067	0.42
	1983/84	112.15	0.74	4.67	13.73	0.055	0.57
Pyuthan	1977/78	38.9	0.26	1.59	5.4	0.03	0.22
	1978/79	44.9	0.29	1.79	11.3	0.07	0.45
	1982/83	136.2	0.05	5.17	25.76	0.16	0.98
	1983/84	123.0	0.75	4.61	16.7	0.10	0.63
Rukum	1977/78	9.0	0.072	0.39	2.7	0.002	0.12
	1978/79	17.3	0.14	0.73	2.1	0.017	0.09
	1982/83	75.1	0.56	2.97	13.17	0.098	0.52
	1983/84	51.3	0.49	2.62	9.98	0.073	0.39
Rolpa	1977/78	3.8	0.022	0.14	1.0	0.006	0.037
	1978/79	0.9	0.005	0.03	0.2	0.001	0.007
	1982/83	48.5	0.29	1.80	19.29	0.11	0.72
	1983/84	66.89	0.40	2.48	10.73	0.063	0.35
Rapti	1977/78	588.5	0.71	4.7	54.9	0.066	0.44
	1978/79	634.6	0.75	4.97	61.7	0.073	0.48
	1982/83	1253.95	1.35	8.9	89.14	0.09	0.60
	1983/84	1415.04	1.50	9.93	68.14	0.07	0.46

Source: 1977 - 79 Data, Rapti Feasibility Study, Volume III, Annex 7.
1982-1984 Data, AIC Ghorahi and Tulsipur Offices.

this is the case, only about 1.1 percent of Rukum households are being served by this facility. Another AIC facility exists in Chaurjhari and sells about the same magnitude of inputs but to farmers outside the district as well. In Pyuthan's AIC branches, 175 farmers reportedly are served per year, or less than one percent of households in the district. Thus, despite some improvements in delivery or tonnage of fertilizers, seeds, and other materials to the districts, AIC service delivery has been quite poor and inputs have been unevenly distributed.

It should also be pointed out that HMG is paying large subsidies to transport agricultural inputs to the hill districts in order to make the prices uniform across the Zone (and country). In Rapti Zone alone, about Rs. 1,827,000 was spent on transport subsidies to get fertilizer and seed to the hill districts in 1983/84. To achieve this end, local contractors are hired who use tractors, porters, and ponies to carry the inputs.

Timeliness in delivery of inputs is also a major problem. Generally, AIC has not been able to guarantee availability of inputs at times of peak demand. Other complaints are that the prices of inputs are too high for the majority of farmers to pay and that seed germination is extremely poor. These factors discourage farmers from utilizing AIC, especially since a trip to an AIC outlet usually involves a trip of several days.

From 1979 to 1984 (Appendix Table A.V.3) the number of AIC staff in the Zone increased by 72 percent, while the distribution of fertilizer rose by 140 percent. Thus, there seems to be a correlation between the number of staff and delivery of services. The question remains, however, whether sufficient investment in staff and facilities for input delivery can be made so as to have a significant impact on yields and reduced food deficits. As was pointed out in Chapter III, cropping system data suggest that major improvements in yields are possible throughout the Zone and that all districts technically should be capable of meeting most of their foodgrain needs. It is thus of high priority to make the agricultural input distribution system more effective. In light of the above data, a radical change in the means by which these inputs are being distributed is required if the needed dramatic impacts are to occur.

It is not within the scope of this study to carry out an in-depth analysis of the agricultural inputs problem. However, on the basis of the data examined in this report, the following scenarios should be considered.

First of all, the distribution of improved varieties of seeds might better be taken over by the cropping systems program, which claims its activities are capable of producing sufficient supplies of seeds for the Zone and that dissemination of successfull varieties is already common.

Secondly, rather than attempting to provide a sophisticated network of storage facilities throughout the districts, the AIC should consider distributing the bulk of its fertilizer and other inputs out of facilities in Ghorahi and Tulsipur. As was shown in Chapter IV, the people of Rapti quite commonly travel to these places even for basic household consumer goods. Thus if efforts were made to make sufficient inputs available in only two places during peak times of need, it would be up would be up to the farmers, and not AIC, to see that they procured inputs in time. Furthermore, the subsidies being paid for transporting inputs into the hills would be

considerably reduced. These subsidies might then be applied to the price of inputs in order to improve their affordability. Obviously such a strategy would require further study and deliberation.

Another strategy would be to allow the private sector to participate in the provision of agricultural inputs (competing with AIC), as is the case in the foodgrain market with NFC. To date, the experiments underway in Rolpa District have not been satisfactory at the sub-district level. This is because the profit margins which private dealers are allowed are too low to cover their transport and storage costs, much less gain a profit. In any case, alternative strategies such as these must be tried if service delivery and agricultural development are to improve.

11. Nepal Food Corporation

The purpose of the Nepal Food Corporation is to supply foodgrain in times of food deficits. Unlike the AIC, the NFC's activities are supplemented by those of a very dynamic private sector. According to data presented in Chapter III, provision of foodgrain by the NFC met only about 4.5 percent of the volume required to cover the Rapti food deficit in 1982/83. On a district basis, the distribution of NFC foodgrain as a percentage of food deficit is as follows: Rukum, 1.8 percent; Rolpa, 3.6 percent; Salyan, 26.4 percent; and Pyuthan, 7.0 percent. On a per capita basis the hill districts received the following: Rukum, 2.59 kg.; Rolpa, 5.17 kg.; Salyan, 3.78 kg.; and Pyuthan, 4.90 kg. These amounts indicate that only a very small portion of food deficit requirements are being satisfied by the NFC.

In contrast, private grain dealers in Tulsipur and Ghorahi indicated that the private foodgrain market in these settlements was on the order of 10 and 30 metric tons per day respectively. The demand for foodgrains is particularly high during the November-June period, when in Ghorahi between 50 and 80 metric tons per day are distributed. On a yearly basis, these figures suggest that about 40 percent of food deficit requirements in the Zone are satisfied by private dealers operating in these two towns alone. Field observations also indicate a high level of commercial foodgrain transport in Pyuthan and Salyan, where roads permit access by tractors or trucks.

Thus, it appears that the private sector is playing a much more dominant role than NFC in helping meet food deficits in the Zone. No doubt, institutional reforms within NFC would help improve its efficiency, but in this case the evidence suggests that foodgrain support should be largely left to the private sector. NFC can still play a vital role in food crisis situations, and the institutional structure of NFC should remain in place for for this purpose.

12. Cottage Industry

In the four districts of Rapti for which data were available (Pyuthan data could not be obtained) the number of cottage industries and corresponding employment, as inventoried by the Ministry of Industry in 1983/84, were as follows: Salyan, 80 units, 431 jobs; Dang, 44 units, 215 jobs; Rolpa, 96 units, 506 jobs; and Rukum, 22 units, 98 jobs. Thus for these four districts, a total of 242 establishments and 1,250 jobs were inventoried. The

highest concentration of establishments and employment was found in Rolpa. Relevant data are presented in Appendix Tables A.IV.5-A.IV.3.

The principal goals of the cottage industry program in Rapti from 1980 to 1985 have been to create income-generating opportunities for 1,000 persons outside the agricultural sector, to train 900 persons in order to increase the productivity of existing industries, and to provide for marketing of raw materials and products. On the basis of progress reports submitted to the IRDP, quantitative training goals are largely being achieved. However, it should be pointed out that the targets imply roughly doubling cottage industry employment in the Zone over a five-year period, a formidable task.

A wide range of technical training programs are being provided, including sewing, cotton weaving, carpentry, construction, and hosiery. Among the districts in 1983, the following trainees benefitted from programs: Rukum, 40; Rolpa, 56; Pyuthan, 79; Dang, 42; and Salyan, 56; for a total of 273 trainees. For those districts for which expenditure data were available, administrative costs for the cottage industry program far exceeded program costs, ranging from 55 percent in Rolpa to 73 percent in Dang. The high cost of administration causes a very high cost per skilled trainee, ranging between Rs. 5,837 in Salyan to Rs. 10,641 in Dang. If administrative costs are not taken into account and only program costs are considered, the cost per trainee would range between Rs. 1,770 and Rs. 2,965. The cost of administration significantly lowers the cost-efficiency of the cottage industry program. It would appear that a high portion of adminsitrative costs has been due to construction of cottage industry facilities.

Available data do not indicate whether or not beneficiaries of cottage industry programs have actually found gainful employment as a result of their training or whether the training has been adequate to produce marketable skills and products. A profile of beneficiaries would also be useful to see if target groups have been reached. These issues require further analysis.

Given the above figures, it is clear that the cottage industry program is not having a significant impact on general employment generation in the Rapti Zone. However, when the numbers of trainees are considered in relation to existing cottage industry employment in the Zone, a considerable impact will have been made if the trainees prove capable of marketing their newly-acquired skills.

Better programming could help to improve the impact of cottage industries activities. On the basis of data presented in Chapter IV, commerce and services were shown to be a dynamic sector. Nearly 1,000 jobs were added in this sector over five years in only eight settlements. The cottage industry program, in conjunction with the ADB/N, should strive to assist this sector through entrepreneurial training and credit. In addition, the data in Chapter IV indicate that a much broader range of cottage industry types exists in the Zone than is reflected in the cottage industry program. Though training and assistance would seem to be of value in some programs, the hosiery program, for instance, appears to have no counterpart among the existing industries of the Zone. For programming purposes it would appear desirable to further study the existing cottage industries, their marketing patterns, and market prospects in the Zone to determine which types of industries need what kind of support. Such a strategy would require a

change in current programming practices, in which targets and activities are defined at the central level.

13. Appropriate Technology

In 1981 an "Appropriate Technology Unit" was established in Tulsipur, Dang District, as part of the Rapti IRDP. The Unit was set up as a program of the Agricultural Development Bank, which has provided loans for acquisition of ATU-promoted technologies. The ATU's main function is to test, distribute, and disseminate information on technologies that are, as an AID report puts it, "compatible with the resources and socio-economic conditions of the Rapti Zone". The aforementioned report (D.E. Jantzen, Technology for the Rural Areas of Nepal--The Experience of the Appropriate Technology Unit, The Pragma Corporation, July 1984) provides a thorough review of the ATU's experiences and lessons for the future. Only a brief review will be presented here.

In its four years of operation the ATU has been involved with numerous technologies. None has yet achieved massive distribution, but several have gained wide acceptance and show good promise for the future. The technologies that have received the most emphasis are water-powered turbines to power mills, biogas plants, improved wood stoves, seed storage bins, and improved beehives. The Jantzen report provides comments on the opportunities and constraints of these technologies and suggestions for their further development.

The ATU office in Tulsipur is staffed by one project manager, one mechanical overseer, and four clerks. There is also one contract JT for the ATU in each of the Rapti hill districts. To illustrate the magnitude of the program, the following were the Unit's accomplishments in 1984/85: Distribution of 19 high-cost and four low-cost biogas plants, 151 improved stoves, 15 beehives, 132 seed bins, six water turbines, and 10 shallow tubewells. The costs of all of these technologies are subsidized at between 20 and 50 percent. In addition, the Unit organized training for 61 persons in beekeeping, three in stove-making, four in storage bin-making, and six in turbine pump-set operation.

The main issues confronting the appropriate technology sector in the Rapti Zone are:

- There are numerous organizations engaged in manufacturing technologies, but promotion, marketing, and servicing functions are poorly developed. Where manufacturers cannot economically disseminate their products, some external organization must step in.

- Administrative changes are needed in ADB/N to insure more stability in ATU staffing. Also, specialized training courses should be designed for AT personnel.

- Opportunities for disseminating appropriate technology through additional agencies should be explored. Possibilites include the SFDP, Peace Corps Volunteers, and line agency personnel in agriculture and forestry.

In general the ATU is an example of a low-budget program that has been successful in disseminating information, creating highly visible demonstration projects, and forging an effective linkage with an outside financing organization (ADB/N) for wider distribution of productive technologies.

B. PLANNING AND BUDGETING UNDER DECENTRALIZATION

1. Decentralization in General

The Decentralization Act dates from 1982. However, the Decentralization Rules and Regulations only took effect at the beginning of 1985. The adaptation of the Rules and Regulations to the reality of Nepal will be a slow, evolutionary process. Nevertheless, there are several important points about decentralization that are already clear and that must be kept in mind:

- From the national standpoint, decentralization does not mean a large-scale turnover of authority to district and local panchayats. Only a relatively modest portion of the national budget will be placed under the control of panchayats, and the scope of this portion will be limited to what the central line agencies define as "local projects". However, from the local standpoint, decentralization potentially offers local governments power over significantly more resources than before <u>if</u> they are capable enough to use the process appropriately.

- For the purpose of planning and implementing these "local" projects, the line agency offices in each district are to be considered staff of the District Panchayat Secretariat, under the general direction of the Local Development Officer (LDO). This means that line agency staff at the district level will in effect have two "bosses": the central agency headquarters in Kathmandu for central projects and the District Panchayat for local projects. The Rules and Regulations specify that any instructions from central agencies to district line offices concerning subjects covered in the District Development Plan (see below) must be transmitted <u>through</u> the District Panchayat Secretariat.

- Decentralization gives new authority to two entities. One is the Local Development Officer, who is assigned to be the Secretary of the District Panchayat (a position akin to chief executive officer). He is in charge of the local planning, budgeting, and implementation process. The other entity gaining power is the District Panchayat, the representative body of the district. Panchayat members are elected politicians, and they are authorized to approve the annual and periodic district plans. Thus decentralization gives the LDO and the District Panchayat members an opportunity to make significant new impacts on their districts.

- Each district is required to prepare an annual District Development Plan (DDP) containing the investment program for the year. The DDP must incorporate village and town panchayat development

plans. According to the Decentralization Act the DDP, once approved by the central government, is binding on all HMG agencies.

Local governments had their first try at planning and budgeting under decentralization in early to mid-1985 (for FY85/86). The process was highly flawed but instructive. There are two "watchdog" organizations looking over decentralization. One is a task force under MPLD which is helping to implement decentralization. The other is a Constitutional Evaluation Group independent of the HMG executive branch which is supposed to submit reports on decentralization three times per year. This group was formed at the start of 1985 and has submitted one report to date.

2. Planning and Budgeting Under Decentralization

The Decentralization Act has brought major changes--in principle--in the annual and periodic (five year) planning and budgeting process in Nepal. The key change is the incorporation of a new and complex district/local planning and budgeting process which is designed to add a new "bottom-up" aspect to decision-making. The entire planning and budgeting process under decentralization is depicted in Figure V.1.

One key innovation is the requirement that planning and budgeting start almost one year ahead of the fiscal year in order to supply districts with individual sector-by-sector resource forecasts on which to base district and local planning. Previously the central government budgeting process began only a few months before the start of the fiscal year.

The basic idea in resource allocation is that each line agency is supposed to set aside a certain portion of its budget for "district-level" and "local-level" projects. These projects are defined as those extending up to but not beyond the borders of the respective jurisdictions. Obviously there is quite a bit of room for interpretation of what this really means, especially in sectors not primarily concerned with physical works. The definitions will be worked out over time on a sector-by-sector basis.

The district and local budget share under decentralization should not be confused with the "panchayat sector", which appears as a third category with the public and private sectors in the Sixth and Seventh National Plans. The panchayat sector consists only of resources mobilized and retained at the local level. It accounted for 5.3 percent of total planned investment in the Sixth Plan and is projected to be 3.7 percent in the Seventh Plan.

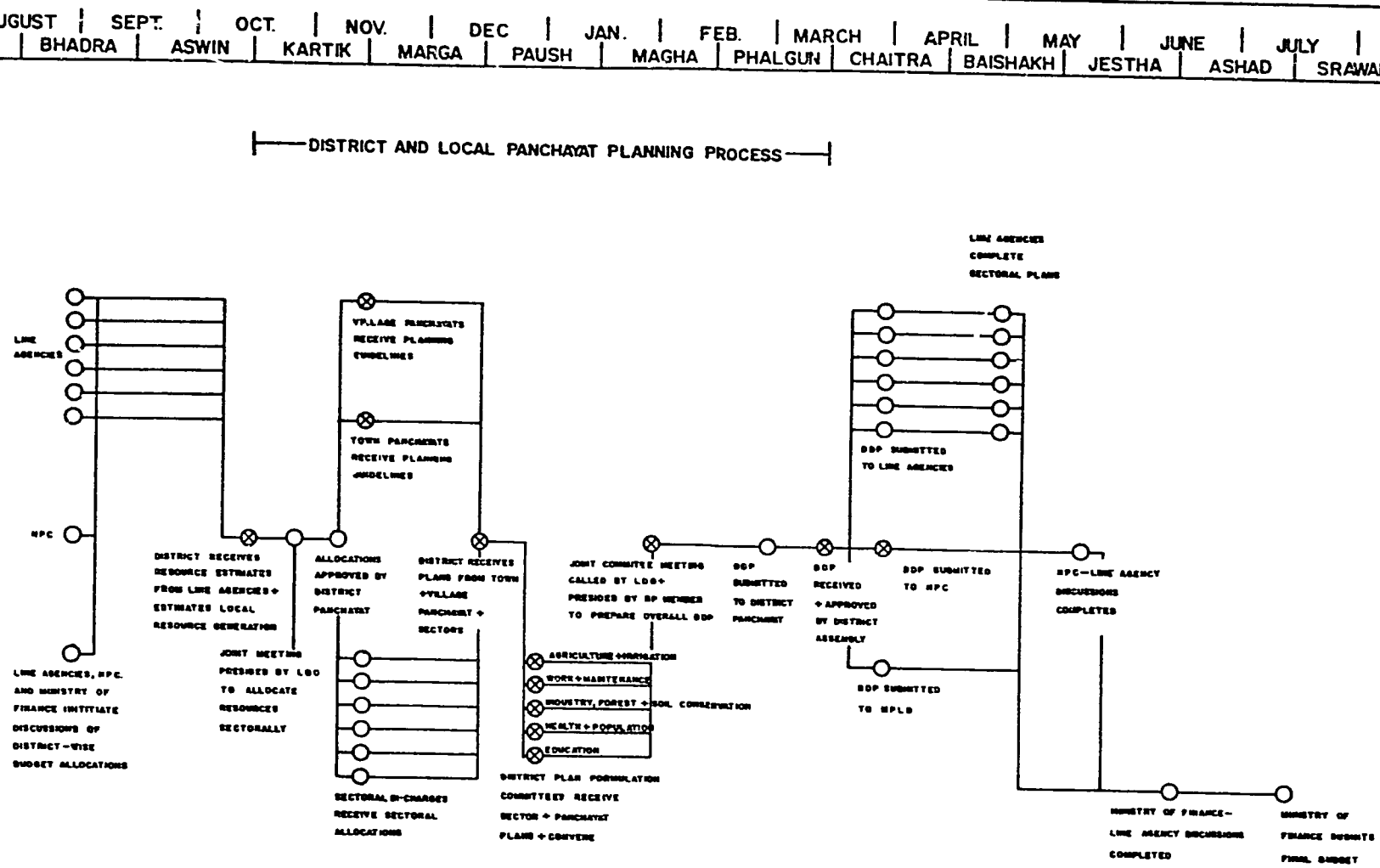
3. Planning and Budgeting Issues Under Decentralization

a. The role of the LDO

The Local Development Officer is in a position to play a leading role in local planning and implementation. Much depends on the personality and skills of the individual occupying the LDO position. As an employee of MPLD, the LDO faces the challenge of asserting authority over staff of other ministries. He must also be capable of dealing effectively with the politically-minded District Panchayat members.

FIGURE V.1

ANNUAL PLANNING AND BUDGETING PROCESS UNDER DECENTRALIZATION AS OF 1985



ABBREVIATIONS:

NPC	NATIONAL PLANNING COMMISSION
MF	MINISTRY OF FINANCE
LDO	LOCAL DEVELOPMENT OFFICER
RP	RASTRIYA PANCHAYAT
DDP	DISTRICT DEVELOPMENT PLAN
MPLD	MINISTRY OF PANCHAYAT AND LOCAL DEVELOPMENT
⊗	REFERS TO A DATE SPECIFIED IN THE DECENTRALIZATION RULES AND REGULATIONS 2040, HMG HIGH LEVEL DECENTRALIZATION COMMITTEE

SOURCE: PADCO CHART COMPILED FROM HMG DOCUMENTS AND INTERVIEWS WITH HMG OFFICIALS

b. Centralization within line agencies

As was seen in the previous section of this chapter, a number of problems stem from excessively centralized decision-making within line agencies. Local line offices do not have authority to set programs or targets, and many routine management decisions must be made in Kathmandu. There is a high potential for conflict and confusion as local line agency staff members try to balance the demands of their headquarters against those of the local panchayats.

c. Local resource mobilization

In Chapter III it was noted that resource mobilization capacity at the district and local levels is low. The Decentralization Act authorizes the imposition of a Panchayat Development and Land Tax for local use, but this is unlikely to be implemented in the forseeable future. Thus while locally-generated revenues are supposed to figure significantly in the resource pool for local plans, central funds will continue to dominate.

d. Formats and procedures for planning and budgeting

To date no uniform formats or procedures have been developed for panchayat or district-level planning and budgeting. For this past year's excercise the existing forms from each line agency were simply collected, compiled, and distributed to districts. Since each agency's forms were different and none of the forms had been designed for local planning, there was much confusion.

HMG reportedly plans to give high priority in the coming months to designing standard formats and procedures for annual plans and budgets. This is a critical prerequisite for practical decentralization training programs.

e. Training

MPLD has organized conceptually-oriented seminars on decentralization for district and local officials in most areas. Several of these have been held in the Rapti Zone over the past two years. These seminars have provided opportunities for useful discussions of how to make the concept fit reality. However, due to the lack of defined, standard procedures, no training programs of a detailed practical nature have yet been offered. There is a critical need for training in such subjects as:

- How to compile a district or panchayat data base.
- How to fill out an annual budget plan form.
- How to estimate local resource generation.
- How to estimate the cost of a proposed project or program to insure it fits within resource constraints.
- How to conduct a meeting to consolidate a District De-velopment Plan from various input sources.
- How to prepare a local periodic plan.

For the past year the UN Food and Agriculture Organization (FAO) has been sponsoring a special "action-research" project on decentralized planning in one district, Tanahu, near Pokhara. The project is being carried out by APROSC. The project has provided intensive technical assistance to the district to help it carry out all the steps of decentralized planning as spelled out in the Act and the Rules and Regulations. The effort was intended to test the process and observe its strengths and weaknesses. A seminar was held in March 1985 to review the experience of the 1984/85 excercise. This seminar resulted in a publication (APROSC/FAO, Proceedings of the Decentralized Planning System Seminar Feb. 23-24, 1985, Pokhara; available in Nepali only) which summarizes the many observations made.

The project will continue for at least one more year, during which APROSC hopes to develop training materials and carry out trainng for all the various local groups (District Panchayat members, line agency staffs, Village Panchayat leaders, etc.) in Tanahu District. The success of this will depend on the extent to which adequate formats and procedures are developed by HMG. Nevertheless, any future effort in the Rapti Zone should draw from the experience of this project.

f. Complexity of the process

As laid out in the Act and the Rules and Regulations, decentralized planning and budgeting involves a multiplicity of steps, committees, meetings, and approvals (see Figure V.1). Heavy data collection requirements are imposed on district and panchayat technical staff. The period allowed for village and town panchayat planning is quite short--one month. Anyone familiar with Nepal will understand that getting this process to function in some way resembling the ideal will take a long time.

4. Actual Performance of Planning and Budgeting Nationally and in Rapti Zone this Year

a. Nationally

Complete annual plans were submitted this year by about one third of Nepal's 75 districts. Another third submitted partial plans. The rest did not submit plans. Various reasons account for this:

- A number of line agencies did not provide financial resource estimates or planning guidelines to districts.
- This being the first experience with formal local planning, many districts simply did not have the capacity to prepare adequate plans.
- In some cases plans were prepared but were not approved by District Panchayats and thus were not submitted to the central government.

Many districts did not relate their plans to total resources available. In some cases this was because budget ceilings were not provided. In other cases districts chose to ignore resource limits and submitted "wish list" plans.

Districts were asked to do periodic plans, but those that were prepared did not affect the Seventh Plan. HMG still expects districts to prepare periodic plans as guides to future annual planning.

b. Rapti Zone

The study team was able to obtain some information on how the decentralized planning and budgeting process went this year in four of the five districts of the Rapti Zone: Salyan, Rukum, Pyuthan, and Dang.

Salyan apparently had the most successful planning process. The LDO, the Chairman of the District Panchayat, and the CDO (Chief District Officer) were all present at a seminar on decentralization held in Nepalganj in February. Thus the key leaders of the district all understood the process before it began. The main steps of the process as laid out in Figure V.1 were followed. A district-level meeting was held at the outset to allocate money to panchayats. Funds were not allocated on an equal-share basis, but on the basis of needs and political realities. Meetings were then held in each Ilaka (a sub-unit of a district) in which all Pradan Panchas (village panchayat leaders) and village panchayat members were briefed. Village panchayats were given 15-20 days in which to prepare village plans under the direction of Village Secretaries. In most cases the village plans did not include cost estimates for proposed projects, but attempts were usually made to list projects in order of priority. The remaining steps were carried out, and both an annual and a periodic plan were produced.

The relative success in Salyan is generally attributed to good leadership, especially on the part of the LDO. The two biggest problems were lack of budget ceilings for some sectors and the confusing hodgepodge of planning formats from different line agencies.

In Rukum District a new LDO arrived just as the planning process was getting underway, and he was not able to mobilize an effective guidance program for local panchayats. The proces was also hampered by the fact that neither the LDO nor the District Panchayat Chairman had attended the seminar in Nepalganj and were thus relatively unfamiliar with the process. District-level committees were formed to decide on how funds would be distributed to panchayats. Village panchayat leaders were summoned to the district headquarters to receive instructions. Panchayats did generally produce rudimentary plans consisting of lists of projects, in some cases prioritized. In the end an annual District Development Plan was prepared, but cost estimation was weak. A district periodic plan was also submitted.

The planning process in Pyuthan was similar to that in Rukum. The LDO played a minimal role, and only the District Panchayat Chairman appeared to understand the process (he had also attended the Nepalganj seminar). Most village panchayats focused attention excusively on small rural works and ignored program activities. Most district offices of line agencies had specific program/project guidelines from headquarters, contrary to the whole idea of decentralized planning. In those line agencies that didn't have such guidelines, staff members were wont to design programs based on those of the previous year rather than be creative.

In Dang District very little of the formal process was followed. The District Panchayat ceded authority to the line agency offices for all sectors except rural works. There were very few village panchayat meetings. Neither the LDO nor the District Panchayat Chairman were particularly active. The DDP was simply compiled by the sectoral agencies and ratified by the District Assembly.

C. INSTITUTIONAL DEVELOPMENT ISSUES AND PROSPECTS

1. Service Delivery

As discussed in Section A of this chapter, there are numerous things particular to each sector that can be done to improve service delivery. Many of the improvements are technical. However, there are a group of institutional problems in service delivery that cut across all sectors:

a. Service delivery targets and guidelines

There are two aspects to this issue. One is the problem of making service delivery more tailored to local conditions. Authority must be delegated to district-level technical staff for the design of programs and projects that are relevant to local needs. Central agencies can still set targets, but they can be defined in such a way as to allow more local flexibility in how they are met. Sectors where such flexibility is needed most are agriculture, forestry, soil conservation, livestock, and cottage industry. The second problem is shifting the focus of targets away from physical facilities and agency performance and toward indicators of actual service delivery to beneficiaries. This will bring into sharper focus important inadequacies such as poor quality of services delivered and operation and maintenance problems of physical works.

b. Late release of funds by HMG

This common handicap needs to be approached from two sides. First, procedures at the central level need to be reviewed to determine if more agility can be introduced. Second, district level technical staff need training in budget release procedures so that they fully understand and can comply with them. Better training of District Treasury staff is also needed.

c. Inadequately trained or motivated staff

There is no short term or easy solution to this problem. Building better skilled and motivated staffs is a long-term task that must in part be approached on a sector-by-sector basis.

d. Frequent transfers and absences of staff

These problems need to be dealt with at the level of overall civil service regulations and incentives.

2. District As Focus of Development Administration

The data reviewed in Chapters II and III of this report indicate that there is no compelling reason to treat the Rapti Zone as a single entity for

development purposes. The physiographic features of the Zone do not imply a physical integration on which to base economic development strategy. Economic linkages between the Zone's districts and areas outside the Zone are as prevalent as (or more prevalent than) intra-zone linkages.

One implication of this is that the focus for most development activities should be shifted to the district level. This is already happening, but the process should be accelerated. Future technical support should be located in each district and not at the Zonal level. This technical support should be directed to helping district level line agency offices carry out central programs and helping district and local panchayats to prepare and implement their development plans.

The Zone is principally a politico/administrative subdivision which should have limited development functions. In Rapti there are a few "higher order" services which should be located in Dang district to serve the hill districts. These are essentially services that need some sort of major, central physical facility: hospital, AIC godown, NFC godown, Roads Department subdivision, and possibly Irrigation Department office. These facilities benefit from having good transportation access to the rest of Nepal.

Another implication of this is that future rural development programs (or any other special programs) need not be Zone-wide. Particular programs may be targeted in some but not all districts of Rapti, in the interest of focusing limited resources on a more intensive effort where needs or opportunities are greatest. One example of this is the groundwater development program in the Dang and Deokhuri Valleys. Another example would be targeting special community forestry efforts in Salyan and Pyuthan Districts (see Chapter II, Section C).

3. Decentralized Planning and Implementation

The Decentralization Act and its Rules and Regulations are being carried out slowly, but they are already causing significant changes and realignments of authority. Planning of not only rural works but also other sectoral programs will increasingly be bottom-up rather than top-down. Future prgramming for the Rapti Zone should have a strong component of technical support for the district-level structure that already exists in law: the District Panchayat Secretariat headed by the LDO, with its staff consisting of the District Planning Officer and the district's sectoral line agency personnel.

One possibility is to use one or more of the districts of the Rapti Zone as an intensive laboratory for developing district-level planning, budgeting, and implementation capacity. This would have to be done in close cooperation with both NPC and MPLD. Dang District has been selected by HMG as one of 14 districts that will receive special emphasis for decentralization in the coming year. However, this should not be the only criterion for targeting institutional development assistance. The capacity and motivation of local officials and staff are also critical considerations.

4. Training

All panchayat leaders and technical personnel in all the districts of the Rapti Zone need training in planning, budgeting, and implementation. It is

vital that the National Planning Commission, MPLD, and the line agencies agree as soon as possible on a standard set of formats and procedures for preparing annual District Development Plans as well as periodic plans. Effective practical training programs can be designed only if clear, consistent procedures exist which can be taught. In other words, for training programs to move from being simply conceptual to being practical and job-related, it is first necessary to spell out the specific content of the various tasks that comprise decentralized planning, budgeting, and implementation. A list of suggested training subjects appears in part 3.e of Section B in this chapter.

Clear reforms are also needed to make budget release procedures more agile, and training is also required at the district level in this subject.

The experience of the APROSC decentralized planning experiment in Tanahu District (see Section B, Part 3.e above) should be studied for development of training programs in Rapti.

Technical training is needed in many sectors, but especially important are 1) training in community forestry and forest resource management for rangers and assistant rangers and 2) training in conducting feasibility studies of irrigation, road, and small works projects. For the latter, the Rapti IRDP Technical Unit has already prepared some materials.

FOOTNOTES CHAPTER V

(1) A.D.M. Stubbings, Final Report as Planning, Monitoring, and Evaluation Adviser to the Project Coordinator's Office, Rapti Rural Area Development Project, January 5, 1984, p. 7.

(2) See, for example:

HMG, Ministry of Water Resources, Water and Energy Commission, Consultancy Study on Institutional and Management Aspects of Large-Scale Public Sector Irrigation, Main Report, No. 3/1/210384/2/2, 1984.

HMG, Ministry of Water Resources, Water and Energy Commission Secretariat, Findings of Joint WEC/IBRD Performance Study of Large Public Sector Irrigation Projects, No. 3/2/010682/2/3, 1982.

No-Frills Development Consultants, Study of Operation and Maintenance Problems in Nepalese Irrigation Projects, USAID/Nepal, December 1984.

(3) These three reports are:

Mark A. Conley and Batuk P. Upadhya, Report on Community Forestry Sector, Soil Conservation Sector, and Department of Roads Biological Stabilization Sector, Rapti IRDP, HMG/USAID, June 30, 1985.

Robert G. Lueckel, Essays on Community Forestry Development in the Rapti Zone of Nepal, USAID/Nepal, June 27, 1985.

Thomas Huetteman and Juliet Hannafin, A Review of the Community Forestry Program in Dang District, USAID/Nepal, July 1, 1985.

(4) Louis Berger Intl./East Consult Ltd., Preliminary Report of Transportation Economics, Rapti Road Assessment Project, Technical Memorandum No. 4, 1985, Sections 4.7.1 and 4.7.2.

(5) Small Hydel Development Board, HMG, Inventory of Promising Sites for Small Hydel Power Operation: Projects Under Investigation, no date.

APPENDICES

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APPENDIX 1

HISTORICAL INFLUENCES, SOCIAL STRUCTURE, AND ETHNICITY IN THE RAPTI ZONE

Historical Influences

Before malaria was controlled in the Terai and Inner Terai, and before the Chinese took over Tibet, people in the Rapti Zone had a much stronger orientation to the north except those in what is now Dang District. Salt, animal products, animals, and other goods were traditionally obtained from Tibet by barter in exchange for foodgrains. Tibetan herders/traders made annual migrations south during the harsh winter season and returned home as the weather warmed. Their animals both carried goods and took advantage of grazing opportunities in the areas through which they travelled.

Today the people of Rapti are clearly oriented to the south. All important goods are brought up from or via the Terai and India. Transportation in the Terai areas is now relatively easy. Indian iodized salt has completely replaced Tibetan salt in all but the very northernmost, remote areas. (A side benefit of this change is the great reduction in the number of cases of goiter among hill Nepalis.) The ready availability of cheap Indian goods, especially cloth, has meant a significant reduction in the amount of local cloth made in Nepal's hills. Indian competition has also affected other Nepalese cottage industries and crafts.

Historically in the area that is now the Rapti Zone, there existed a number of principalities or kingdoms. The seats of power were located on ridge tops with one or two large household compounds dominating the landscape. Salyan and Rukum have had Thakuri kings, whereas in Pyuthan there was a Brahmin king, an unusual situation in Nepal. Rolpa did not exist, as its territory was under Salyan and Pyuthan's zone of influence. Rukum's seat of power changed several times, from Baphikot to Rukumkot to Musikot, the present district headquarters.

The feudal society which characterized this earlier stage of Rapti's history is still in many respects the basis for today's sociopolitical situation. In Pyuthan there are political factions led by wealthy Brahmins who vie for control of the District Panchayat. In Rukum the feud between the would-be rulers of Musikot and Rukumkot is very real today. Such disputes and rivalries have a negative impact on the ability to carry out development projects, as each faction tries to block the activities backed by the other(s). Only in Salyan is there relative political peace, and the greater success of development efforts in Salyan is in part attributable to this.

What is now Dang District was originally populated only by the Tharus. There were also Tharu landowners who dominated the socio-political system. In recent times, the Tharus have been gradually pushed out of the Dang and Deokhuri Valleys into other Terai areas by inmigrating Brahmins, Thakuris, and Chhetris. Today a small number of influential Tharus remain, but politics in Dang District is dominated by factions of people who originated in the hills.

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Social Structure and Ethnicity

In most of the Rapti Zone a modified version of the traditional Hindu caste system is the basis for the social structure. The dominant castes are the Brahmins and Chhetris, with Brahmins considered to be at the top of the socio-religious hierarchy and Chhetris (in this case Thakuris) at the top of the socio-political hierarchy. Pyuthan was historically unique, having Brahmins at the top of both hierarchies.

Both the Brahmins and Chhetris have maintained their power by the control of scarce resources, particularly land. There are, of course, poor Brahmin and Chhetri families as well. Below these two castes come the Newars, who live almost entirely in the major bazaar towns in the Zone. While they also own land, most Newars are shopkeepers and perform little agricultural work themselves. Below the Newars are the Matwali, or "liquor-drinking" castes. These "castes" are actually composed mainly of various Tibeto-Burmese-speaking ethnic groups. In the hills of the Rapti Zone the major members of this category are the Magars and Kham Magars.

In an equivalent position in Dang are the Tharus. They are not Tibeto-Burmese but an indigenous Terai ethnic group whose origins are thought to be in Rajastan, India. At the bottom of the caste hierarchy are the occupational and service castes, which include blacksmiths, tailors, leatherworkers, potters, and entertainers ("Badi").

This description of the social structure is basically from the point of view of the dominant castes. This model is generally accepted by the native Nepali-speaking Hindus. However, the Tharus, Magars, and Kham Magars may view the situation somewhat differently since the concept of caste is not an integral part of their own social systems. Some of these people have been "Hinduized", especially the Magars, but the Kham Magars and the Tharus have maintained very distinct socio-cultural traditions. Although they are generally aware of the caste model of society, a social class and ethnic structure would probably be more relevant to their reality. This would consist roughly of powerful landowners/politicians at the top, small landowners in the middle, tenants and landless next, and occupational castes at the bottom. Cross-cutting these "classes" would be ethnic groups, e.g. Brahmins, Newars, Tamangs, Tharus, etc.

Ethnic differences have concrete behavioral and organizational manifestations which have practical meaning when trying to undertake development work. Moreover, ethnic tensions and prejudices exist which override the caste/class differences. Behaviorally, there are three general categories. The first includes the Brahmin-Chhetris as well as the occupational castes. These people may be characterized as hierarchical, competitive-independent, meaning that each household maintains itself as an independent economic and political unit to the extent possible, and each is in direct and often stiff competition with other households for a place in the socio-economic hierarchy. This implies that among these people cooperative group behavior is extremely difficult to bring about and sustain. Alliances and cooperation where found are usually short-lived and fragile.

The second category of people includes the Magars, Kham Magars, other Tibeto-Burmese groups, and the Tharus. These people may be characterized as egalitarian, competitive-communal. In contrast to the first group, these

people tend to have egalitarian and communal values and patterns of behavior; yet there is competition among them in a loosely ranked type of social structure. In general group cooperation is common and easy to mobilize and sustain, in comparison with the caste Hindus.

What holds the caste system together is a series of hierarchical patron-client links with some horizontal links via kinship ties. The second category of social organization is held together by kinshp and community ties with a set of values emphasizing egalitarianism and cooperation.

The third category is composed mainly of the Newars. Their social system is roughly halfway between the other two; i.e. somewhat hierarchical but also exhibiting communal values.

A brief description of the geographic distribution of ethnic groups in the Rapti Zone is also useful. The Brahmin-Chhetris, and the majority of service castes associated with them, occupy the best land in the middle hills and intra-mountain river valleys. They also control large amounts of land in the Dang and Deokhuri Valleys. The Magars also live in villages on the slopes of the middle hills but usually have much less river valley land and less productive slope land as well. The Kham Magars are concentrated in northern Salyan, Rolpa, and Pyuthan and in northern and eastern Rukum. They tend to occupy land at higher elevations, and such land is generally less productive. Tharus are found in the rural areas of the Dang and Deokhuri Valleys only. Newars are concentrated in major bazaar towns. Service castes are needed at least in small numbers by all communities. They are often found living in separate small villages or hamlets throughout the Zone.

Appendix 2

DESCRIPTION OF LRMP LAND CAPABILITY CLASSES

The Land Resources Mapping Project (HMG and Government of Canada) has defined seven land capability classes. The following points must be kept in mind when interpreting the LRMP data:

- o Land fertility is a function not only of physical characteristics but also of land management practices.

- o Availability of water is not considered in the land capability classifications; nor are distance to markets, access, sizes of farms, land ownership, cultural patterns, etc., all of which influence land productivity.

- o The classification system is based essentially on the physical productive potential of the land. The emphasis is on arable agriculture; however other uses are considered: perennial cropping, fuel and fodder, timber, pasture, and watershed protection.

Class I: Nearly level; deep soils; little erosion except river bank cutting; necessary to control rainfall impact.

Class II: Gently sloping; deep, moderately well-drained soils; no limitations to forestry or pasture development; terracing/contouring needed for arable agriculture; drainage provisions needed.

Class III: Moderately to steeply sloping (5-30 degrees); soils 50-100 cm. deep and well drained; erosion is a constant hazard (landslides, slumps, debris torrents, river bank failures); management needed to control surface erosion; few limitations to forestry; terracing mandatory for arable agriculture (30 degree maximum empirically derived as steepest slope that could maintain high productivity in terraced cultivation); small site-specific erosion problems initiated by construction works, terrace failures, or runoff diversions can trigger gully erosion and landslides affecting much wider areas; social organization must receive as much attention as technical problems.

Class IV: Slopes too steep to be terraced and cultivated (over 30 degrees); suitable for all forestry provided vegetative cover is maintained to minimize erosion; grazing must be strictly controlled r prohibited (stall feeding instead); soil deeper than 20 cm.

Class V: Land either alpine (above tree line) or flood plains; slopes less than 30 degrees; soils more than 20 cm. deep; suitable for grazing; accessible pasture areas are overgrazed, thus greatly controlled or reduced grazing is required to optimize sustainable yields; very limited arable potential in some areas if irrigation is available.

Class VI: Slopes 30-40 degrees; soil depths less than 20 cm.; land should

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be maintained under vegetation--erosion hazard is extreme; potential for controlled extraction of fuelwood or timber, watershed protection, wildlife conservation, and tourism.

Class VII: Rock and ice; scenic value; trekking and climbing.

Appendix 3

COST COMPARISONS FOR SMALL INFRASTRUCTURE

A. Drinking Water Systems

Rural water supply constitutes an important component of the development programme for the Rapti Zone in the five districts: Dang, Salyan, Rukum, Rolpa, and Pyuthan. Three agencies are involved in the planning, design and execution of drinking water supply schemes. The RWS programmes are:

1. Rapti IRDP programme.
2. UNICEF and MPLD, HMG joint programme.
3. Department of Water Supply and Sewerage (DWSS).

There are also a number of drinking water schemes undertaken by local governments through grants-in-aid from MPLD.

Per capita cost estimates for the four programmes appear in Table 1.

Table 1

RAPTI IRDP: RURAL WATER SUPPLY

COST PER CAPITA INDICATORS FOR THE HILL AND THE TERAI DISTRICTS

District	IRDP Rs.	No. of Schemes	UNICEF Rs.	No. of Schemes	DWSS Rs.	No. of Schemes	DP Rs.	No. of Schemes	Average Cost per Capita Rs.
Dang	226.00	8	-	-	361.50	4	-	-	271.17
Hill Districts									
Salyan	548.50	6	423.50	5	1103.75	2	214.25	28	332.07
Rukum	365.50	6	288.50	6	362.25	[illegible]	-	-	335.81
Kolpa	193.50	3	405.75	5	773.25	4	-	-	475.19
Pyuthan	276.50	2	-	-	545.00	3	77.50	5	257.55
Average Cost Per Capita	389.26		367.33		644.96		193.53		350.16

Total average cost/capita for Terai - Rs.271.25

Total average cost/capita for Hills - Rs.350.16

IRDP : Integrated Rural Development Project

DWSS : Department of Water Supply and Sewerage

DP : District Panchayat (grant-in-aid project)

The cost indices (Table 2) indicate high figures for DWSS schemes compared to IRDP and UNICEF schemes with respect to cost per meter and cost per capita. The main reasons for the cost variations appears to be as follows:

1. The DWSS schemes are usually much larger compared to the IRDP and UNICEF Schemes and include trunk mains of larger size pipes which are quite expensive. Also the fact that the bigger water sources are usually at a long distance requires longer pipe lengths sometimes exceeding 10 km.

2. The overhead costs (office set-ups, etc.) in the DWSS schemes are normally on the higher side.

3. The DWSS schemes provide for individual connections for upper-class houses and are designed to take account of future expansion needs of the water supply system.

4. The general reasons that UNICEF costs are lower with some exceptions for Rolpa (per capita costs) and for Salyan (per metre cost) when compared to the IRDP and WSSB costs are:

   (a) the UNICEF costs exclude technical supervision costs which if included would add 10 to 20% approximately

   (b) the high quality of technical supervision contributing to the reduction of costs, which do not seem to be available for WSSB and IRDP projects.

Table 2

COST VARIATION INDEXES FOR DRINKING WATER SCHEMES OF DIFFERENT AGENCIES

1. On Per Meter Basis

	Dang	Salyan	Rukum	Rolpa	Pyuthan
Rapti IRD	1.00	1.00	1.00	1.00	1.00
UNICEF	-	1.25	0.57	0.88	-
DWSS	3.16	4.27	1.81	2.80	3.48

2. On Per Capita Cost Basis

	Dang	Salyan	Rukum	Rolpa	Pyuthan
Rapti IRD	1.00	1.00	1.00	1.00	1.00
UNICEF	-	0.77	0.79	2.10	-
DWSS	1.60	2.01	0.99	4.00	1.97
Panchayat (MPLD Grant)		0.39			0.28

Regarding districtwise variation of cost indicators, the analysis of the two indicators as given in table 2 leads to following observations:

1. The per capita cost (PCC) variations do not exhibit a consistent pattern for the three programmes. The IRDP has the highest PCC (Rs.548.50) for Sallyan and the lowest PCC (Rs.193.5) for Rolpa. The UNICEF figures show almost the same pattern for these two districts. The DWSS figures show some sort of consistency with IRDP by indicating a highest PCC for Sallyan (RS.1,103.75) but do not correspond at all for the lowest PCC figure.

2. The per meter cost (PMC) is highest for Rukum but lowest for Sallyan in the case of IRDP. There seems to be some sort of consistency in the PMC figure variations in the case of DWSS and UNICEF. But, one can see a marked discrepancy if the absolute figures are taken.

3. It appears quite difficult to come up with a single set of PCC and PMC figures for each district for future programming purposes on the of these three programmes, which offer no basis for rational explanation for cost variations.

Table 3

DISTRICTWISE COST VARIATION INDEX FOR RURAL WATER SUPPLY

1. On Per Meter Basis

	Dang	Salyan	Rukum	Rolpa	Pyuthan
Rapti IRD	1.00	0.64	1.39	0.75	0.78
UNICEF	-	1.00	0.99	0.82	-
DWSS	1.00	0.87	0.80	0.66	0.87

2. On Per Capita Cost Basis

	Dang	Salyan	Rukum	Rolpa	Pyuthan
Rapti IRD	1.00	2.43	1.62	0.86	1.22
UNICEF	-	1.00	0.68	0.96	-
DWSS	1.00	3.05	1.00	2.14	1.51

B. Suspension Bridges

Detailed cost data are presented in Table 4. The districtwise cost variation indexes for suspension bridge projects in the Rapti Zone are as follows:

Dang	Salyan	Rukum	Rolpa	Pyuthan
1.04	1.34	2.16	1.00	1.33

The table shows approximately the same cost index for Rolpa and Dang but the highest index for Rukum. The disproportionately high cost index could mean the high cost of transportation and labour for Rukum district.

A cost comparison of large and small spans yields the following:

Size	Dang	Salyan	Rukum	Rolpa	Pyuthan
Small Spans (20-60 metres)	1.00	1.00	-	1.00	1.00
Large Spans (70-300 metres)	-	1.25	1.00	0.82	3.04

The above table shows that the large bridges are 300 percent more expensive than the smaller ones for Pyuthan, whereas for Salyan these are only 25 percent higher. The corresponding costs come out to be 18 percent cheaper for Rolpa. The bigger sizes of the structural components, the transportation difficulties in handling the bigger sizes, and the high cost of civil construction at the site could be the governing factors for the higher costs of the bridges with larger spans. The lower cost for Rolpa could not be explained.

Table 4

RAPTI ZONE: SUSPENSION BRIDGES

SERVICE DELIVERY INDICATORS

District	Agency	Total Span (Metre)	Cost Rs.	Traffic Flow No./day (est.)	Cost/Metre Rs.	No. of Schemes	Locations
Dang	IRPD	34	256,197.00	300*	7,535.00	1	Ghosh Khola
Salyan	IRDP	79 (39.5)	669,844.00	600	8,479.00	2	Mokhala, Baluwa and Sangrahi
	SBD	107	1,131,987.00	400	10,579.00	1	Luhang Khola
	Grand total and avg. cost/m.	186	1,801,871.00	1,000	9,687.00	3	
Rukum	SBD	223.6 (79.0)	4,942,528.00	1,100	15,591.50	4	Rimna Ghat I, Jahari Khola, Sukh Khola
Rolpa	IRDP	184.00 (46.00)	1,391,092.00	1,400	7,560.00	4	Tribeni, Saibang, Mashina, Sibang
	SBD	364.50 (182.25)	2,163,750.00**	550	6,220.25	2	Madi Khola, Thawang
	Grand total and average cost per metre	548.50	3,956,047.00	1,950	7,212.50	6	
Pyuthan	IRDP	43.29 (21.65)	150,545.00	600	3,477.00	2	Andheri Khola, Baya Khola
	SBD	265.20	2,807,525.00	750	10,586.50	2	Dhanwang, Bagdulla
	Grand Total	308.50	2,958,070.00	1,350	9,588.50	4	

Note: * Indicates average span

** All cost figures converted into 1983/84 figures (based on Financial Survey: 2041/042 B.S.)

Source: Rapti IRDP; PCO, Tulsipur , Dang.
Suspension Bridge Division, MPCO/HMG

IRDP - Integrated Rural Development Project
SBD - Suspension Bridge Division, MPLD
* Estimated

C. Small Irrigation Schemes

The analysis of cost indicators in Table 5 - cost/meter (CM), cost/Ha (CH), and cost/capita (CC) - present an interesting pattern, and do not show the highest or lowest figures for the same district. The CM figures are the highest for Rukum and the lowest for Pyuthan. The CC figures are the highest for Salyan and the lowest for Pyuthan. The CH figure appears to be lowest for Dang but highest for Rolpa. The CH figure for Dang gives a distorted picture as one of its schemes - the largest one at Tarigaon/Ranigar - has not yet fully taken off the ground.

Table 5

RAPTI IRDP - SMALL IRRIGATION SCHEMES

SERVICE DELIVERY INDICATORS

District	Cost Rs.	Populated Benefitted	Land Irrigated Ha.	Cost/metre Rs.	Cost/Ha. Rs.	Cost/Capita Rs.	No. of Schemes	Length Km.
Dang	1,487,000/-	8,800	3,797	62.00	391.50	169.00	5	24
Salyan	322,538/-	1,400	412	29.50	789.00	230.50	3	10
Rukum	465,644/-	2,340	96.7	65.00	4,815.50	199.00	3	7.17
Rolpa	372,910/-	1,900	75.28	38.30	4,954.00	196.00	2	9.73
Pyuthan								
Guthiwang	21,174/-	300	Pond	-	-	70.50	1	-
Narikot	27,440/-	300	20	12.00	1,372.00	91.50	1	2.27
Total	2,696,706/-	15,040	4,500				15	54.6

Note: All cost figures converted into 1983/84 figures. Based on Financial Survey - 2041/042 B.S. (1984/85), Ministry of Finance/HMG, 2042 B.S.

Source: 'Rapti IRDP: A Glimpse of Local Development Programmes', PCO, Tulsipur, Dang (Refer Irrigation Component).

APPENDIX TABLES

Appendix Table A.II.1

LAND CAPABILITY AREAS BY DISTRICT IN RAPTI ZONE[1]/

(Hectares)

District	I	II	III	IV	V	VI	VII	Unclassified[2]/	Total Area
Rukum	872	2,325	39,814	127,289	10,172	57,832	50,858	1,452	290,614
Rolpa	330	661	58,954	81,743	1,156	21,798	0	495	165,137
Sallyan	2,401	1,051	60,480	65,883	150	18,159	0	1,951	150,075
Pyuthan	2,331	3,238	37,561	65,149	388	18,781	0	2,073	129,521
Dang	58,325	26,646	27,830	66,023	888	104,807	0	11,546	296,065
Rapti Zone	64,259	33,921	224,639	406,087	12,754	221,377	50,858	17,517	1,031,412

1/ Capability classes are defined in Appendix.

2/ Active riverbeds and channels.

Note: Classes I, II, and III are defined as suitable for agriculture; Classes IV and V are suitable for forestry and grazing; and Classes VI and VII are unsuitable for intensive resource use.

Source: Computed from Land Resources Mapping Project (LRMP) data.

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Appendix Table A.II.2

RAPTI ZONE LAND UTILIZATION

(Hectares; Percentages of District Area in Parentheses)

District	Terai Wet Lands (W)	Terai Dry Lands (D)	Level Terraces (T)	Sloping Terraces (C)	Valley Floors (V)	Tars, Alluvial Fans, Lower Footslopes (F)	Grazing Lands (G)	Total Agriculture Land	Mature Forest (M)	Immature Forest (I)	Reproduction Forest (R)	Shrub Forest (S)	Total Forest	Gravel, Sand, Rock, Ice (O)	Total land Area
	Agricultural Land								Forest Land					Other	Total
Rukum			7,789 (2.7)	33,113 (11.4)	499 (0.2)	3,900 (1.3)	53,087 (18.3)	98,388 (33.9)	52,259 (18.0)	75,994 (26.1)	156 (0.1)	7,981 (2.7)	136,390 (46.9)	55,836 (19.2)	290,614
Rolpa			10,569 (6.4)	39,798 (24.1)	165 (0.1)	2,312 (1.4)	28,899 (17.5)	81,743 (49.5)	30,055 (18.2)	41,449 (25.1)	2,972 (1.8)	8,422 (5.1)	82,898 (50.2)	495 (0.3)	165,137
Salyan			13,048 (8.7)	34,624 (23.1)	2,393 (1.6)	2,609 (1.7)	17,334 (11.5)	70,008 (46.6)	5,905 (3.9)	65,070 (43.4)	2,634 (1.8)	5,962 (4.0)	79,571 (53.1)	496 (0.3)	150,075
Pyuthan			9,181 (7.1)	25,532 (19.7)	1,179 (0.9)	7,150 (5.5)	12,899 (10.0)	55,941 (43.2)	9,605 (7.4)	50,449 (38.9)	6,230 (4.8)	6,410 (5.0)	72,694 (56.1)	886 (0.7)	129,521
Dang	19,995 (6.7)	10,589 (3.6)	130 (0.0)	11,471 (3.9)	9,404 (3.2)	27,649 (9.3)	8,906 (3.0)	88,143 (29.7)	34,665 (11.7)	139,862 (47.2)	5,587 (2.0)	17,158 (5.8)	197,273 (66.7)	10,649 (3.6)	296,065
Rapti Zone	19,995 (1.9)	10,589 (1.0)	40,717 (4.0)	144,538 (14.0)	13,640 (1.3)	43,620 (4.2)	121,125 (11.7)	394,223 (38.2)	132,489 (12.9)	372,824 (36.1)	17,579 (1.7)	45,933 (4.5)	568,826 (55.2)	68,362 (6.6)	1,031,412

Source: Computed from Land Resources Mapping Project (LRMP) data.

Appendix Table A.II.3

LAND CAPABILITY/LAND USE COMPARISON BY DISTRICT, RAPTI ZONE

(Percentages of District Areas)

District	Land Capability 1/							Present Land Use 2/					
	I	II	III	IV	V	VI	VII	(1) Low-land Agri-culture	(2) Upland/ Slope Agri-culture	(3) Gra-zing Land	(4) Forest	(5) De-graded Forest	(6) Waste-Land
Rukum	0.3	0.8	13.7	43.8	3.5	19.9	17.5	1.5	14.1	18.3	18.1	28.8	19.2
Rolpa	0.2	0.4	35.7	49.5	0.7	13.2	0.0	1.5	30.5	17.5	20.0	30.2	0.3
Sallyan	1.8	2.5	29.0	50.3	0.3	14.5	0.0	3.3	31.8	11.5	5.7	47.4	0.3
Pyuthan	1.6	0.7	40.3	43.9	0.1	12.1	0.0	6.4	26.8	10.0	12.2	43.9	0.7
Dang	19.7	9.0	9.4	22.3	0.3	35.4	0.0	22.8	3.9	3.0	13.7	53.0	3.6
Rapti Zone	6.2	3.3	21.6	39.5	1.2	21.5	4.9	8.4	18.0	11.7	14.6	40.6	6.6

Land Capability Classes (See Appendix 2):

I. Few limitations on agriculture or forestry.

II. Terracing or contouring necessary for agriculture; Ground/cover required for forest usage.

III. Terracing mandatory for agriculture.

IV. Not suitable for Agriculture; suitable for fuelwood, fodder, timber production under proper management.

V. Fodder collection and grazing only.

VI. Highly fragile land ecosystem.

VII. Rock and ice.

1/ Totals do not equal 100.0% because some land has been left unclassified (active river channels).

2/ Land use categories aggregated from those in Table A.II.2 as follows: (1)W,D,V,F (2) T,C (3) G (4) M,R (5) I,S (6) O

Source: Computed from Land Resources Mapping Project (LRMP) data.

Appendix Table A.II.4

YEARLY DISCHARGE OF RAPTI RIVER
AT JALKUNDI (NEAR AMILE)
(M^3 Per Second)

Year	Mean	Maximum	Month	Minimum	Month
1964	118.0	1440	August	6.32	June
1965	79.94	984	August	1.21	February
1966	74.75	1000	August	2.45	May
1967	85.06	703	July	1.65	June
1968	111.0	1520	August	1.05	May
1969	107.1	2500	August	3.99	May
1970	123.0	1670	July	3.45	May
1971	126.7	928	August	14.4	April
1972	71.49	1060	July	3.63	May
1973	211.8	2280	June	7.12	May
1974	113.5	2140	August	3.68	May
1975	167.6	2880	August	1.45	May

Source: HMG, Hydrology Section, Department of Irrigation, Hydrology, and Meteorology.

Appendix Table A.II.5

YEARLY DISCHARGES OF JHIMRUK KHOLA
AND MADI KHOLA, PYUTHAN DISTRICT
(M^3 Per Second)

Year	Mean	Maximum	Month	Minimum	Month
Jhimruk Khola at Kalimati Ghat					
1965	16.96	155	August	0.24	May
1966	18.17	124	September	0.20	May
1967	23.28	213	September	0.24	May
1968	27.94	141	September	0.40	May
Madi Khola at Nayagaon					
1964	89.66	868	August	7.00	July
1965	44.91	368	August	5.98	June
1966	43.50	282	August	6.74	May
1967	46.30	310	September	5.30	June
1968	61.63	363	August	6.30	May
1969	63.64	589	August	7.95	June
1970	71.4	577	July	7.20	April
1971	75.72	477	July	4.48	April
1972	40.2	408	July	10.4	June
1973	98.89	624	August	4.60	April

Source: HMG, Hydrology Section, Department of Irrigation, Hydrology, and Meteorology.

Appendix Table A.II.6

AMOUNT OF RAINFALL IN 1983 AT SEVEN STATIONS
IN RAPTI ZONE
(Millimeters)

Place	January	February	March	April	May	June	July	August	September	October	November	December	Total
Rukumkot	110	77	121	47	141	196	324	443	105	27	27	6	1,624
Libang Gaon (Rolpa)	47	18	101	50	124	223	291	712	208	15	15	14	1,818
Bijuwar Tar (Pyuthan)	38	8	83	17	77	103	305	337	228	9	29	10	1,244
Tulsipur (Dang)	39	2	82	7	111	343	208	540	420	69	22	9	1,852
Koilabas (Deokhuri)	67	206	182	46	80	132	201	241	308	69	25	-	1,557
Sallyan	66	26	74	77	131	106	249	210	187	15	14	21	1,176
Chaurjahari (Rukum)	59	40	110	25	72	130	233	417	184	14	20	31	1,335

Source: HMG, Nepal Meteorological Service, Department of Irrigation, Hydrology, and Meteorology.

Appendix Table A.III.1

YIELD TRENDS IN DIFFERENT ECOLOGICAL ZONES OF NEPAL

(Metric Tons per Hectare)

Crop	Yields 1970/71			Yields 1980/81			Percentage Change		
	Mount.	Hills	Terai	Mount.	Hills	Terai	Mount.	Hills	Terai
Rice	2.38	2.49	1.85	1.91	2.18	1.88	-19.8	-12.5	1.6
Maize	1.87	1.77	1.62	1.59	1.60	1.68	-15.0	- 9.6	3.7
Wheat	1.06	1.12	0.78	1.03	1.22	1.30	- 2.8	-13.7	66.7
Millet	1.19	1.17	0.90	0.99	1.01	0.94	-16.8	-13.7	4.4
Barley	1.06	0.98	0.70	0.91	0.87	0.88	-14.2	-11.2	15.8

Source: Asian Development Bank, Nepal Agriculture Sector Strategy Study, December, 1982. Vol. II, p. 189, Table 5.7.

Appendix Table A.III.2

AREA, PRODUCTION AND YIELD FOR CEREAL AND CASH CROPS IN DANG DISTRICT, 1973/74 - 1982/83

		1973/74	1974/75	1975/76	1976/77	1977/78	1978/79	1979/80	1980/81	1981/82	1982/83
Paddy	Area[1/]	32,100	32,400	32,400	32,910	31,940	32,040	30,440	31,620	28,340	32,950
	Prod	60,990	62,208	63,990	63,187	61,330	61,520	36,930	60,080	56,080	57,300
	Yield	1.90	1.92	1.98	1.92	1.92	1.92	1.21	1.90	1.98	1.74
Maize	Area	13,000	13,000	13,000	10,700	20,550	20,910	20,910	21,170	20,470	19,940
	Prod	25,480	25,740	12,870	15,392	33,910	34,510	31,060	36,000	34,390	33,540
	Yield	1.96	1.98	0.99	1.44	1.65	1.65	1.49	1.70	1.68	1.68
Wheat	Area	6,800	6,900	11,900	12,495	12,790	12,700	13,000	12,880	14,990	12,970
	Prod	7,650	7,866	14,280	10,620	14,980	13,340	15,600	15,740	25,480	16,990
	Yield	1.13	1.14	1.20	0.85	1.17	1.05	1.20	1.22	1.70	1.31
Millet	Area	350	350	350	310	400	400	400	450	450	450
	Prod	315	315	320	310	480	480	410	450	360	360
	Yield	0.90	0.90	0.91	1.00	1.20	1.20	1.03	1.00	0.80	0.80
Barley	Area	365	365	212	291	470	450	450	450	450	100
	Prod	254	254	147	181	560	450	450	450	400	90
	Yield	0.70	0.70	0.69	0.62	1.19	1.00	1.00	1.00	0.89	0.90
Potato	Area	500	500	500	500	450	440	440	450	450	500
	Prod	3,000	3,000	3,000	2,880	2,700	2,640	2,680	2,930	3,050	4,000
	Yield	6.00	6.00	6.00	5.76	6.00	6.00	6.09	6.51	6.78	8.00
Oilseeds	Area	10,510	10,962	10,000	10,900	13,700	18,680	17,600	18,650	17,980	18,370
	Prod	7,094	7,399	6,740	7,126	13,290	14,940	12,320	13,060	13,480	11,020
	Yield	0.67	0.67	0.67	0.65	0.97	0.80	0.70	0.70	0.75	0.60

1/ Area in hectares; Production in metric tons; Yield in metric tons/hectare.

Source: HMG, Ministry of Agriculture, Agriculture Statistics of Nepal, 1983.

Appendix Table A.III.3

AREA, PRODUCTION AND YIELD FOR CEREAL AND CASH CROPS IN SALLYAN DISTRICT, 1973/74 - 1982/83

		1973/74	1974/75	1975/76	1976/77	1977/78	1978/79	1979/80	1980/81	1981/82	1982/83
Paddy	Area 1/	4,500	4,510	4,510	4,500	4,500	4,320	3,890	4,080	4,080	5,110
	Prod	10,125	10,147	10,640	10,600	10,490	10,070	6,040	8,570	8,570	10,730
	Yield	2.25	2.25	2.36	2.36	2.33	2.33	1.55	2.10	2.10	2.10
Maize	Area	5,011	5,500	5,500	5,500	5,200	7,160	7,160	7,080	7,100	7,100
	Prod	9,320	10,312	9,800	10,506	9,930	9,580	8,140	10,620	10,650	9,580
	Yield	1.86	1.87	1.78	1.91	1.91	1.33	1.14	1.50	1.50	1.35
Wheat	Area	3,450	3,465	3,018	4,961	4,960	5,000	5,000	5,950	5,900	7,900
	Prod	3,519	3,534	3,531	5,953	5,210	6,000	6,000	7,140	6,490	8,700
	Yield	1.02	1.02	1.17	1.20	1.05	1.20	1.20	1.20	1.10	1.10
Millet	Area	3,200	3,200	3,200	3,200	3,200	4,300	3,870	5,160	4,500	4,570
	Prod	2,400	2,400	2,400	2,400	3,520	4,700	2,320	5,680	4,950	5,030
	Yield	0.75	0.75	0.75	0.75	1.10	1.09	0.60	1.10	1.10	1.10
Barley	Area	750	750	760	836	820	800	760	1,140	1,140	1,000
	Prod	746	746	755	662	820	800	760	990	1,140	1,000
	Yield	0.99	0.99	0.99	0.79	1.00	1.00	1.00	0.87	1.00	1.00
Potato	Area	400	400	400	440	420	400	400	800	810	860
	Prod	2,160	2,160	2,160	933	1,470	2,250	2,280	3,330	3,320	4,300
	Yield	5.40	5.40	5.40	2.12	3.50	5.63	5.70	4.16	4.10	5.00
Oilseed	Area	480	480	490	539	520	500	500	820	820	800
	Prod	218	218	222	196	280	250	250	360	410	400
	Yield	0.45	0.45	0.45	0.36	0.54	0.50	0.50	0.44	0.50	0.50

1/ Area in hectares; Production in metric tons; Yield in metric tons/hectare.

Source: HMG, Ministry of Agriculture, Agriculture Statistics of Nepal, 1983.

Appendix Table A.III.4

AREA, PRODUCTION AND YIELD FOR CEREAL AND CASH CROPS IN ROLPA DISTRICT, 1973/74 - 1982/83

		1973/74	1974/75	1975/76	1976/77	1977/78	1978/79	1979/80	1980/81	1981/82	1982/83
Paddy	Area 1/	655	675	680	680	680	640	620	600	600	550
	Prod	1,506	1,552	1,530	1,600	1,630	1,510	1,110	1,140	1,140	1,050
	Yield	2.30	2.30	2.25	2.35	2.40	2.36	1.79	1.90	1.90	1.91
Maize	Area	3,650	3,700	3,700	3,700	3,100	3,220	3,220	3,760	3,760	3,760
	Prod	6,670	6,919	6,790	7,130	5,380	5,590	4,190	5,680	5,640	5,360
	Yield	1.83	1.87	1.84	1.93	1.74	1.74	1.30	1.51	1.50	1.43
Wheat	Area	2,700	2,700	2,005	1,604	1,600	1,600	1,600	2,320	2,300	2,300
	Prod	2,430	2,430	2,245	1,203	1,410	1,400	1,440	2,090	2,070	2,070
	Yield	6.90	0.90	1.12	0.75	0.88	0.88	0.90	0.90	0.90	0.90
Millet	Area	630	630	630	630	600	620	620	610	610	610
	Prod	775	775	780	780	700	720	650	610	610	610
	Yield	1.23	1.23	1.24	1.24	1.17	1.17	1.05	1.00	1.00	1.00
Barley	Area	650	650	480	480	470	520	520	490	490	490
	Prod	718	718	530	384	520	470	500	440	390	390
	Yield	1.10	1.10	1.10	0.80	1.11	0.90	0.96	0.90	0.80	0.80
Potato	Area	400	400	410	410	400	400	400	550	550	440
	Prod	2,400	2,400	2,460	2,214	2,200	2,000	2,040	3,300	3,300	2,200
	Yield	6.00	6.00	6.00	5.39	5.50	5.00	5.10	6.00	6.00	5.00
Oilseed	Area	40	40	40	40	40	40	40	40	40	40
	Prod	17	17	17	17	10	20	20	20	20	20
	Yield	0.43	0.43	0.43	0.43	0.25	0.50	0.50	0.50	0.50	0.50

1/ Area in hectares; Production in metric tons; Yield in metric tons/hectare.

Source: HMG, Ministry of Agriculture, Agriculture Statistics of Nepal, 1983.

Appendix Table A.III.5

AREA, PRODUCTION AND YIELD FOR CEREAL AND CASH CROPS IN PYUTHAN DISTRICT, 1973/74 - 1982/83

		1973/74	1974/75	1975/76	1976/77	1977/78	1978/79	1979/80	1980/81	1981/82	1982/83
	Area[1/]	3,900	3,900	3,200	3,200	3,200	3,600	3,200	3,180	3,180	3,180
Paddy	Prod	9.085	8,970	10,790	8,830	7,650	7,600	6,000	7,000	7,000	7,000
	Yield	2.33	2.30	3.37	2.76	2.39	2,11	1.90	2.20	2.20	2.20
	Area	8,000	8,000	7,190	7,090	7,100	8,500	7,100	7,080	8,050	9,080
Maize	Prod	15,908	15,600	14,820	14,667	12,290	12,300	11,070	11,470	12,080	13,620
	Yield	1.99	1.95	2.06	2.07	1.73	1.45	1.56	1.62	1.50	1.50
	Area	3,000	4,280	4,280	4,280	4,300	2,500	4,300	3,200	4,000	4,000
Wheat	Prod	2,760	2,760	5,136	4,708	4,620	5,590	5,590	4,000	4,800	4,800
	Yield	0.92	1.15	1.20	1.10	1.07	2.24	1.30	1.25	1.20	1.20
	Area	1,360	1,360	1,250	1,200	1,200	975	1,200	1,210	1,210	1,420
Millet	Prod	1,390	1,394	1,530	1,275	1,430	1,400	1,200	1,450	1,450	1,400
	Yield	1.02	1.03	1.22	1.06	1.19	1.44	1.00	1.20	1.20	0.99
	Area	115	100	100	110	100	130	100	150	150	200
Barley	Prod	166	126	109	109	120	100	100	130	130	160
	Yield	1.44	1.26	1.09	1.09	1.20	0.77	1.00	0.87	0.87	0.80
	Area	200	200	200	200	210	200	200	200	200	250
Potato	Prod	1,060	1,060	1,060	1,113	3,130	1,100	1,080	1,100	1,200	1,500
	Yield	5.30	5.30	5.30	5.57	4.90	5.50	5.40	5.50	6.00	6.00
	Area	630	630	720	720	710	700	680	720	680	600
Oilseeds	Prod	293	293	334	334	250	350	350	360	340	300
	Yield	0.47	0.47	0.46	0.46	0.35	0.50	0.51	0.50	0.50	0.50

1/ Area in hectares; Production in metric tons; Yield in metric tons/hectare.

Source: HMG, Ministry of Agriculture, Agriculture Statistics of Nepal, 1983.

Appendix Table A.III.6

AREA, PRODUCTION AND YIELD FOR CEREAL AND CASH CROPS IN RUKUM DISTRICT, 1973/74 - 1982/83

		1973/74	1974/75	1975/76	1976/77	1977/78	1978/79	1979/80	1980/81	1981/82	1982/83
Paddy	Area 1/	620	620	620	630	670	700	700	860	860	450
	Prod	1,364	1,374	1,330	1,370	1,490	1,600	1,280	1,640	1,640	860
	Yield	2.20	2.20	2.15	2.17	2.22	2.29	1.83	1.91	1.91	1.91
Maize	Area	3,860	3,900	3,900	3,910	3,190	3,200	3,200	3,840	3,840	3,460
	Prod	7,334	7,488	5,620	7,480	5,490	5,500	4,950	5,070	5,370	3,630
	Yield	1.90	1.92	1.44	1.91	1.72	1.72	1.55	1.32	1.40	1.05
Wheat	Area	2,000	2,025	1,625	1,625	1,620	1,600	1,600	2,000	2,000	2,000
	Prod	1,740	1,762	1,852	1,137	1,200	1,280	1,320	1,780	1,800	1,800
	Yield	0.87	0.87	1.14	0.70	0.75	0.80	0.83	0.89	0.90	0.90
Millet	Area	475	475	470	470	200	200	200	250	500	500
	Prod	589	589	600	600	250	250	250	260	500	500
	Yield	1.24	1.24	1.28	1.28	1.25	1.25	1.25	1.04	1.00	1.00
Barley	Area	620	620	800	700	700	700	700	690	690	700
	Prod	694	694	895	560	770	560	570	560	550	560
	Yield	1.12	1.12	1.12	0.80	1.00	0.80	0.81	0.81	0.80	0.80
Potato	Area	300	300	300	300	310	300	300	290	290	270
	Prod	1,500	1,500	1,500	1,425	1,550	1,500	1,530	1,480	1,450	1,350
	Yield	5.00	5.00	5.00	4.75	5.00	5.00	5.10	5.10	5.00	5.00
Oilseeds	Area	145	145	150	100	90	100	100	90	90	90
	Prod	59	59	61	41	30	40	40	40	50	50
	Yield	0.41	0.41	0.41	0.41	0.33	0.40	0.40	0.44	0.56	0.56

1/ Area in hectares; Production in metric tons; Yield in metric tons/hectare.

Source: HMG, Ministry of Agriculture, Agriculture Statistics of Nepal, 1983.

Appendix Table A.III.7

AREA, PRODUCTION AND YIELD FOR CEREAL AND CASH CROPS IN RAPTI ZONE, 1973/74 - 1982/83

		1973/74	1974/75	1975/76	1976/77	1977/78	1978/79	1979/80	1980/81	1981/82	1982/83
Paddy	Area 1/	41,775	42,105	41,410	41,920	40,990	41,300	38,850	40,340	37,060	42,240
	Prod	83,070	84,251	88,280	85,587	82,590	82,300	51,140	78,430	74,430	76,940
	Yield	1.99	2.00	2.13	2.04	2.01	1.99	1.32	1.94	2.01	1.82
Maize	Area	33,521	34,100	33,290	30,900	39,140	42,990	41,590	42,930	43,220	43,340
	Prod	64,712	66,059	49,900	55,175	67,000	67,480	59,410	68,840	68,130	65,730
	Yield	1.93	1.94	1.50	1.79	1.71	1.57	1.43	1.60	1.58	1.52
Wheat	Area	17,950	19,370	22,828	24,965	25,270	23,400	25,500	26,350	29,190	29,170
	Prod	18,099	18,352	27,044	23,621	27,420	27,610	29,950	30,750	40,640	34,360
	Yield	1.01	0.95	1.18	0.95	1.09	1.18	1.17	1.17	1.39	1.18
Millet	Area	6,015	6,015	5,900	5,810	5,600	6,495	6,290	7,680	7,270	7,550
	Prod	5,469	5,473	5,630	5,365	6,380	7,550	4,830	8,450	7,870	7,900
	Yield	0.91	0.91	0.95	0.92	1.14	1.16	0.77	1.10	1.08	1.05
Barley	Area	2,500	2,485	2,352	2,417	2,560	2,600	2,530	2,920	2,920	2,490
	Prod	2,578	2,538	2,436	1,896	2,790	2,380	2,380	2,570	2,610	2,200
	Yield	1.03	1.02	1.04	0.78	1.09	0.92	0.94	0.88	0.89	0.88
Potato	Area	1,800	1,800	1,810	1,850	1,790	1,740	1,740	2,290	2,300	2,320
	Prod	10,120	10,120	10,180	8,565	11,050	9,490	9,610	12,140	12,320	13,350
	Yield	5.62	5.62	5.62	4.63	6.17	5.45	5.52	5.30	5.36	5.75
Oilseeds	Area	11,805	12,257	11,400	12,299	15,060	20,020	18,920	20,320	19,610	19,900
	Prod	7,681	7,986	7,374	7,714	13,860	15,600	12,980	13,840	14,300	11,790
	Yield	0.65	6.65	6.65	0.63	0.92	0.78	0.69	0.68	0.73	0.59

1/ Area in hectares; Production in metric tons; Yield in metric tons/hectare.

Source: HMG, Ministry of Agriculture, Agriculture Statistics of Nepal, 1983.

Appendix Table A.III.8

TREND IN THE FOOD BALANCE IN THE RAPTI ZONE, 1976/77 - 1982/83

(Calories in Millions)

District/Zone	1976/77	1977/78	1978/79	1979/80	1980/81	1981/82	1982/83
Rukum District							
Daily Demand for Calories	267.5	271.8	278.4	282.8	289.4	291.6	296.0
Annual Supply of Calories	27,524.3	22,365.5	22,253.2	20,368.5	22,406.3	23,778.7	17,869.8
Annual Supply Less Annual Demand							
(In days) 1/	- 262	- 283	- 285	- 293	- 288	- 283	- 305
(In percent) 2/	- 72.0	- 77.0	- 78.0	- 80.0	- 79.0	- 78.0	- 83.0
Rolpa District							
Daily Demand for Calories	367.0	367.0	367.0	367.0	367.0	367.0	367.0
Annual Supply of Calories	27,151.6	23,255.6	23,494.7	19,125.4	24,387.3	24,110.7	23,218.2
Annual Supply Less Annual Demand							
(In days)	- 291	- 302	- 301	- 313	- 299	- 299	- 302
(In Percent)	- 80.0	- 83.0	- 82.0	- 86.0	- 82.0	- 82.0	- 83.0
Sallyan District							
Daily Demand for Calories	325.8	325.8	325.8	325.8	325.8	325.8	325.8
Annual Supply of Calories	67,577.9	67,128.0	70,065.6	53,532.9	75,637.0	72,833.1	78,906.7
Annual Supply Less Annual Demand							
(In days)	- 158	- 159	- 150	- 201	- 133	- 141	- 123
(In Percent)	- 43.0	- 44.0	- 41.0	- 55.0	- 36.0	- 39.0	- 34.0

(Continued.....)

District/Zone	1976/77	1977/78	1978/79	1979/80	1980/81	1981/82	1982/83
Pyuthan District							
Daily Demand for Calories	319.2	323.5	327.8	334.2	338.5	342.7	344.9
Annual Supply of Calories	68,417.1	60,291.9	62,413.8	56,049.7	55,599.1	59,099.0	63,095.9
Annual Supply Less Annual Demand							
(In days)	- 151	- 179	- 175	- 197	- 201	- 193	- 182
(In Percent)	- 41.0	- 49.0	- 48.0	- 54.0	- 55.0	- 53.0	- 50.0
Hill Districts							
Daily Demand in Calories	1,279.5	1,288.1	1,299.0	1,309.8	1,320.7	1,327.1	1,333.7
Annual Supply of Calories	190,670.9	173,041.0	178,227.3	149,076.5	178,029.7	179,821.5	183,090.6
Annual Supply Less Annual Demand							
(In days)	- 216	- 231	- 228	- 251	- 230	- 230	- 228
(In Percent)	- 59.0	- 63.0	- 62.0	- 69.0	- 63.0	- 63.0	- 62.0
Dang District							
Daily Demand in Calories	439.8	461.9	483.9	508.0	534.1	560.2	588.3
Annual Supply of Calories	177,711.8	234,720.2	232,459.9	185,438.9	239,469.0	251,017.3	229,998.3
Annual Supply Less Annual Demand							
(In days)	+ 39	+ 143	+ 115	0	+ 83	+ 83	+ 26
(In Percent)	+ 11.0	+ 39.0	+ 32.0	0.0	+ 23.0	+ 23.0	+ 7.0

(Continued ... ...)

District/Zone	1976/77	1977/78	1978/79	1979/80	1980/81	1981/82	1982/83
Rapti Zone							
Daily Demand for Calories	1,722.5	1,753.1	1,786.3	1,821.0	1,857.8	1,890.9	1,925.5
Annual Supply of Calories	368,382.7	407,761.3	410,687.3	334,515.4	417,498.8	430,838.7	413,088.9
Annual Supply Less Annual Demand							
(In days)	- 151	- 132	- 135	- 181	- 140	- 137	- 150
(In Percent)	- 41.0	- 36.0	- 37.0	- 50.0	- 38.0	- 38.0	- 41.0

1/ Letting annual supply be x and daily demand be y, the formula is (x ÷ y) - 365.

2/ (x - 365 y) ÷ (365 y)

Note: The methodology and calculations that form the background to this table are to be found in Appendix Tables A.III.9-11.

Source: PADCO analysis.

Appendix Table A.III.9

POPULATIONS ASSUMED IN THE CALCULATION OF THE FOOD BALANCE

(Thousands)

Year	Rapti Zone	Districts				
		Rukum	Rolpa	Sallyan	Pyuthan	Dang
1976/77	811	122	169	152	149	219
1977/78	826	124	169	152	151	230
1978/79	842	127	169	152	153	241
1979/80	859	129	169	152	156	253
1980/81	877	132	169	152	158	266
1981/82	893	133	169	152	160	279
1982/83	910	135	169	152	161	293

Notes: 1. The 1981 population from the census were assigned to 1980/81. Fiscal years are employed because crop data are given on this basis.

2. Growth Assumptions:

Rukum: before 1981, 2% p.a.; After 1981, 1% p.a.

Rolpa: No growth

Sallyan: No growth

Pyuthan: before 1981, 1.5 p.a.; after 1981, 1% p.a.

Dang: before 1981, 5% p.a.; after 1981, 5% p.a.

Sources: 1981 Census and PADCO analysis.

Appendix Table A.III.10

CONVERSION OF A POPULATION TO ITS EQUIVALENT IN ADULTS

Age Distribution 1/	Rapti Zone	District: Rukum	Rolpa	Sallyan	Pyuthan	Dang	Adult Consumption Units 2/ (Index)
0 - 4	16.8	15.1	16.2	18.6	18.2	16.1	33
5 - 9	14.4	14.3	13.4	13.8	12.9	16.4	66
10 - 14	11.9	12.0	10.6	11.1	10.8	13.6	88
15 - 19	9.2	9.4	8.4	9.0	8.4	10.0	107
20 - 29	16.5	17.2	16.2	17.0	15.7	16.4	100
30 - 39	12.3	12.8	12.7	12.6	12.3	11.6	97
40 - 49	8.7	9.0	9.8	8.5	9.1	7.8	94
50 - 59	5.8	5.8	6.9	5.5	6.6	4.6	85
60 - 69	3.1	3.0	3.9	2.6	3.8	2.4	78
70 +	1.4	1.2	1.9	1.2	2.3	1.1	68
	100.0	100.0	100.0	100.0	100.0	100.0	
N.A.C. Weight 3/	80.27	81.20	80.44	79.38	79.34	80.32	

1/ Age distributions are from the 1981 Census.

2/ Adult Consumption Units expressed as percentages of average prescribed for males and females between ages 20-29 by the Nutrition Advisory Committee, India, 1958. N.A.C.: 2500 calories per day. 200 calories have been added for Hill requirements.

3/ N.A.C. for Nutrition Advisory Committee India. A N.A.C. Weight for each district and for the Rapti Zone is calculated by applying Adult Consumption Units as weights to the corresponding percent of the age distribution. The N.A.C. Weights, expressed as percentages, when multiplied by population convert a population to its equivalent in adults.

Appendix Table A.III.11

ASSUMPTIONS USED FOR CALCULATING THE CALORIC VALUE

OF FOODGRAINS AVAILABLE FOR CONSUMPTION

	Assumption	Foodgrains				
		Paddy	Maize	Wheat	Millet	Barley
1.	Seed (in percent of foodgrain)	2.75	1.75	6.50	2.25	4.50
2.	Waste (in percent after deducting seed from production)	15.0	15.0	15.0	15.0	15.0
3.	Milling/Conversion Ratios (in percent after deducting seed and waste from production)	60.0	90.0	90.0	85.0	90.0
4.	Factor for Converting Foodgrains Available for Consumption to Caloric Values (millions of calories per metric ton)	3.54	3.49	3.32	3.32	3.40

Source: PADCO analysis.

Appendix Table A.III.12

AVERAGE HOUSEHOLD INCOME, FARM INCOME AND CASH INCOME AND THE SHARES OF FARM AND CASH INCOME, BY SIZE OF FARM IN THE DISTRICTS OF RAPTI ZONE; ABOUT 1978

District	Size of Farm[1]	Total Household Income[2] (Rs.)	Total Farm Income[3] (Rs.)	Total Cash Income (Rs.)	Ratio of Farm to Household Income (%)	Ratio of Cash to Household Income (%)
Rukum	-	2,238	1,635	746	0.73	0.33
	Sub-marginal	1,094	715	485	0.65	0.44
	Marginal	1,954	1,469	544	0.75	0.28
	Small	2,146	1,556	684	0.73	0.32
	Medium	3,430	2,625	1,139	0.77	0.33
	Large	4,357	2,911	2,173	0.67	0.50
	Income Variation [4]	3.98	4.07	4.48	-	-
Rolpa	-	1,957	1,237	888	0.63	0.45
	Sub-marginal	1,472	1,044	1,062	0.71	0.72
	Marginal	1,376	612	859	0.44	0.62
	Small	2,629	1,858	974	0.71	0.37
	Medium	3,077	2,503	1,005	0.81	0.33
	Large	3,602	2,645	1,494	0.73	0.41
	Income Variation	2.45	2.53	1.41	-	-
Sallyan	-	2,748	1,546	1,388	0.56	0.50
	Sub-marginal	1,854	1,052	915	0.57	0.49
	Marginal	1,808	896	1,038	0.50	0.57
	Small	3,060	1,736	1,522	0.57	0.50
	Medium	4,415	2,820	1,882	0.64	0.43
	Large	7,725	4,461	3,863	0.58	0.50
	Income Variation	4.16	4.24	4.22	-	-

(continued . . . .)

District	Size of Farm 1/	Total Household Income 2/ (Rs.)	Total Farm Income 3/ (Rs.)	Total Cash Income (Rs.)	Ratio of Farm to Household Income (%)	Ratio of Cash to Household Income (%)
Pyuthan	-	3,444	2,126	1,680	0.62	0.49
	Sub-marginal	3,055	1,865	1,457	0.61	0.48
	Marginal	3,057	2,016	1,330	0.66	0.44
	Small	3,988	2,404	2,006	0.60	0.50
	Medium	7,917	5,150	3,688	0.65	0.47
	Large	8,816	6,861	3,065	0.78	0.35
	Income Variation	2.89	3.68	2.10	-	-
Dang	-	3,651	2,329	2,274	0.64	0.62
	Sub-marginal	2,921	1,905	1,449	0.65	0.50
	Marginal	3,346	2,157	1,719	0.64	0.51
	Small	3,079	2,139	1,969	0.69	0.64
	Medium	5,638	3,833	3,978	0.68	0.70
	Large	8,019	6,334	5,845	0.79	0.73
	Income Variation	2.75	3.32	4.03	-	-

1/ See Table III.5 for definitions

2/ Total Household Income equals Household Adjusted Income of the Source minus sales of Assets and Debts.

3/ Farm Income includes Agriculture, Livestock, Vegetables and Horticulture; its definition is identical to that employed in the Source. All else (Trade, Business, Wages, Services, Interest, Rent, Transfers and Other) is Non-farm income also identical to the definition in the Source. All Non farm Income is in cash. Therefore, Cash Income less Non-farm Income equals Farm Cash Income.

4/ Ratio of the average income for large farms to the average income for sub-marginal farms.

Source: APROSC, Report on Rapti Baseline Survey, Kathmandu, Annex G, September, 1980. Table 3.7.1. and 3.7.2.

Appendix Table A.III.13

INCOME FROM FARM AND NON-FARM ACTIVITIES BY DISTRICT STRATUM (SIZE OF OPERATIONAL HOLDING), 1982/83

District and Stratum		Household Income (Rs.) Farm Income 1/	Non-Farm Income 2/	Income From All Sources	Ratio of Farm Income to Income From All Sources
Rukum	Stratum I 3/	3,517	2,077	5,594	.63
	II	9,454	1,632	11,086	.85
	III	14,246	1,915	16,161	.88
	IV	35,467	2,618	38,085	.93
Income Variation 4/		10.1		6.8	
Rolpa	Stratum I	1,791	6,497	8,288	.22
	II	5,811	1.700	7,511	.77
	III	9,865	2,011	11,876	.83
	IV	15,672	2,790	18,462	.85
Income Variation		8.7		2.2	
Salyan	Stratum I	1,347	2,251	3,598	.37
	II	4,510	735	5,245	.86
	III	8,976	1,955	10,931	.82
	IV	10,179	3,151	13,330	.76
Income Variation		7.6		3.7	
Pyuthan	Stratum I	2,348	2,150	4,498	.52
	II	8,574	1,189	9,763	.88
	III	16,889	4,993	21,882	.77
	IV	19,490	3,050	22,540	.86
Income Variation		8.3		5.0	
Hills	Stratum I	2,528	3,198	5,726	.44
	II	7,348	1,392	8,740	.84
	III	12,231	2,588	14,819	.83
	IV	18,211	1,111	19,322	.94
Income Variation		7.2		3.4	
Dang	Stratum I	6,901	3,567	10,468	.66
	II	4,433	1,409	5,842	.76
	III	7,810	1,420	9,230	.85
	IV	35,809	2,973	38,782	.92
Income Variation		5.2		3.7	

1/ Agriculture plus Animal Husbandry plus Poultry.

2/ All other activities including Fishing, Cottage Industry Off-farm Employment, Wages, Firewood and Business.

3/ Stratum I = 0-4 Ropani, II = 5-10 Ropani; III = 11-20 Ropani; IV = Above 20 Ropani; Strata represent size of operational land holding.

4/ Ratio of income in Stratum IV to income in Stratum I, highest over lowest.

Source: No-Frills Development Consultancy, Report on the Households Production Systems in the Rapti Zone, December, 1983, Kathmandu. Table 18 and pp 86 - 190.

Appendix Table A.III.14

HOUSEHOLDS AND POPULATION WITH EXPENDITURE AND INCOME BELOW MIMIMUM SUBSISTENCE LEVELS IN NEPAL BY REGION, 1977

	Percentage of Households Below National Minimum Subsistence Level				Percentage of Population Below National Minimum Subsistence Level			
	Consumption		Income		Consumption		Income	
Region	Rural	Urban	Rural	Urban	Rural	Urban	Rural	Urban
Eastern	34.09	13.70	38.63	21.99	32.61	14.40	37.02	19.06
Central	34.00	25.56	36.33	27.81	29.53	25.30	34.46	21.23
Western	37.25	25.76	29.96	29.26	37.00	26.25	28.45	25.61
Far-Western	38.29	33.96	47.31	35.85	34.82	33.96	43.56	25.04
Nepal (all regions)	35.53	23.49	37.33	27.58	32.91	23.99	35.46	22.20
Nepal (rural + urban)	33.24		35.50		31.33		32.89	

Source: National Planning Commission, A Survey of Employment, Income Distribution and Consumption Patterns in Nepal, 1977. P. 116. Table 13.7.

Appendix Table A.III.15

ECONOMIC ANALYSIS OF CROPPING PATTERNS AT TWO CSP SITES, 1981/82

Cropping Systems Site	Land Type	Cultivation Practices[a/]	Cropping Patterns	Gross Returns (Rs/ha)	Material Cost[b/] (Rs/ha)	Labor and Power Cost (Rs/ha)	Return over Variable Cost (Rs/ha)[c/]	M.B.C.R.[d/]
Rukum	Upland	1. Farmers'	Rice-Maize-Wheat	10,985	999	n.a.	9,986[e/]	10.10
		2. Improved	" " "	22,980	2,192	n.a.	20,788[e/]	
Ratna Nagar[f/]	Lowland	1. Farmers'	Rice-Wheat	8,460	695	3,154	4,611	9.63
		2. Improved	Rice-Wheat-Maize	25,175	2,430	5,205	17,540	

a/ Data for farmers' practices based on socio-economic studies over a number of years. Data for improved practices derived from 1981/82 cropping pattern trials.

b/ Costs of seed, chemical fertilizers and pesticides (if any).

c/ Returns Over Variable Costs = Gross Returns - Materials Costs, Labor Costs and Power Costs.

d/ M.B.C.R. = Marginal Benefit Cost Ratio or Change in Gross Returns Divided by Change in Material Costs. Note that a M.B.C.R. of 3 and above is generally considered adequate to provide an economic incentive to farmers.

e/ Labor and Power Costs were not subtracted out.

f/ This Site is in the Inner Terai.

Source: Reproduced, with minor explanatory additions, from: Cropping Systems Staff, "Cropping Systems Studies in Winter Crops 1981/1982", ICP, HMG Department of Agriculture, August 1982.

Appendix Table A.III.16

ESTIMATED SALES OF AGRICULTURAL PRODUCTS

IN RAPTI ZONE, 1982/83

(Rs.'000)

District	Foodgrains	Animal Husbandry	Poultry	Cash Crops	Vegetables
Rukum	30,587	9,634	-	666	16,313
Rolpa	14,708	19,726	1,585	2,974	2,631
Sallyan	2,408	4,031	68	17,091	1,371
Pyuthan	20,726	18,101	2,689	1,911	1,530
Hill Districts	68,699	51,492	4,342	22,642	21,845
Dang	19,467	6,754	372	15,347	1,550
Rapti Zone	88,166	58,246	4,714	37,289	23,395

Source: PADCO analysis using data from No Frills Development Consultancy, Household Production Systems in Rapti Zone, Kathmandu, 1983, p.70, Table 16.

Appendix Table A.III.17

ESTIMATED SALES OF AGRICULTURAL PRODUCTS

OUTSIDE THE DISTRICT OF ORIGIN

RAPTI ZONE, 1982/83

(Rs. '000)

District		Foodgrains	Animal Husbandry	Cash Crops	Total
Rukum	Sales	-	4,817	599	5,416
	%	-	(88.9)	(11.1)	(100.0)
Rolpa	Sales	-	9,863	2,677	12,540
	%	-	(78.7)	(21.3)	(100.0)
Sallyan	Sales	-	2,016	15,382	17,398
	%	-	(11.6)	(88.4)	(100.0)
Pyuthan	Sales	-	9,051	1,720	10,771
	%	-	(84.0)	(16.0)	(100.0)
Hill Districts	Sales	-	25,747	20,387	46,125
	%	-	(55.8)	(44.2)	(100.0)
Dang	Sales	17,520	3,377	13,812	34,709
	%	(50.5)	(9.7)	(39.8)	(100.0)
Rapti Zone	Sales	17,520	29,124	34,190	80,834
	%	(21.7)	(36.0)	(42.3)	(100.0)

Note: These figures were calculated using the following assumptions:

1. In food deficit districts, 100 percent of foodgrains are sold within the district. In food surplus district, the figure is only 10 percent.
2. 50 percent of animal husbandry production and 10 percent of cash crops are sold outside the district; 100 percent of poultry and vegetables are sold within the district.

Source: Appendix Table A.III.16

Appendix Table A.III.18

NET PRODUCER MARGINS FOR SELECTED CROPS AND LOCATIONS

(Margins in Constant 1976/77 Rs.)

Crop	Location	Net Producer Margin Per Hectare 1976/77	1981/82	Percentage Change
Paddy	Hills 1/	2,754	1,617	-41.3
	Terai 2/	1,577	685	-56.6
Wheat	Hills 1/	1,051	932	-11.3
	Terai 2/	2,175	1,164	-46.5
Maize	Hills 3/	405	460	+13.6
	Terai 2/	457	728	+59.3
Mustard	Terai 2/	533	912	+71.1

1/ Central Hills, Dhading.

2/ Western Terai, Rupandehi.

3/ Mid-Western Hills, Surkhet.

Source: World Bank, Nepal -Recent Developments and Selected Issues in Trade Promotion, Report No. 4663 - NEP, October 14, 1983, Table 10, p.40.

Appendix Table A.III.19

AIC DEALERS NETWORK FOR AGRICULTURAL INPUTS, 1983

Districts	No.of Sajha Outlets	Percent of Sajhas in Rapti Zone	Remarks	No. of Private Dealers	Total No.of Outlets
Salyan	3	13	One at Tharmare is not effective	-	3
Rolpa	-	-	No Sajha	8	8
Pyuthan	2	9	One private dealer at district headquarter	1	3
Rukum	4	17		-	4
Hills	9	39		9	18
Dang	14	61			14
Total in Zone	23	100		9	32

Source: No Frils Development Consultancy, Report on the Evaluation of Agricultural Inputs Provision in Rapti Zone, USAID/Nepal, Number 1983, Table No. 18, p. 54.

Appendix Table A.III.20

ECONOMICALLY ACTIVE POPULATION BY MAIN SECTORS, NEPAL 1950 - 1979/80

(Thousands)

('000)

	Total		Agriculture		Manufacturing		Services	
1950[a/]	EAP	%	EAP	%	EAP	%	EAP	%
Male	2,506	100.0	2,298	91.7	60	2.4	148	5.9
Female	1,693	100.0	1,622	95.8	29	1.7	42	2.5
Total	4,199	100.0	3,920	93.8	89	2.1	190	4.5
1960[a/]								
Male	2,620	100.0	2,405	92.45	68	2.60	129	4.95
Female	1,783	100.0	1,735	97.30	22	1.25	66	1.45
Total	4,385	100.0	4,140	94.43	90	2.05	195	3.52
1971[b/]								
Male	3,434	100.0	3,187	92.8	96	2.8	151	4.4
Female	1,418	100.0	1,392	98.2	10	0.7	16	1.10
Total	4,852	100.0	4,579	94.4	106	2.2	167	3.4
1979/80[c/]								
Male	-	-	-	-	-	-	-	-
Female	-	-	-	-	-	-	-	-
Total	7,400	100.0	6,900	93.0	100	2.0	400	5.0

a/ The 1950 and 1960 information is derived from 1950-80 Labor Force Projections of ILO.

b/ The 1971 information is from the Population Census, 1971, Central Bureau of Statistics, Nepal.

c/ The 1979/80 data are from estimates by IBRD, World Development Report, 1981.

Appendix Table A.III. 21

EMPLOYMENT PATTERN: ECONOMICALLY ACTIVE POPULATION IN RAPTI ZONE DISTRICTS BY OCCUPATIONAL CATEGORY AND ECONOMIC SECTOR, 1981

(Percentages)

Occupational Category	Nepal	Rapti Zone	Pyuthan	Rolpa	Rukum	Salyan	Dang
Prof/Tech	0.9	0.6	0.6	0.9	0.8	0.4	0.6
Admn, Clerical, Sales, Service	2.3	0.8	0.3	0.3	0.8	0.3	2.1
Farm	91.4	96.3	96.7	97.2	97.0	97.9	93.6
Production/Labour	3.1	0.9	0.5	0.2	0.6	0.7	2.0
Not stated	2.3	1.4	1.9	1.4	0.8	0.7	1.7
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Economic Sector							
Agriculture/Forest	91.2	96.3	96.8	97.4	96.9	97.9	93.3
Manufacturing	0.5	0.2	0.1	-	0.2	0.2	0.4
Commerce	1.6	0.8	0.3	0.2	0.5	0.5	2.0
Personal/Community Service	4.6	1.5	0.9	0.6	1.6	0.6	3.2
Other [1/]	1.7	-	0.1	-	-	0.1	1.1
Not stated	0.4	1.2	1.8	1.8	0.8	0.7	1.0
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Number of Economically Active (000)	6,850.9	405.2	85.6	84.3	63.7	73.0	98.5

[1/] Mining/quarrying, utilities, construction, transport/communications, finance/business.

Note: Economically active population covers people 10 years old or older.

Source: 1981 Census.

Appendix Table A.III.22

UNEMPLOYMENT BY DEVELOPMENT REGIONS:
RURAL AND URBAN NEPAL, 1977
(Thousands)

Region		Labour Force (No. of Persons)			Unemployed (No. of Persons)			Percent Unemployed		
		M	F	T	M	F	T	M	F	T
Eastern	Rural	1717	1483	3200	90	85	175	5.24	5.73	5.47
	Urban	359	56	415	18	13	31	5.01	23.21	7.47
Central	Rural	2678	2230	4908	174	162	336	6.50	7.26	6.85
	Urban	512	137	649	23	16	39	4.49	11.66	6.01
Western	Rural	1802	1625	3427	67	53	120	3.72	3.26	3.50
	Urban	377	279	656	22	22	44	5.84	7.89	6.71
Far-Western	Rural	1504	1313	2817	90	78	168	5.98	5.94	5.96
	Urban	169	18	187	-	-	-	-	-	-
Nepal	Rural	7701	6651	14352	421	378	799	5.47	5.68	5.57
	Urban	1417	490	1907	63	51	114	4.52	10.20	5.98

Note: M, F and T stand for Male, Female and Total (of both sexes) respectively.

Source: National Planning Commission, A Survey of Employment, Income Distribution and Consumption Patterns in Nepal, 1977 P. 55. Table 6.3

Appendix Table A.III.23

UNDER EMPLOYMENT AMONG RURAL WORKERS IN DIFFERENT DEVELOPMENT REGIONS, NEPAL, 1977

Development Region	Percentage of Days Underemployed	
	Male	Females
Eastern	60.76	75.31
Central	56.35	73.17
Western	54.26	63.93
Far Western	60.78	63.39
Nepal	57.88	68.87

Source: National Planning Commission, A Survey of Employment Income Distribution and Consumption Patterns in Nepal, 1977. P. 64. Tables 6.10 and 6.11.

Appendix Table A.III.24

POPULATION AND LABOR FORCE GROWTH IN THE RAPTI ZONE, 1981 - 1996

(Thousands)

District/Zone	High Growth			Medium Growth			Low Growth		
	Increase in Population	Increase in Population 10 Yrs and Above	Increase in Labor Force	Increase in Population	Increase in Population 10 Yrs and Above	Increase in Labor Force	Increase in Population	Increase in Population 10 Yrs and Above	Increase in Labor Force
Rukum									
1981-86	21	15	9	19	14	8	17	12	7
1986-96	47	33	20	33	23	14	23	16	10
1981-96	68	48	29	52	37	22	40	28	17
Rolpa									
1981-86	23	16	10	20	14	9	18	13	8
1986-96	51	36	21	36	26	15	24	17	10
1981-96	74	52	31	56	40	24	42	30	18
Sallyan									
1981-86	23	15	9	20	13	8	18	12	7
1986-96	52	35	21	38	26	15	26	17	11
1981-96	75	50	30	58	39	23	44	29	18
Pyuthan									
1981-86	20	14	9	17	12	7	15	10	7
1986-96	48	33	20	34	23	15	23	16	9
1981-96	68	47	29	51	35	22	38	26	16
Dang									
1981-86	41	27	17	37	25	15	33	22	13
1986-96	104	70	42	76	51	31	55	37	23
1981-96	145	97	59	113	76	46	88	59	36
Rapti									
1981-86	126	87	52	112	77	46	101	70	41
1986-96	303	209	125	218	150	90	150	103	62
1981-96	429	296	177	330	227	136	251	173	103

	Rukum	Rolpa	Sallyan	Pyuthan	Dang	Rapti
Notes: 1. Population 10 and Above/Population (in percent) =	70.6	70.4	67.6	68.9	67.5	68.8

Notes: 1. Population 10 and Above/Population (in percent) = Rukum 70.6; Rolpa 70.4; Sallyan 67.6; Pyuthan 68.9; Dang 67.5; Rapti 68.8

2. These are derived from the 1981 Census. Labor force participation rate of 60.1 percent was employed throughout; it was the rural labor force participation rate in Nepal in 1971.

Source: Population Projections by the Central Bureau of Statistics. High, medium and low growth are produced by alternative sets of assumptions concerning trends in fertility and life expectancy. The above is a summary table; see Appendix Tables A.III.25 - 30 for additional details.

Appendix Table A.III. 25

POPULATION AND LABOR FORCE GROWTH IN RUKUM DISTRICT, 1981 - 1996

(Thousands)

Year(s)	High Growth			Medium Growth			Low Growth		
	Population	Population 10 Yrs. and Above	Labor Force	Population	Population 10 Yrs. and Above	Labor Force	Population	Population 10 Yrs.and Above	Labor Force
1981	132	93	56	132	93	56	132	93	56
1986	153	108	65	151	107	64	149	105	63
1991	175	124	75	168	119	71	162	114	69
1996	200	141	85	184	130	78	172	121	73

	Increase in Population	Annual Population Growth Rate %	Increase in Population 10 Yrs.and Above	Increase in Labor Force	Increase in Population	Annual Population Growth Rate %	Increase in Population 10 Yrs.and Above	Increase in Labor Force	Increase in Population	Annual Population Growth Rate %	Increase in Population 10 Yrs.and Above	Increase in Labor Force
1981-86	21	3.0	15	9	19	2.7	14	8	17	2.5	12	7
1986-96	47	2.7	33	20	33	2.0	23	14	23	1.4	16	10
1981-96	68	2.8	48	29	52	2.2	37	22	40	1.8	28	17

Note(s): 1. Population 10 and Above/Population = 70.6 percent from 1981 Census;

2. Labor Force Participation Rate = 60.1 percent which was the rural labor force participation rate in Nepal in 1971.

Source: Population Projections by the Central Bureau of Statistics. High, Medium and Low Growth are produced by alternative sets of asumptions concerning trends in fertility and life expectancy.

Appendix Table A.III.26

POPULATION AND LABOR FORCE GROWTH IN ROLPA DISTRICT, 1981-1996

(Thousands)

Year(s)	High Growth			Medium Growth			Low Growth		
	Population	Population 10 Yrs. and Above	Labor Force	Population	Population 10 Yrs. and Above	Labor Force	Population	Population 10 Yrs. and Above	Labor Force
1981	168	118	71	168	118	71	168	118	71
1986	191	134	81	188	132	80	186	131	79
1991	215	151	91	206	145	87	200	141	85
1996	242	170	102	224	158	95	210	148	89

	Increase in Population	Annual Population Growth Rate %	Increase in Population 10 Yrs. and Above	Increase in Labor Force	Increase in Population	Annual Population Growth Rate %	Increase in Population 10 Yrs. and Above	Increase in Labor Force	Increase in Population	Annual Population Groth Rate %	Increase in Population 10 Yrs. and Above	Increase in Labor Force
1981-86	23	2.6	16	10	20	2.3	14	9	18	2.1	13	8
1986-96	51	9.4	36	21	36	1.8	26	15	24	1.2	17	10
1981-96	74	2.5	52	31	56	1.9	40	24	42	1.5	30	18

Note(s): 1. Population 10 and Above/Population = 70.4 percent from 1981 Census.

2. Labor Force Participation Rate: See Appendix Table A.III.21

Source: See Appendix Table A.III.21

Appendix Table A.III.27

POPULATION AND LABOR FORCE GROWTH IN SALLYAN DISTRICT, 1981 - 1996

(Thousands)

Year(a)	High Growth			Medium Growth			Low Growth		
	Population	Population 10 Yrs. and Above	Labor Force	Population	Population 10 Yrs. and Above	Labor Force	Population	Population 10 Yrs. and Above	Labor Force
1981	152	103	62	152	103	62	152	103	62
1986	175	118	71	172	116	70	170	115	69
1991	199	135	81	191	129	78	185	125	75
1996	227	153	92	210	142	85	196	132	80

	Increase in Population	Annual Population Growth Rate %	Increase in Population 10 Yrs.and Above	Increase in Labor Force	Increase in Population	Annual Population Growth Rate %	Increase in Population 10 yrs. and Above	Increase in Labor Force	Increase in Population	Population Growth Rate %	Annual Population 10 yrs.and Above	Increase in Labor Force
1981-86	23	2.9	15	9	20	2.5	13	8	18	2.3	12	7
1986-96	52	2.6	35	21	38	2.0	26	15	26	1.4	17	11
1981-96	75	2.7	50	30	58	2.2	39	23	44	1.7	29	18

Note(a): 1. Population 10 and Above/Population = 67.6 percent from 1981 Census.

2. Labor Force Participation Rate: See Appendix Table A.III.21

Source: See Appendix Table A.III. 21.

Appendix Table A.III.28

POPULATION AND LABOR FORCE GROWTH IN PYUTHAN DISTRICT, 1981 - 1996

(Thousands)

Year(s)	High Growth			Medium Growth			Low Growth		
	Population	Population 10 Yrs. and Above	Labor Force	Population	Population 10 Yrs. and Above	Labor Force	Population	Population 10 Yrs. and Above	Labor Force
1981	158	109	65	158	109	65	158	109	65
1986	178	123	74	175	121	72	173	119	72
1991	200	138	83	192	132	80	186	128	77
1996	226	156	94	209	144	87	196	135	81

	Increase in Population	Annual Population Growth Rate %	Increase in Population 10 Yrs.and Above	Increase in Labor Force	Increase in Population	Annual Population Growth Rate %	Increase in Population 10 Yrs.and Above	Increase in Labor Force	Increase in Population	Annual Population Growth Rate %	Increase Population 10 Yrs.and Above	Increase in Labor Force
1981-86	20	2.4	14	9	17	2.1	12	7	15	1.8	10	7
1986-95	48	2.4	33	20	34	1.8	23	15	23	1.3	16	9
1981-96	68	2.4	47	29	51	1.9	35	22	38	1.4	26	16

Note(s) 1. Population 10 Years and Above/Population = 68.9 percent from 1981 Census.

2. Labor Force Participation Rate: See Appendix Table A.III.21

Source : See Appendix Table A. III. 21

Appendix Table A.III.29

POPULATION AND LABOR FORCE GROWTH IN DANG DISTRICT, 1981 - 1996

(Thousands)

Year(s)	Population	High Growth			Medium Growth			Low Growth		
		Population 10 Yrs. and Above	Labor Force	Population	Population 10 Yrs.and Above	Labor Force	Population	Population 10 Yrs.and Above	Labor Force
1981	266	180	108	266	180	108	266	180	108
1986	307	207	125	303	205	123	299	202	121
1991	355	240	144	341	230	138	329	222	133
1996	411	277	167	379	256	154	354	239	144

	Increase in Population	Annual Population Growth Rate %	Increase in Population 10 Yrs.and Above	Increase in Labor Force	Increase in Population	Annual Population Growth Rate %	Increase in Population 10 Yrs.and Above	Increase in Labor Force	Increase in Population	Annual Population Growth Rate %	Increase Population 10 Yrs.and Above	Increase in Labor Force
1981-86	41	2.9	27	17	37	2.6	25	15	33	2.4	22	13
1986-96	104	3.0	70	42	76	2.3	51	31	55	1.7	37	23
1981-96	145	2.9	97	59	113	2.4	76	46	88	1.9	59	36

Note(s): 1. Population 10 and Above/Population = 67.5 percent from 1981 Census.

2. Labor Force Participation Ratio : See Appendix Table A.III. 21

Source: See Appendix Table A. III. 21.

Appendix Table A.III.30

POPULATION AND LABOR FORCE GROWTH IN RAPTI ZONE, 1981-1996

(Thousands)

Year(s)	High Growth				Medium Growth				Low Growth			
	Population		Population 10 Years and Above	Labor Force	Population		Population 10 Years and Above	Labor Force	Population		Population 10 Years and Above	Labor Force
1981	877		603	363	877		603	363	877		603	363
1986	1003		690	415	989		680	409	978		673	404
1991	1145		788	473	1099		756	454	1062		731	439
1996	1306		899	540	1207		830	499	1128		776	466
	Increase in Population	Annual Population Growth Rate (%)	Increase in Population 10 Years and Above	Increase in Labor Force	Increase in Population	Annual Population Growth Rate(%)	Increase in Population 10 Years and Above	Increase in Labor Force	Increase in Population	Population Growth Rate(%)	Annual Population 10 Years and Above	Increase in Labor Force
1981-86	126	2.7	87	52	112	2.4	77	46	101	2.2	70	41
1986-96	303	2.7	209	125	218	2.0	150	90	150	1.4	103	62
1981-96	429	2.7	296	177	330	2.2	227	136	251	1.7	173	103

Notes: 1. Population 10 Years and Above/Population = 68.8 percent from 1981 Census.

2. Labor Force Participation Rate: See Appendix Table A.III.21

Source: See Appendix Table A.III.21

Appendix Table A.III.31

AGRICULTURAL DEVELOPMENT BANK OF NEPAL TOTAL AMOUNT LOANED IN THE RAPTI ZONE BROKEN DOWN BY SMALL FARMERS' DEVELOPMENT PROGRAM AND ALL OTHERS: BY DISTRICT: 1981/82 - 1984/85

(Thousands of Current Rs.)

Districts	1981/82		1982/83		1983/84		1984/85	
	Rs.	Percent	Rs.	Percent	Rs.	Percent	Rs.	Percent
Rukum								
Total Loaned	172	100.00	357	100.00	655	100.00	1,223	100.00
SFDP	34	19.77	305	85.43	495	75.57	624	51.02
All Others	138	80.23	52	14.57	160	24.43	599	48.98
Rolpa								
Total Loaned	406	100.00	1,160	100.00	945	100.00	1,389	100.00
SFDP	98	24.14	500	43.10	842	89.10	596	42.91
All Others	308	75.86	660	56.90	103	10.90	793	57.09
Sallyan								
Total Loaned	675	100.00	986	100.00	1,183	100.00	2,282	100.00
SFDP	4	0.59	523	53.04	630	53.25	815	35.71
All Others	671	99.41	463	46.96	553	46.75	1,467	64.29
Pyuthan								
Total Loaned	911	100.00	1,395	100.00	1,295	100.00	1,842	100.00
SFDP	113	12.40	454	32.54	606	46.80	631	34.26
All Others	798	87.60	941	67.46	689	53.20	1,211	65.74

(Continued .....)

Districts	1981/82		1982/83		1983/84		1984/85	
	Rs.	Percent	Rs.	Percent	Rs.	Percent	Rs.	Percent
Dang								
Total Loaned	2,923	100.00	8,004	100.00	8,775	100.00	9,612	100.00
SFDP	143	4.89	433	5.41	806	9.19	1,308	13.61
All Others	2,780	95.11	7,571	94.59	7,969	90.81	8,304	86.39

Source: Agricultural Development Bank of Nepal, Rapti Zone Office, Dang

Appendix Table A.III.32

AGRICULTURAL DEVELOPMENT BANK OF NEPAL

TOTAL AMOUNT LOANED IN RAPTI ZONE BY TYPE OF LOAN AND DISTRICT, 1981/82 - 1984/85

(Thousands of Current Rs.)

Type of Loan	1981/82		1982/83		1983/84		1984/85	
	Amount	Percent	Amount	Percent	Amount	Percent	Amount	Percent
Production	1,873	36.8	3,682	30.9	4,679	36.4	5,299	32.4
Agricultural Input and Marketing	210	4.1	1,773	14.9	1,086	8.4	1,428	8.7
Farm Mechanization	216	4.2	1,553	13.0	1,631	12.7	1,628	10.0
Irrigation	118	2.3	639	5.4	645	5.0	626	3.8
Agro and Cottage Industry	947	18.6	1,780	14.9	1,879	14.6	2,537	15.5
Livestock	1,092	21.5	1,600	13.4	2,330	18.1	4,138	25.3
Biogas	542	10.6	645	5.4	373	2.9	245	1.5
Warehousing	-	-	-	-	-	-	50	0.3
Horticulture	89	1.8	230	1.9	230	1.8	362	2.2
Land Improvement	-	-	-		-		35	0.2
Total Rapti Zone	5,087	100.0	11,902	100.0	12,853	100.0	16,348	100.0
District								
Dang	2,923	57.5	8,004	67.2	8,775	68.3	9,612	58.8
Salyan	675	13.3	986	8.3	1,183	9.2	2,282	14.0
Rolpa	406	8.0	1,160	9.8	945	7.4	1,389	8.5
Pyuthan	911	17.9	1,395	11.7	1,295	10.1	1,842	11.3
Rukum	172	3.4	357	3.0	655	5.1	1,223	7.5
Total Rapti Zone	5,087	100.0	11,902	100.0	12,853	100.0	16,348	100.0

Source: ADB/N Zonal Office, Tulsipur

Appendix Table A.III.33

AGRICULTURAL DEVELOPMENT BANK OF NEPAL

TOTAL AMOUNT LOANED IN RAPTI ZONE FOR SMALL FARMER DEVELOPMENT PROGRAM

BY TYPE OF LOAN AND DISTRICT, 1981/82 - 1984/85

(Thousands of Current Rs.)

Type of Loan	1981/82		1982/83		1983/84		1984/85	
	Amount	Percent	Amount	Percent	Amount	Percent	Amount	Percent
Production	38	9.7	328	14.8	337	9.9	464	11.7
Agricultural Input+Marketing	-		-		-		161	4.0
Farm Mechanization	60	15.3	368	16.6	627	18.5	709	17.8
Irrigation	5	1.3	21	0.9	141	4.2	200	5.0
Agro & Cottage Industry	12	3.1	188	8.5	284	8.4	386	9.7
Livestock	238	60.7	1,189	53.7	1,676	49.6	1,907	48.0
Biogas	24	6.1	-	-	-	-	-	-
Warehousing	2	0.5	70	3.2	60	1.8	-	-
Horticulture	13	3.3	25	1.1	98	2.9	117	2.9
Land Improvement	-		26	1.2	156	4.6	30	0.8
Total Rapti Zone	392	100.0	2,215	100.0	3,379	100.0	3,974	100.0
District								
Dang	143	36.5	433	19.6	806	23.8	1,308	32.9
Salyan	4	1.0	523	23.6	630	18.6	815	20.5
Rolpa	98	25.0	500	22.4	842	24.9	596	15.0
Rukum	34	8.7	305	13.8	495	14.6	624	15.7
Pyuthan	113	28.8	454	20.5	606	17.9	631	15.9
Total Rapti Zone	392	100.0	2,215	100.0	3,379	100.0	3,974	100.0

Source: ADB/N Zonal Office, Tulsipur

Appendix Table A.III.34

ACTUAL PUBLIC EXPENDITURES IN RAPTI ZONE FOR ECONOMIC AND SOCIAL SECTORS

1980/81 - 1983/84

(Thousands of Constant 1983/84 Rs.)

	1980/81	1981/82	Percent Change Over Previous Year	1982/83	Percent Change Over Previous Year	1983/84	Percent Change Over Previous Year	Percent Change 80/81-83/84
Agriculture 1/	509	3,265	541.4	3,654	11.9	3,287	- 10.0	545.8
Livestock	345	1,482	329.6	2,654	79.1	2,573	- 3.0	645.8
Medium Irrigation	3,922	4,600	17.3	2,009	- 56.3	4,313	-114.7	10.0
Cottage Industry	NA	314	NA	414	31.8	449	8.4	NA
Forestry	70	254	262.8	1,059	316.9	1,707	61.2	2,338.6
Soil Conservation	0	791	-	1,508	90.6	1,033	- 31.5	-
Communications/Postal 2/	2,935	4,051	38.0	3,714	- 8.3	3,705	- 0.2	26.2
Roads 3/	18,679	22,768	21.9	21,357	- 6.2	30,090	40.9	61.1
Electricity 4/	1,214	4,452	266.7	5,889	32.3	4,210	- 28.5	246.8
Education	1,232	1,664	35.1	3,587	115.6	1,913	- 46.7	55.3
Drinking Water 5/	2,173 6/	10,712	393.0	20,664	92.9	17,103	- 17.2	687.1
Other Small Works 7/	NA	2,894	NA	2,534	- 12.4	1,402 8/	- 44.6	NA
Total	31,079	57,247	84.2	69,043	20.6	71,785	4.0	131.0

Note: Health is excluded due to unavailability of data.

1/ Includes Vegetable Seed Production Center in Rukum from 1981/82 onwards.

2/ Telecommunications in Dang District only. 1981/82 expenditures include Rs.80,000 per district from GTZ for Wireless Sets.

3/ Does not include expenditures on the East-West Highway.

4/ Power is generated only in Dang District.

5/ Includes expenditures for four programs: HMG Department of Water Supply and Sewerage; Rapti IRDP; MPLD Grant-in-Aid; and UNICEF/HMG.

6/ MPLD Grant-in-Aid data not included because unavailable for this year.

7/ MPLD Grants-in-Aid for small irrigation, Suspension bridges, and panchayat buildings.

8/ Data for Rukum not included because unavailable for this year.

Sources: HMG Line Agencies
Rapti IRDP Project Coordination Office
District and Zonal Sector Offices
USAID/Nepal
UNICEF

Appendix Table A.III.35

ACTUAL PUBLIC EXPENDITURES BY DISTRICT IN RAPTI ZONE

FOR SELECTED ECONOMIC AND SOCIAL SECTORS 1982/83 AND 1983/84

(Thousands of Current Rs.)

		Dang		Salyan		Rolpa		Pyuthan		Rukum		Rapti Zone	
		Expend-iture	% of Zone	Expend-iture	% of Zone	Expend-iture	% of Zone	Expend-iture	% of Zone	Expend-iture	% of Zone	Expend-iture	% of Zone
Agriculture 1/	82/83	659	19.2	473	13.7	575	16.7	654	19.0	1,080	31.4	3,441	100.0
	83/84	702	21.4	491	14.9	618	18.8	530	16.1	946	28.8	3,287	100.0
Livestock	82/83	581	23.2	559	22.4	413	16.5	376	15.0	570	22.8	2,499	100.0
	83/84	630	24.5	530	20.6	543	21.1	411	16.0	459	17.8	2,573	100.0
Cottage Industry	82/83	34	8.7	174	44.6	117	30.0	30	7.7	35	9.0	390	100.0
	83/84	38	8.5	196	43.6	131	29.2	43	9.6	41	9.1	449	100.0
Forestry	82/83	411	41.2	251	25.2	- 2/	-	335	33.6	-	-	997	100.0
	83/84	811	47.5	279	16.3	- 2/	-	495	29.0	122	7.1	1,707	100.0
Soil Conservation	82/83	1,212	85.4	146	10.3	-	-	62	4.4	-	-	1,420	100.0
	83/84	827	80.0	127	12.3	-	-	79	7.6	-	-	1,033	100.0
Communications/Postal	82/83	1,188	34.0	251	7.2	768	22.0	602	17.2	688	19.7	3,497	100.0
	83/84	1,192	32.2	263	7.1	876	23.6	616	16.6	758	20.4	3,705	100.0
Electricity	82/83	5,545	100.0	-	-	-	-	-	-	-	-	5,545	100.0
	83/84	4,210	100.0	-	-	-	-	-	-	-	-	4,210	100.0
Education	82/83	681	20.2	586	17.3	662	19.6	795	23.5	654	19.4	3,378	100.0
	83/84	384	20.1	360	18.8	416	21.7	384	20.1	369	19.3	1,913	100.0
Drinking Water	82/83	8,023	41.2	2,895	14.9	2,939	15.1	4,045	20.8	1,556	8.0	19,458	100.0
	83/84	3,677	21.5	5,788	33.8	3,519	20.6	1,169	6.8	2,950	17.2	17,103	100.0
Other Small Works	82/83	181	7.6	229	9.6	25	1.0	1,214	50.9	737	30.9	2,386	100.0
	83/84	110	7.8	332	23.7	668	47.6	292	20.8	NA	NA	1,402	100.0

Note: This table includes only those sectors for which district-wise expenditure breakdowns were available.

1/ Expenditures for Vegetable Seed Production Center in Rukum are assigned to Rukum even though the Center benefits all five districts.

2/ Rolpa and Pyuthan are under one Forestry Office.

Sources: HMG Line Agencies
Rapti IRDP Project Coordination Office
District and Zonal Sector Offices
USAID/Nepal
UNICEF

Appendix Table A.IV.1

TRANSPORT COSTS BETWEEN KEY SETTLEMENTS IN RAPTI ZONE

From / To	Porter/Pony Rs. Per Quintal					Truck/Tractor Rs. Per Quintal			
	Ghorahi	Tulsipur	Bhairahawa	Butwal	Nepalgunj	Ghorahi	Tulsipur	Nepalgunj	Bhairahawa Butwal
Ghorahi							13	30	25 - 50
Libang	246.38								
Madichaur	246.37								
Bhingri						61.27			
Pyuthan Khalanga	225					71.68			
Bijouar	214.98					55.77			
Khungri	198.8					88.0			
Salyan Khalanga		225/200							
Kapurkot		45							
Luham		99.5							
Chaujahari		302			500				
Musikot Khalanga	600/400	600/400							
Rukumkot					800				
Tulsipur						13			

Source: PADCO Survey, May, 1985.

Appendix Table A.IV.2

TRAVEL TIME AND DISTANCES

BETWEEN SETTLEMENTS IN RAPTI

(in days)

	Porter/Pony					Truck/Tractor				Distance Kilometers			
From / To	Ghorahi	Tulsipur	Bhai-rahawa	Butwal	Nepal-gunj	Ghorahi	Tulsi-pur	Nepal-gunj	Bhai-rahawa Butwal	Ghorahi	Tulsi-pur	Ghorahi	Tulsi-pur
Ghorahi													
Manpur										24		24	
Lamahi												20	46
Galyan Khalanga		1.5/2.0					0.5				50		36
Sitalpati		1.5/2.0					0.69				43		24
Chaurjari	5	5			10/12						100		
Musikot	3	3			13					115	110		
Rukumkot	5	5								135			
Libang	1.75	2.0/2.5								58		108	
Bingri	1	1											
Chakchake						0.36							
Pyuthan Khalanga	1.5	1.5					0.5			81			
Butwal										73			
Khungri										50		80	
Bhingri										71			
Loham											40		

Source: PADCO Survey, May, 1985

Appendix Table A.IV.3

DISTRIBUTION OF MANUFACTURING ESTABLISHMENT BY DISTRICT IN RAPTI ZONE

Types of Industries	Dang		Rolpa		Salyan		Pyuthan		Total	
	1976/77	1981/82	1976/77	1981/82	1976/77	1981/82	1976/77	1981/82	1976/77	1981/82
Oil & Grain Mills	55	65	-	5	-	4	-	1	55	75
Ice & Ice Cream	-	-	-	-	-	-	-	1	-	1
Iron & Iron Products	-	1	-	-	-	-	-		-	1
Yarn & Textile	1	-	1	-	-	-	-	-	2	-
Bricks & Tiles	1	-	-	-	-	-	-	-	1	-
Furniture	-	-	1	-	-	-	-	-	1	-
Paper Manufacturing	-	-	1	-	-	-	-	-	1	-
Soap	-	-	-	-	-	-	-	1	-	1
Others	-	1	-	-	-	-	-	-	-	1
Total	57	67	3	5	-	4	-	3	60	79

Source: Central Bureau of Statistics, Census of Manufacturing Establishments 1976/77 and 1981/82

Appendix Table A.IV.4

REGIONAL DISTRIBUTION OF MANUFACTURING BY SETTLEMENT AND SIZE

(1982/83)

Location	Size*				Total
	Large	Medium	Small	Not Specified	
Nepalgunj	-	4	9	14	27
Bhairahawa	1	5	3	-	9
Butwal	-	2	5	3	10
Tulsipur	-	-	1	-	1

* As defined by Department of Industries (as per registration record till 1982/83)

Small - Rs.200 - 2,000 thousands fixed assets

Medium - Rs.2,000 - 10,000 thousands fixed assets

Large - Above Rs.10,000 thousand fixed assets

Source: See table A.IV.3

Appendix Table A.IV.5

Dang District

DISTRIBUTION OF COTTAGE INDUSTRY BY TYPE, EMPLOYMENT AND PANCHAYAT (1983/84)

	Dang																					
	Oil and Grain		Cotton Text		Knitting		Brick		Furniture		Animal Feed		Bakery		Press		Metal		Others		Total	
Panchayat	#	Emp.	#	Emp.	#	Emp.	#	Emp.	#	Emp.	#	Emp.	#	Emp.	#	Emp.	#	Emp.	#	Emp.	#	Emp.
Satbariya	2	4	-		-		-		-		-		-		-		-		-		2	4
Bijauri	1	2	-		-		-		-		-		-		-		-		-		1	2
Laxmipur	2	5	-		-		-		-		-		-		-		-		1	4	3	9
Duruwa	1	3	-		-		-		-		-		-		-		-		-		1	3
Tulsipur	7	28	1	7	-		1	16	2	12	1	5	1	3	1	5	1	11	2	5	17	92
Amritpur	-		-		-		1	22	-		-		-		-		1	4	1	4	3	30
Tribhuvan Nagar	3	6	-		-		-		-		-		-		-		-		-		3	6
Sohanpur	1	5	1	3	-		-		-		-		-		-		-		-		2	8
Hansipur	1	2	-		-		-		-		-		-		-		-		-		1	2
Manpur	4	12	-		1	3	-		1	7	-		-		-		-		-		6	22
Dhikpur	I	5	-		-		-		-		-		-		-		-		-		1	5
Lalmatiya	-		-		-		-		-		-		-		-		-		1	4	1	4
Hekuli	1	4	-		-		-		-		-		-		-		-		-		1	4
Ghaulahi	-		-		-		1	14	-		-		-		-		-		-		1	14
Gobardaiya	-		-		-		-		-		-		-		-		-		1	10	1	10
Total	24	76	2	10	1	3	3	52	3	19	1	5	1	3	1	5	2	15	6	27	44	215

Source: Dept. of Cottage Industries

Appendix Table A.IV.6

SALYAN: DISTRIBUTION OF COTTAGE INDUSTRY BY TYPE, EMPLOYMENT, AND PANCHAYAT

1983/84

Panchayat	Oil & Grain Mill		Cotton Textile		Knitting		Furniture		Leather Shoes		Construction		Woolen & Carpets		Soap		Saw Mill		Metal		Others		Total		% Total Emp.
	#	Emp.	#	Emp.	#	Emp.	#	Emp.	#	Emp.	#	Emp.	#	Emp.	#	Emp.	#	Emp.	#	Emp.	#	Emp.	#	Emp.	
Darmakot	1	4	-	-	-	-	-	-	-	-	1	12	1	2	-		1	10	-		-		4	28	
Khalanga	2	8	12	60	6	24	8	48	2	18	2	24	1	8	1	4	-		3	9	3	18	40	221	
Chhayachhera	4	16	1	10	-		-		1	9	1	13	-		-		-		-		-		7	48	
Marke	-		1	6	-		-		-		-		-		-		-		-		-		1	6	
Karbang-jhimpe	1	9	1	7	-		-		-		-		-		-		-		-		-		2	16	
Danda Gaon	1	5	1	3	-		-		-		-		-		-		-		-		-		2	8	
Sinbang	-		1	3	-		-		-		-		1	2	-		-		-		-		2	5	
Tharmare	1	4	2	12	-		-		-		-		-		-		-		-		-		3	16	
Kotmaula	1	4	2	10	-		-		-		-		-		-		-		-		1	3	4	17	
Phalabang	0		3	15	-		1	6	-		-		-		-		-		1	3	3	12	8	36	
Dhajari-pipal	1	3	3	12	-		-		-		-		-		-		-		-		-		4	15	
Darmachaur	-		-		1	6	-		-		-		-		-		-		-		1	6	2	12	
Majkharka	-		1	3	-		-		-		-		-		-		-		-		-		1	3	
Total	12	53	28	141	7	30	9	54	3	27	4	49	3	12	1	4	1	10	4	12	8	39	80	431	

Source: Dept. of Cottage Industries

Appendix Table A.IV.7

ROLPA: DISTRIBUTION OF COTTAGE INDUSTRY BY TYPE, EMPLOYMENT AND PAHNCHAYAT

1983/84

Panchayat	Oil & Grain Mills		Cotton Testile		Knitting		Furniture		Kamlo Bhangro		Paper		Others		Total	
	Number	Employment	Number	Employment	Number	Employment	Number	Employment	Number	Employment	Number	Employment	Number	Employment	Number	Employment
Libang	2	8	7	21	7	28	3	15	4	28	1	12	4	24	28	136
Thawang	-		4	25	2	8	1	12	-		-		-		8	45
Ghoda Gaon	1	3	3	12	-	-	-	-	5	65	-		1	7	10	87
Lamidanda	-		-		-		-		1	12	-		-		1	12
Kurele	-		1	3	-		-		-		-		1	7	2	10
Haama	1	3	-		-		-		5	45	1	7	3	6	10	61
Gajul	1	3	1	12	1	3	2	12	-		-		-		5	30
Uba	-		-		-		-		1	7	-		-		1	7
Karbang	-		3	24	-		-		-		-		-		3	24
Nuwa Gaon	-		-		-		-		-		-		1	2	1	2
Khungri	-		-		2	6	1	7	-		-		-		3	13
Khumel	-		5	20	-		-		-		-		1	3	6	23
Gairi Gaon	-		1	5	-		3	12	-		-		-		4	17
Dubidanda	-		1	1	1	3	-		-		-		-		2	4
Talabang	-		2	4	-		-		-		-		1		3	4
Mijing	1	11	-		-		-		-		-		-		1	11
Mabang	-		2	4	-		-		-		-		-		2	4
Ota	-		1	1	1	3	-		-		-		-		2	4
Gharti Gaon	-		2	6	-		-		-		-		-		2	6
Ramkot	-		2	6	-		-		-		-		-		2	6
Total	6	28	36	144	14	51	10	58	16	157	2	19	12	49	96	506

Source: Dept. of Cottage Industries

Appendix Table A.IV.8

Rukum District

DISTRIBUTION OF COTTAGE INDUSTRY BY TYPE, EMPLOYMENT AND PANCHAYAT (1983/84)

	Rukum											
	Oil and Grain		Cotton		Knitting		Furniture		Leather		Total	
Panchayat	#	Emp.	#	Emp.	#	Emp.	#	Emp.	#	Emp.	#	Emp.
Khalanga	1	7	4	20	1	2	-		1	3	7	32
Baphikot	-		3	10	-		-		-		3	10
Shobha	1	2	-		1	2	-		-		2	4
Shakha	-		-		-		1	11	-		1	11
Kholagaun	1	4	-		-		-		-		1	4
Athbiskot	-		1	7	-		-		-		1	7
Bhalakchhi	-		2	8	-		-		-		2	8
Magma	-		2	12	-		-		-		2	12
Chhibang	-		2	7	-		-		-		2	7
Chunabang	-		1	3	-		-		-		1	3
Total	3	13	15	67	2	4	1	11	1	3	22	98
	13%		68%									

Source: Dept. of Cottage Industries

Appendix Table A.V.1

ESTIMATED CHANGE IN SCHOOL ENROLLMENT
IN DANG DISTRICT, 1979 - 1985

I. Numbers of Students

	1979		1985		Percentage Change	
	Male	Female	Male	Female	Male	Female
Primary (6-8 Yrs.)	12,814	4,215	21,574	7,914	68.4	87.8
Lower Secondary (9-12 Yrs.)	5,251	749	3,058	990	- 41.8	32.2
Secondary (13-15 Yrs.)	1,713	288	3,669	870	114.2	202.1

II. Apparent Enrollment Rates[1/]

		1979	1985
Primary	Male	89.6	112.6
	Female	28.3	39.7
	Total	58.3	75.4
Lower Sec.	Male	30.6	13.3
	Female	5.5	5.5
	Total	19.5	9.9
Secondary	Male	24.8	39.6
	Female	4.8	10.2
	Total	15.1	25.5

1/ The apparent enrollment rate is the number of students, regardless of age, enrolled at a particular level as a percentage of the total population of the age group for that level. Percentages over 100 thus indicate over-aged enrollment.

Sources: 1979 data from Rapti Baseline Survey, Main Text, pp 126-133.
1985 numbers of students from District Panchayat Secretariat, Education Division, Dang District, apparent enrollment rates are PADCO estimates.

Appendix Table A.V.2

DISTRIBUTION AND CAPACITY OF AIC STORAGE FACILITIES

AIC Godown Location	Storage Capacity (Metric Tons) 1979 1/	1985 2/ Own	1985 2/ Rental	1985 2/ Total	Storage as Percent of Seeds and Fertilizer Distributed 1983/84 3/
Ghorahi	250	772	2,200	2,975	
Tulsipur	500	500	500	1,000	298% (For Zone)
Lamahi	-	250	200	450	
Pyuthan	250	40	400	440	296%
Salyan	250	-	250	250	245%
Rolpa	100	-	200	200	327%
Musikot	100	-	150	150	685%
Chaujhari	100	250	20	270	
Total	1,550			3,920	

Source: 1/ Rapti Feasibility Study, Volume III, Annex 7, Page 6

2/ AIC Zonal Office, Ghorahi

3/ Table V.4

Appendix Table A.V.3

RAPTI ZONE

AIC STAFF LOCATION AND SIZE

Staff Location	No. of Staff		% Increase 1979/85	
	1979	1985	Staff	Dist. of Fertilizers
Ghorahi	10	16	60	112%
Tulsipur	7	8	14	
Musikot Chaurjhari	6	10	67	250%
Lamahi	0	6	-	
Pyuthan	3	4	33	188%
Salyan	3	4	-	221%
Rolpa	0	[illegible]	NA	NA
Total	29	50	72	

Source: 1979 data: Rapti Feasibility Study, Annex 7, Appendix 2, Table 1
1985 data: AIC Zonal Office