



**Discussion Paper  
Series No. MEI 98/6**

**Access Improvement  
and Sustainable  
Development**

*Rural Road Development  
in Nepal*

**DURGA P. PAUDYAL**

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ISSN 1024 - 7564

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**Published by**

International Centre for Integrated Mountain Development  
G.P.O. Box 3226  
Kathmandu, Nepal

**Typesetting at** ICIMOD Publications' Unit

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# Access Improvement and Sustainable Development

## *Rural Road Development in Nepal*

**Durga P. Paudyal**

*MEI Series No. 98/6*

T.S. Papola  
Head

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Durga P. Paudyal is a Research Fellow of the International Centre for Integrated Mountain Development (ICIMOD).

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International Centre for Integrated Mountain Development  
Kathmandu, Nepal

December 1998

# Preface

# Acknowledgements

I would like to give my sincere thanks to ICIMOD for awarding me with the research fellowship. Inaccessibility is a basic characteristic and the most important constraint in the development of mountain areas. Availability of transport infrastructure, and within it, a road link, comes naturally to one's mind as the first obvious means to improve access. Road construction in the hill and mountain areas has, however, been a controversial subject both from the perspective of its environmental effects and returns on the very large investments that are required.

The present study by Dr. Durga P. Paudyal, undertaken as part of the ICIMOD Research Fellowship scheme, highlights some of the issues relating to planning, construction techniques, and utilisation and benefits of rural roads, with special reference to the actual experience of four selected rural road projects in different parts of Nepal. It examines particularly the institutional arrangements for planning, construction, and maintenance of roads; the role of the central and local agencies; and the effects of road connection on economic and social aspects of life in the villages connected. It makes a number of suggestions for improvement in planning and implementation of road projects and better use of road facilities for the economic and social upliftment of rural people. It is hoped that the study will be found useful by the planners, policy-makers, and managers of road projects not only in Nepal but also in hill and mountain areas elsewhere.

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# Acknowledgements

I would like to give my sincere thanks to ICIMOD for awarding me with the research fellowship to carry out this study. This study was carried out under the supervision of Dr. Trilok S. Papola, Head, Mountain Enterprises and Infrastructure Division of ICIMOD. I am grateful for the encouragement and support he has extended to me. I have also benefitted from the comments of Dr. Mahesh Banskota, Dr. Pitamber Sharma, Prof. Li Tianchi, and Dr. Tej Partap on my earlier draft.

Several people helped during the field work. I am extremely grateful to Mr. Krishna Prasad Sapkota, Mr. Jhapendra Pokhrel, and Mr. Gayatri Raj Pandey, the DDC Chairman, DDC Engineer, and LDO of Kabhre District respectively. I also thank Mr. Bhim Neupane, the Kushadevi VDC Chairman, for his support during the field study. In Dhading District, I thank Mr. Bhimsen Kumar Shrestha, the DDC Chairman, Mr. Shahadev Bhandari, DDC Engineer, and Mr. Shibaraj Mainali, LDO, for their support. In Baglung District, I thank Mr. Gopal Prasad Sapkota, DDC Chairman, Mr. Bel Bahadur Bhujel, DDC Engineer, and Mr. Hari Prasad Kiran, LDO, for their support. I thank Mr. Sagar Prasai of UNDP for sharing his knowledge of indigenous technology for suspension bridge construction. In Ilam District, I thank Mr. Hari Khanal, DDC chairman, Rudra Paudel, LDO, and Mr. Kamal Regmi, DDC technician, for their support. I thank Mr. Bhu Prasad Paudyal, Headmaster, and Mrs. Shasi Paudyal, a teacher from Bhanubhakta High School, for their support during the field study. I also thank those who contributed their ideas as respondents or in open discussion.

I thank Mr. Rajendra Gurung and Mr. Gopal Sanjel for their immense help as Research Assistants during the field study. I am also grateful to Mr. Surendra G. Joshi, Energy & Infrastructure Consultant of the World Bank, Mr. Rod Stickland, Team Leader of the Priority Investment Plan (PIP) Project, and Mr. Masahiro Otsuka, Project Economist of the Asian Development Bank, Manila, for providing me with valuable documents for the study. Finally, I thank Mr. Dinker Shrestha of Prime Computers for helping me with the computer work.

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## Abbrevial **Abstract** Acronyms

This study is undertaken on the premise that improvements in access to rural areas are essential for sustainable development. It has attempted to examine the existing policies for rural roads, institutional arrangements, and their linkages with production processes. The study was carried out on three levels, namely, the policy, programme, and project levels.

The study found that the existing policy framework and the institutional arrangements for rural roads are not used effectively and, in some cases, the policy has not been properly implemented. On the technical side, on the one hand, there is shortage of project manpower with the District Development Committees (DDCs) and, on the other, the available technical manpower at the district level is not used effectively. There is no clear maintenance policy for rural road projects. Two unresolved issues, one concerning ownership and the other the economic use of rural roads, have serious implications for designing and road maintenance policy.

On the project level, it was found that roads have, no doubt, changed the feeling of isolation and remoteness among the population, the decisive control of traders in frontier locations over hinterland trade has been weakened, and there has been a reduction in cost, time, and damage of goods during transport. Moreover, the scale of business areas connected by road has increased considerably; and many locally available non-marketable items, such as *Lapsi* in Kabhre District and broom flower in Ilam District, have also become commercially profitable items. Full economic benefits have, however, not been realised due to the lack of supporting institutions for the supply of technology, inputs, and extension services. Roads have had a positive impact on sectors such as education and health. In the education sector, roads have reduced the feeling of remoteness and isolation, therefore, good teachers from outside have also moved in to teach at local schools. In the health sector, roads have enabled patients to reach better hospitals quickly.

Based on its findings, the study makes a number of recommendations to improve the planning and execution of road projects and the delivery of socioeconomic benefits.

# Abbreviations and Acronyms

AADT	Average Annual Daily Traffic	
APP	Agricultural Perspective Plan	1
APROSC	Agricultural Projects' Services' Centre	1
ADB	Asian Development Bank	2
ADB\N	Agricultural Development Bank of Nepal	3
BBLL	Building of Bridges at Local Level	5
CDO	Chief District Officer	5
DDC	District Development Committee	6
DDP	Dhading Development Programme	8
DOTM	Department of Transport Management	8
DOR	Department of Roads	10
DTO	District Technical Office	12
ESCAP	Economic and Social Commission for Asia and the Pacific	12
GTZ	German Agency for Technical Cooperation	14
ICIMOD	International Centre for Integrated Mountain Development	16
JT\JTA	Junior Technician\Junior Technical Assistant	
IBRD	The World Bank (The International Bank for Reconstruction and Development)	
LES	Low-cost, environmentally friendly and self-help approach to rural road construction	18
LDO	Local Development Officer	20
LRIP	Local Road Improvement Programme	22
MLD	Ministry of Local Development	
MOTC	Ministry of Transport and Construction	25
NPC	National Planning Commission	
NGO	Non-Government Organization	25
NRB	Nepal Rastra Bank	25
ODA	Overseas' Development Administration	26
PDDP	Participatory District Development Programme	28
PLRP	Pilot Labour-based District Roads' Rehabilitation and Maintenance Programme	28
PIP	Priority Investment Plan Project	35
SDC	The Swiss Development Corporation	37
UNDP	United Nations Development Programme	39
UC	Users' Committee	41
VDC	Village Development Committee	42

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# Chapter 1

## Background: The Context of Rural Roads in Nepal

### 1.1 Historical Context of Road Development in Nepal

Prior to 1950, motorable roads in the country were almost non-existent. Until 1956, there were altogether 264km of metalled and 365km of fair-weather roads in and around the few main cities (Shrestha 1981).

During the period of the Fourth and Fifth Five Year Plans (1970-80), a regional development strategy was devised as an important policy guideline. A growth axis, based on the functional regionalisation principle, was spelled out in which the main north-south roads under the transport programme were designated as the spine of the growth axis. The country was divided into four development regions in 1972. Later the Far Western Development Region was further divided into two, making altogether five development regions, cutting across from north-south in order to affect economic linkages among diverse geographic regions, particularly between the mountains, hills, and the *Terai*.

The main idea was to develop a hierarchy of settlements with functional linkages. The regional centres were planned as viable growth centres with commercial and industrial activities. These centres, in turn, were to be linked with district headquarters and other potential growth points in a network covering the development region. At the district level, service centres were to be identified to support development. The development regions were rather visualised as administrative sub-divisions of the national territory and long-term investments were proposed without examining the regional resources (Gurung 1984).

During the period of the Sixth and Seventh Plans (1981-90), priority was given to the provision of minimum transport facilities to rural areas. A block grant was provided to the local self-governing bodies, such as the village and district *Panchayat(s)*, to plan and implement, among others, rural transport projects. These projects consisted of mule trails, foot tracks, and suspension and other types of small bridges in the hill and mountainous regions, whereas in the *Terai* they consisted of construction of culverts, drainage, and bullock-cart tracks. The projects were identified, along with other rural development projects, by the local *Panchayat* and implemented through the mobilisation of free labour contributions. During 1985-90, over 20 per cent of the local level projects implemented through local *Panchayat(s)* were on rural infrastructural development (Paudyal 1994).

Up to the end of 1989\90, 7,330km of road facilities were available in the country; out of these 2,958km were black topped, about 1,658km gravelled, and 2,714km were fair-weather road (NPC 1992).

In spite of the efforts made for the development of road transport, by 1997, 20 out of 75 districts had still not been connected with a motorable road network; these can only be

approached after walking one to several days. In fact, Nepal's topography enforces isolation in many parts of the country. Internal communications are poor in almost all hill and mountain districts. Most of the rural areas are connected through mule trails and foot tracks. The estimated total length of trails and tracks is reported to be 134,000km; and out of these 16,000km have been identified as main trails.

## **1.2 The Present Study: Context and Background**

While transport facilities do not create development, they are essential for development to occur, therefore, the growth of farm productivity and non-farm rural employment is linked closely to infrastructural facilities. Road access can reduce isolation; permit people to move quickly and easily; stimulate crop production and marketing activities; encourage public services such as health, education, and government administration; and increase the potential for the transfer of technology and change. The World Development Report 1994 shows that an important ingredient in the success of rural enterprise in China has been the delivery of a minimum package of transport, telecommunications, and power at the village level. Similarly, countries that have made concerted efforts to provide infrastructure in rural areas, for example, Indonesia and Malaysia, have succeeded in reducing poverty dramatically (World Bank 1994).

In Nepal, road building interests people at all levels because road access brings about visible changes in village life and is regarded as a dramatic sign of development. Politicians, both at national and local levels, exert considerable pressure to secure road development projects for their constituencies. During the *Panchayat* Period (1960-1990) improvements to motorable roads, trails, culverts, and suspension bridges, under what was called the 'rural works' programme, were implemented by district and village *Panchayats* through mobilising people's participation. After the restoration of democracy in 1990, the rural works programme continues to be implemented through the District Development Committees (DDCs) and Village Development Committees (VDCs). Recently, when the government channelled resources directly to the VDCs under the 'Build Your Own Village Programme' and later under the 'Village Development and Self Reliance Programme', a sizeable share of the resources was spent on building rural roads.

The Eighth Five Year Plan (NPC 1992) identifies lack of adequate transportation infrastructure as one of the main problems for sustainable development of rural areas where a majority of the people live. Inadequate farm-to-market roads is one of the reasons why farmers from villages in the interior continue to face poverty. Therefore, the Eighth Five Year Plan emphasized the need for construction of farm-to-market roads and suggested that these be built as low-cost, fair-weather roads and maintained by the District Development Committees (DDCs) through mobilising people's participation.

Although a considerable amount of resources, both money and voluntary labour in the form of people's participation, has been spent on building rural roads during the last few decades, their services have been poor because of, among other things, the lack of maintenance and economic use. Many poorly constructed road projects also have negative environmental effects on the surrounding areas. Therefore, further expansion of rural roads for agricultural and rural development should be planned based on the quality of roads and their gainful use for sustainable development.

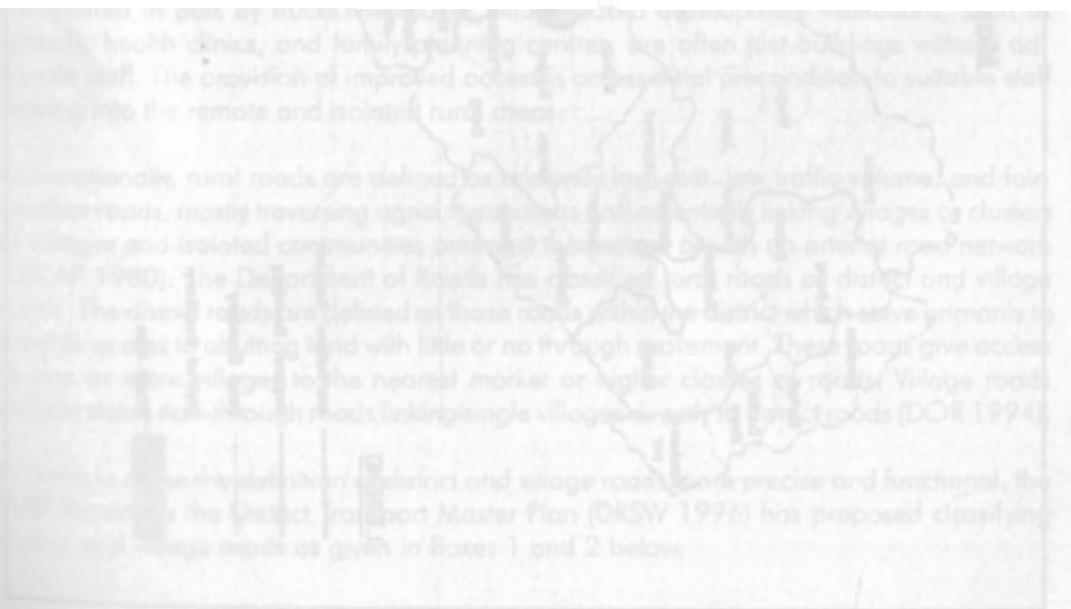
In recent years, some private engineering firms have collaborated with international donors to experiment with a low-cost, environmentally friendly and self-help (LES) approach to building rural roads. The LES approach to road construction as used in the Palpa and Dhading districts of Nepal is claimed to be cost effective and environmentally friendly. This approach could be used more widely for building rural roads in Nepal. It is in this context that this study examines the rural road programmes and their linkages with production processes and identifies problems experienced at various levels in making rural roads a part of the development process.

### 1.3 Objectives and Methodology

The study attempts to carry out the following.

- Examine the existing policies, institutional arrangements of rural roads, and their linkages with production processes
- Identify problems experienced at various levels to making rural roads a part of the development process
- Suggest policy and programme level arrangements for development.

The study was carried out at the policy, programme, and project levels. At the policy level, the policy environment, such as definition of rural roads; the rural road policy; institutional mechanisms at national, district, and project levels; and efforts on rural road development carried out in the past were analysed. At the programme level, attention was given to identification, design, approval, implementation, and operational procedures of rural road projects at the district level. In order to examine these issues, four districts—Baglung, Dhading, Kabhre, and Ilam — were selected for case studies (Map 1). At the project level, the economic use of rural roads and their impact on sustainable rural development were examined.





# Chapter 2

## Rural Roads: Concepts and Policies

### 2.1 Introduction

This chapter describes and reviews the policy environment for rural roads in Nepal. It covers aspects such as definition of rural roads, rural road policy, and institutional mechanisms at national, district, and project levels. It also reviews past efforts at rural road development. It is based on secondary information from sources such as annual and Five Year Plan documents, policy papers, research reports, and published and unpublished project documents of donor agencies such as the Asian Development Bank (ADB), German Technical Cooperation (GTZ), and the World Bank. Particular use has been made of literature from the Priority Investment Plan Project Report (Vol. III), Agricultural Perspective Plan, Rural Infrastructure Development Project Report, Dhading District Development Project Report, and the Pilot Labour-based District Roads Rehabilitation and Maintenance Programme (PLRP) Report.

### 2.2 The Concept of Rural Roads

Although the road network has been expanding over the years with the assistance of several donors, it has been confined to the main strategic roads and bridges connecting, at best, the district headquarters. The transportation network among villages and between villages and the market centres and district headquarters has remained poor.

In almost all areas in the hill and mountain regions, porters or mule caravans transport goods. According to the freight cost per tonne\km estimate made in the Priority Investment Plan (PIP) Project Report (1996), it was about the same by helicopter, porter, or by mule caravan. Therefore, the transportation cost could decrease drastically if the goods were transported in bulk by trucks. Moreover, village-based development institutions, such as schools, health clinics, and family planning centres, are often just buildings without adequate staff. The provision of improved access is an essential precondition to suitable staff moving into the remote and isolated rural areas.

Conventionally, rural roads are defined as relatively low-cost, low traffic volume, and fair-weather roads, mostly traversing agricultural areas and essentially linking villages or clusters of villages and isolated communities amongst themselves or with an arterial road network (ESCAP 1980). The Department of Roads has classified rural roads as district and village roads. The district roads are defined as those roads within the district which serve primarily to provide access to abutting land with little or no through movement. These roads give access to one or more villages to the nearest market or higher classes of roads. Village roads include short, non-through roads linking single villages directly to district roads (DOR 1994).

In order to make the definition of district and village roads more precise and functional, the PLRP Report on the District Transport Master Plan (DRSW 1996) has proposed classifying district and village roads as given in Boxes 1 and 2 below.

### **Box 1: Definition of District Roads/Tracks**

1. Primary District Roads : Arterial roads linking two district headquarters or the main trading centres to higher classes of roads with through movement but other than those defined as Feeder Roads by the DOR
2. Secondary District Roads : Rural roads linking more than one Village Development Committee, connecting services, commercial and market centres, and providing access to abutting land to higher level roads
3. Main Trails including Tracks : Trails and tracks for the movement of people to enable them to obtain essential goods and services where, because of their arterial characteristics, the travelling distance varies from about one day to several days

### **Box 2: Village Roads**

1. Village Access Roads (VAR): VAR connect mainly with district roads (including National Highways and Feeder Roads) to a village and they also include firm roads, roads leading to river and *ghat* etc — normally non-through in character.
2. Village Trails (VT): Non-motorable trails for communication within the village

The above definitions do not include motorable bridges, suspension bridges, and wooden bridges, and these also play a vital role in road accessibility. Given the difficult terrain of the hill and mountain areas of Nepal, there are severe limitations on construction of motorable roads to connect every settlement. Therefore, the definition of rural roads should include tracks, mule trails, and suspension (or wooden) bridges, which connect motorable roads and then feeder roads and highways.

### **2.3 Design Standard of Rural Roads**

The district engineers generally follow the design standard of feeder roads while designing rural road projects as per the definition given in the Classification and Design Standards for Feeder Roads (1994) of the DOR. In order to construct roads in an economic manner, phase-wise construction of roads into five development stages is suggested for implementation (Box 3).

### Box 3: The Stages in Road Development

- |            |   |
|------------|---|
| Stage I:   | Detailed Design and Project Formulation Stage: planning, engineering design, costing for the construction or upgrading the project  |
| Stage II:  | Fair Weather Earth Track: construction of a basic level of dry season vehicular access track  |
| Stage III: | Fair Weather Gravel Track: improve the dry season access track to gravel standards  |
| Stage IV:  | All Weather Gravel Track: improve the road to all-weather access of gravel standards with the provision of structures to ensure only minimum restrictions to traffic at stream crossings    |
| Stage V:   | All Weather Bitumen Road: improve the road to all — weather access of bitumen standard with the provision of structures to ensure only minimum restrictions for traffic at stream crossings |

Feeder roads are further divided into two categories: Category I—Truck Standard (general standard) which is applicable for traffic levels above 50 AADT (Average Annual Daily Traffic) — and Category II—Tractor\Trailer standard (minimum standard) which is applicable for less than 50 AADT. In Category I feeder roads, the following factors are given consideration, among others.

- Feeder roads provide a basic means of vehicular access with low traffic levels (up to a few hundred vehicles per day). Therefore, apart from possibly road width and gradient, geometric standards have much less importance than the performance of the road.
- The concept of selecting geometric standards to suit a predetermined design speed is to be avoided. The geometric standards should be chosen on the basis of safety and minimum construction and maintenance costs.
- Earthworks are costly and should be kept to a minimum in the hills and *Terai*. The use of labour based operations has important advantages in this respect in that excavation and filling can be carried out more selectively to much closer tolerances and with less disturbance than by machine.
- Adequate provision should be made for drainage in construction in Stage II. The improvements needed in successive stages will mostly concern cross drainage such as the replacement of fords by culverted drifts and, eventually, the addition of bridges.

The Category II standard applies to those roads that would be considered for construction under a pilot scheme. The purpose of such roads is to serve primarily the tractor\trailer mode of transport, which includes mini-buses, light trucks, and tractor\trailers. In framing the minimum design standards, careful attention should be given to ensuring minimum impact on the surrounding environment. It demands a careful balance of cut-and-fill earth work operations. The design standards for both categories of feeder roads are summarised in Table 2.1.

## 2.4 Public Policy on Rural Roads

### 2.4.1 The Eighth Five Year Plan (1992-97)

The Eighth Five Year Plan accorded high priority to the development of lead infrastructure, such as rural roads, because other physical infrastructures, such as communications and electricity, also depend upon it. The development of transport was and is considered to have a direct influence on the development of both productive and social sectors. Moreover,

the creation of employment opportunities through rural infrastructure was given serious consideration in order to provide work for the growing labour force in rural areas. Furthermore, rural roads can generate employment through the expansion of markets for industrial products in rural areas and can also provide access to surplus agricultural produce from rural areas by providing roads and other forms of transportation to link village communities and market centres. On the basis of these facts, the following policies regarding rural roads were adopted in the Plan.

1. The main goal of this Plan was to develop a national transportation system with a view to making the various means of transport, such as roads, bridges, main trails, ropeways, waterways, and airways, complementary, thereby interlinking various areas of the country in efforts to facilitate economic development. The aim was to formulate a National Transport Master Plan within the plan period. This Plan would identify the appropriate model for helping the structural development of a national transportation system in the coming years. The Master Plan would cover a 20-year span for planned development of a road network.
2. Special emphasis was given to the construction of link roads joining farms to market places or linking the agricultural production centres and the local market centres in the districts. Priorities were given to those projects in which a greater degree of participation could be ensured. District Development Committees (DDCs) would be involved in the selection, formulation, and operation of these projects.
3. At the beginning of the Eighth Plan period, only 52 district headquarters in the kingdom were connected by the road network. Therefore, road connections to the hitherto unconnected districts were scheduled within the Plan period in a phased manner.
4. Priority was given to the construction of mule tracks in the Himalayan region, service tracks in the hilly regions, and cart tracks in the Terai region, in order to provide a minimum level of road access.

**Table 2.1: Design Standards for Stage II Feeder Roads: Fair Weather Earth Tracks**

Design Standards	Category I	Category II
Right of way (m)	30	30
Formation width (m)	4.5	4.0
Carriageway width (m)	4.5	3.5
Shoulder width (m)	-	-
Camber (%)	5	5
Minimum horizontal curve radius (m)	12.5	12.5
Minimum vertical curve radius (m)	150	100
Maximum gradient (%)	12*	15
Limitation of the maximum gradient length (m)	300	200
Minimum culvert size (mm diameter)	600	600
Pavement surfacing	Earth	Earth
Stream crossings	Ford	Ford

Source: DOR 1994

\* Sections exceeding 7% must be paved with either clay-bound macadam or gravel.

## 2.4.2 Rural Road Programme

In 1993, the Ministry of Local Development (MLD) introduced a programme called the Rural Road Programme, in which the District Development Committees (DDCs) are provided with a block grant for taking up district and village road projects. The outlay for this programme has been about Rs 180 million per year, ranging from Rs one to Rs 4.5 million per district. The MLD prepared a manual in 1993, which laid down the following principles of planned development for rural roads.

### Project Planning

- A rural road project should normally be for less than 10km of road.
- In view of the limited availability of technical manpower and construction equipment and tools at the district level, not more than six projects should be selected per year.
- Only projects that can be implemented within a year should be selected.
- The planning of rural roads should follow the District Road Network Plan (as soon as it is completed by the Department of Roads [DOR]).
- A rural road project should support the rural development process by linking rural areas with good roads or market centres.
- Priority should be given to projects having the least negative environmental impacts and which can be maintained through toll tax collection and mobilisation of local resources.
- In district road projects, the Users' Committee should ensure provision on a free of cost basis of 10 metres of land (on both sides) from the centre of the road as Right of Way. The DDC should make necessary arrangements for transferring ownership.
- In districts inaccessible motor transport, the money should be used in the construction of suspension bridges. For improvement of mule trails and tracks, prior approval of the MLD must be secured.

### Users' Committee

- The Users' Committee should be elected from among the people of the VDC(s) connected by the road and labourers from the village used for road construction.
- No elected officials shall be ex-officio chairpersons or members of a Users' Committee. However, the beneficiaries can elect such an official, if he/she is also among the project beneficiaries.
- The DDC should be represented at the meeting of project beneficiaries in which the Users' Committee is elected.

### Implementation

- Rural road projects should be implemented through the Users' Committee.
- A Monitoring and Supervision Committee should be constituted to supervise, monitor, and evaluate rural road projects. The members of the Committee should be as follow.

DDC Chairman	Chairman
Member of Parliament of the area	Member
DDC Ilaka Member	Member
Local Development Officer (LDO)	Member Secretary

- The functions of the Monitoring and Supervision Committee are to help the Users' Committee implement the project, monitor progress, provide technical backstopping, and, in the case of any problems in functioning bring it to the notice of the DDC.
- Rural road projects should be based on labour-intensive technology. Labourers should be employed from the VDC to which the connecting road is being built. Twenty-five per cent of the wages should be deducted as a source free labour contribution.
- For special cases, the Department of Roads may provide heavy equipment, such as bulldozers and compressors on the request of the DDC. The DDC may use up to five per cent of the budget for use of the heavy equipment to be used for maintenance of the equipment.
- If the allocated budget remains unspent, the amount, along with the service charge, should be used for road maintenance.
- The DDC should plant trees on both sides of the road.
- The expenditure of the Users' Committee must be audited according to government rules.

### Road Completion

- The Road Completion Certificate Committee should certify a road project within three months of its completion.

## **2.5 Institutional Set-up**

The Ministry of Transport and Construction (MOTC) is responsible for all types of transport services. For construction and management of motorable roads, there are two departments under the MOTC: the Department of Roads (DOR) and the Department of Transport Management (DOTM). The DOR is responsible for designing, implementing, and maintaining strategic and feeder road networks and for developing standard norms for road construction in Nepal. The DOTM is responsible for operational arrangements such as fixing transport fares/rates for different types of vehicles and roads and certifying road completion for plying vehicles etc. The DOTM has 12 local offices that are mandated to cover all districts with road access. At the district level, there is a District Transport Management Committee headed by the Chief District Officer (CDO) with the Chief of Police, representative of transport workers, and the chief of the Transport Management Office as members. For a newly built road, the committee examines the completion and recommends the DOTM for certifying road completion. Vehicles are allowed to ply on a newly built road only after certifying road completion from the DOTM, otherwise the risk of a vehicle is not covered, e.g. in insurance policies.

Prior to 1993, district roads had also been the responsibility of the DOR. In many districts, the DOR manned the District Road Offices. The construction works used to be carried out through contractors who work as per the DOR norms. At the same time, local self-governing bodies such as District Development Committees (DDC) and Village Development Committee (VDC) also constructed rural roads. Such roads were constructed through users' committees by mobilising voluntary labour. Therefore, there were two operational norms for constructing rural motorable roads: the DOR constructed through local contractors, while the DDC/VDC constructed through the users' committee. The maintenance arrangements after

road completion were not clear as it was expensive for the DOR to continue maintaining such small projects, while local bodies refused to take them over, because they were not constructed by them.

Therefore, from 1993 onwards, the responsibility for rural motorable roads was also transferred from the DOR to the Ministry of Local Development (MLD), as the latter was already responsible for all types of rural infrastructures such as mule trails, tracks, suspension bridges, small irrigation projects, village drinking water supplies, school buildings, and so on. All local-level projects, including rural roads, are then selected, implemented, and maintained by the District Development Committees (DDCs) and Village Development Committees (VDCs) at the local level, which are under the umbrella of MLD. In order to provide managerial support to the DDC, there is a DDC Secretariat headed by a senior executive officer, called a Local Development Officer (LDO), who is appointed by the MLD. At the VDC level, there are Village Secretaries, under the administrative jurisdiction of the LDO.

The organizational processes of these local self-governing bodies at the village and district levels are briefly summarised here. At the village level, there is a Village Development Committee (VDC) to which nine members are elected from among the adult voters of nine wards, and the chairperson and vice-chairperson are elected from all adult voters of the VDC. At the district level, there is a District Development Committee, in which nine to 13 members and chairperson and vice-chairperson are elected indirectly by the electoral roll of the VDC officials. A district is divided into nine to 13 areas called *llaka* and one DDC member is elected from the electoral roll of the *llaka* (VDC chairperson + vice-chairperson + members x number of VDCs in an *llaka*), whereas the chairperson and vice-chairperson are elected from the electoral college of the entire district.

In 1996, a decentralisation policy has been adopted by the government that proposes to modify the organizational structure of the local self-governing bodies and widen their mandate for local development. Accordingly, the government was drafting a bill that was subsequently approved by Parliament.

At the central level, the MLD provides policy guidelines, financial allocation in the form of block grants, and technical support to DDCs and VDCs. After the transfer of responsibility for construction and maintenance of rural roads from the MOTC to the MLD, the technical capability of the MLD was strengthened. The MLD recruited 84 engineers and posted one engineer in each district to supervise all infrastructure projects, including rural roads, undertaken by the DDC. At the five regional headquarters, the MLD has Regional Directorates to provide managerial and technical support to the DDCs within the region. The Ministry has also established a Technical Division at the Ministry level, headed by one Superintending Engineer and assisted by seven Divisional Engineers and seven assistant engineers.

From 1995, the government has been providing a block grant to all VDCs annually, a large component of which is spent in developing rural transport network. But, there was no technical staff at VDC level until 1996 when the MLD recruited about 4,000 low-level technical personnel, called Technical Assistants, one for each VDC. The recruitment process and the quality of the manpower have been subjects of contention between the local authorities and the Ministry. It was alleged that the recruitment process was politically motivated and that the

qualifications of recruited personnel are not commensurate with the qualifications needed for the job.

## **2.6 Rural Road Development in the Past**

Because of the difficult mountain terrain, the majority of the population is scattered throughout remote and isolated villages all over the country. To break this isolation and link them with the mainstream development process, the government has been giving high priority to the development of rural infrastructure. In this noble endeavour, the international community has also provided constructive support in need identification and development of rural infrastructure projects through government and non-government organizations. The principal donor agencies involved in this sector are the World Bank (IBRD\IDA), the Asian Development Bank (ADB), the UK's Overseas' Development Administration (ODA), Germany's GTA, the Swiss Development Corporation (SDC), and the European Commission. In the development and upgrading of the trail and suspension bridges in the hills and mountains, the Swiss agency Helvetas has had a long involvement with the government through the Ministry of Local Government (MLD). With this background, some of the work carried out in need identification, technology experimentation, and programme development, either by the government or through the support of donor agencies, have been summarised in this section.

### **2.6.1 District Road Network Studies**

The Department of Roads (DOR) carried out two major studies during 1992 and 1993 for identification and development of a rural road network in eastern and western parts of Nepal. The study for the eastern sector covered 33 districts (excluding Rasuwa and Dhading districts) of the Eastern and Central Development Regions, whereas the western sector covered 40 districts of the Western, Mid-Western, and Far Western Development Regions. The overall objectives were to identify road access to district headquarters, feeder roads, and farm to market roads, with priority being given to those districts without motorable road access.

**Eastern Nepal:** The analysis of the eastern sector study was based on the development of various computer-based models using a number of socioeconomic and demographic variables to assess overall development potentials. In addition to the socioeconomic and demographic parameters, the database of the study included information of agricultural parameters together with data on road construction, maintenance, and user and environmental costs. The socioeconomic database included population, agricultural land, manufacturing output, marketing network, and service facilities. The analysis was carried out, as far as possible, at the VDC level with the aid of GIS-based digitised maps.

Computer-aided models were used to rank the VDCs in order to determine the proposed road network. A gravity force model that was modified for application to the specific socioeconomic context of Nepal provided the basis for the modelling work. Ranking of VDCs was achieved by estimating their overall development potential in terms of certain key variables. These variables covered households, health facilities and schools, cottage industry development, cultivated land, and fertilizer usage. The ranking system was based on the

total scores of each VDC as a function of the individual weighted scores of each of the socioeconomic variables.

Taking into account topographical constraints, the gravity model approach then used the total score values of the VDCs to determine, on the contour basis, the degree of interaction between these key socioeconomic and demographic variables and so generated the road network for each district. The gravity force principle provided the conceptual basis on which VDC to VDC attractiveness was calculated in order to determine proposed road alignments within a district. Regression analysis was also carried out in this study in order to assess the causal relationships between road density and the various socioeconomic factors, thereby giving an indication of likely potential demand for roads in relation to the output of the gravity model. For eastern Nepal, the study proposed an additional 5,536km of roads on to the existing network of 6,091km, that is an increase of 91 per cent. Of this addition, 1,536km account for the construction of new roads into presently inaccessible districts.

**Western Nepal:** The development of the road network in western Nepal was appraised through examining the demand generating factors for roads, at the same time taking into account the need for any network proposed to be economically viable. The analysis was based on a review of road density and connectivity in terms of land area and population and by analysing a number of key socioeconomic variables such as agricultural land area, production potentials, population distribution, and nodal points. Nodal points were identified as important centres of market/commercial activities, representing integral parts of the network where key junctions exist. Road connectivity measured the relative positions of settlements and markets in terms of trade interaction and traffic flow. For specified geographical areas, these measures examined the spatial nature of the existing road network as well as the relationship between the number of road links and the number of nodal points.

The database of the study included information on population, GDP and income, agricultural land, service facilities, road lengths, vehicle operating costs, and road construction costs. Together with these data, other criteria were determined with reference to road densities, the functional type and magnitude of market centres (in terms of provision of services and shops), and connectivity and linkage patterns of market centres to one another. The proposed road network in western Nepal called for an additional 8,651 km over and above the existing level of 3,154km, that is an increase of 274 per cent. Of this addition, 2,159km account for the construction of new roads into presently inaccessible mountain regions.

For the country as a whole (excluding Rasuwa and Dhading districts), based on these two road network planning studies, the optimum proposed road network, which would connect all districts and meet the projected demand for roads, would entail the construction of over 14,000km of new roads, representing an increase of over 150 per cent above the current total of 9,200km (all roads including the strategic network). This is summarised in Table 2.2 below.

However, these studies were carried out at the national level and were not very clear on the implementation and operational aspects of rural roads at the local level. They seem to have taken for granted that the objectives can be achieved by strengthening the organizational structure of the DOR. Although it has been recognised that both these District Road Studies

**Table 2.2: Proposed Road Network for Eastern and Western Nepal (km)**

Region	Ecological belt	Existing (1991)	Proposed	Total
East Nepal	<i>Terai</i>	3946	1448	5394
	Hills	1871	3073	4944
	Mountains	274	1015	1289
West Nepal	<i>Terai</i>	1721	800	2521
	Hills	1433	5692	7125
	Mountains	-	2159	2159
All Nepal	<i>Terai</i>	5667	2248	7915
	Hills	3304	8765	12069
	Mountains	274	3174	3448
Total	All belts	9245	14187	23432

Source: PIP Project Report, Vol.III

have their shortcomings, in terms of methodology and accuracy of the data, they nevertheless represent a very comprehensive review of the possibilities and potential for the development of the rural road network throughout the country.

### 2.6.2 Agricultural Perspective Plan (APP)

The APP was prepared in 1995 with the financial and technical support of the Asian Development Bank (ADB) in order to provide a framework for a period of 20 years for stimulating the agricultural sector on to a sustainable high growth path. Under the APP, the basic stimulus for rising income and rural business was considered through the increase of agricultural productivity. One of the priority inputs identified as a key element towards achieving rural development and transforming the agricultural sector from a subsistence base into a commercial base was road building. At the same time, great emphasis was placed on the need for institutional strengthening to provide the necessary support for implementing and maintaining the proposed agricultural road network.

Particular emphasis was placed on the need for roads in the *Terai* to facilitate drilling and maintenance of shallow tube-wells (for improved water control) and in the hills to facilitate marketing and agribusiness activities associated with high-value agricultural commodities. For the *Terai*, road needs were calculated by taking into account the time needed to reach the market and return on the same day. On the basis of an influence area of up to four km either side of a rural road, a hypothetical network was developed which inferred a density of 22km per 100 square kilometres. In the case of hill and mountain districts, the Plan proposed that the missing linkages to the district headquarters be completed and provided with a road density of 11km per 100 square kilometres of mapped agricultural land for the hill districts and four km per 100 square kilometres of mapped agricultural land for mountain districts. The additional agricultural roads proposed by the APP are shown in Table 2.3 below.

The Plan identified, as an initial objective, the construction of a rural road grid for the *Terai* based on the existing trunk and district road system. Accordingly during the first ten years of the APP the construction of 5,146km was envisaged, with a balance of 1,054km to be constructed in the second ten-year period.

**Table 2.3: Proposed Additional Agricultural Roads by the APP**

Region	Eastern	Central	Western	Mid-Western	Far-Western	Total
Terai	1045	1040	600	425	290	3400
Hills	447	424	549	343	187	1950
Mountains	246	238	16	170	180	850
Total	1738	1702	1165	938	657	6200

Source: APP Report 1995

The magnitude of rural road construction at the district level as proposed by the APP was enormous. However, the operational plan to achieve that target was not clearly visualised. The Plan proposed the creation of a Department of Agricultural Roads under the Ministry of Local Development (MLD) to provide technical backstopping at the district level. The government implemented this recommendation by strengthening the existing technical division of MLD. At the district level, the District Development Committees were made responsible for construction and maintenance of the rural road network. However, as the DDCs are self-governing, local statutory bodies, no effective linkages were visualised between the policy, the programme, and the project levels to achieve the target while maintaining the technical standard.

### 2.6.3 Priority Investment Plan (PIP) Project

The PIP Project (1996), which was carried out by the Department of Roads, with financial and technical support from the World Bank, reviewed the road sector as a whole. The review included strategic roads, rural transport, bridges, and domestic aviation and presented an overall plan in the road sector over a period of 10 years corresponding to the Ninth and Tenth Five Year Plans (1997-2006).

The Report identified and prioritised a number of road projects for Eastern, Mid-Western, and Far-Western Regions. The priorities are based primarily on the potential costs and economic benefits from individual project components, using standard cost-benefit appraisal techniques applicable to road projects. The cost per kilometre is calculated at four standards: earth road, fair weather gravel, all weather gravel, and black top. The benefits included transport savings from the replacement of porters or mule transport by freight with truck transport; savings from the replacement of walking by bus journeys for personal travel; road users' savings in the form of vehicle operating costs and passenger time saving; and producer surplus benefits in the form of increases in farm incomes from the growing of cash crops for sale in markets outside the hill areas. These benefits are determined by the size of the population served. The result of this analysis has supported the thesis that, in rural areas, the greatest net benefits are obtainable from the construction of low-cost earth roads into currently areas not served by roads.

The Report recommended development and extension of the national road networks that can contribute to the regional integration by providing high-quality links between all regions, thus reducing the transport costs and travel time. Extension of the road networks into hill districts currently not served by roads provides the single-most effective and demonstra-

ble benefit for uplifting the overall economic conditions of these presently inaccessible and poorly accessed areas.

In the rural transport sector, the Report recommended maintenance of the existing facilities as a first priority, followed by the expansion and development of the road network as justified and as resources permit. The concern for the long term should be the sustainability of and the maintenance of the resultant increases in road length. Beyond the maintenance commitments, the PIP Report identified priorities for the extension and development of the rural road transport network. These are summarised below.

- First, construction of earth standard roads into currently non-road served areas: this includes the completion of the on-going programme of new Feeder Roads to district headquarters not connected by road.
- Second, construction of a limited number of additional district roads, mostly in hill areas, to provide access to significant pockets of the population or to improve network connections and linkages.

In the *Terai*, there is already a basic network of roads and tracks available and some form of wheeled transport operates to virtually all areas. Therefore, the Report has concluded that the construction of additional roads in the *Terai* areas cannot be supported on the basis of transport cost savings or agricultural development benefits alone. Such roads may, however, be required as part of other broader development programmes, for example, as a component of an irrigation project or an integrated rural development project. This conclusion is in conflict with one of the main recommendations of the Agricultural Perspective Plan (APP), which proposed an approximate doubling of the length of farm-to-market roads, particularly in the *Terai*.

The PIP study, conducted under the DOR, reviewed several sectors such as strategic roads, rural transport, bridges and domestic aviation. The rural transport sector should have been reviewed by the MLD, which is the responsible policy-making body for the rural transport sector. This could be one of the reasons why, as in other previous key studies, it also failed to visualise the operational arrangements, i.e., the effective linkage between the policy, the programme, and project levels.

## **2.7 Experimentation with Sustainable Rural Road Projects**

### **2.7.1 *The Concept of a District Transport Master Plan in the Pilot Labour-based District Road Rehabilitation and Maintenance Project (PLRP)***

The PLRP, which was carried out with the financial support of the World Bank and the technical support of Helvetas, aimed to improve rural access by rehabilitation and maintenance of rural roads in three *Terai* districts and one hill district in the Western Development Region, namely, Kapilbastu, Rupandehi, Nawalparasi, and Syangja. The responsibilities of construction and maintenance of district roads were transferred to the DDCs in 1993, but the technical units of the DDCs were not capable of maintaining technical standards while, at the same time, resisting political pressures from local political leaders. Moreover, several agencies were constructing roads in their respective areas of interest, and the DDCs did not

possess exclusive information about the road inventory. *Ad hoc* decisions, rather than a thorough understanding of socioeconomic linkages and geological and topographical constraints, largely guided road construction. In order to deal with this chaotic situation, the PLRP conceived a District Transport Master Plan as an essential document for the DDCs, in order to prepare an annual programme and maintenance and rehabilitation of the district transport network.

The Master Plan would be basically confined within a district. Nevertheless, the existing and planned road network in neighbouring districts would also be considered. Similarly, while focussing mainly on district roads, the highways, feeder roads, urban and village roads would be included. In addition to that, the major foot trails would also be located on the map and considered for planning. The Master Plan was conceived for a 20-year period which would materialise during the tenure of four successive district governments.

The Master Plan would be largely prepared on the grounds of economic linkages among settlements. The engineering considerations in the alignment selection based on the topography and other engineering details were given least emphasis. The findings would thus remain as an indication, subject to being checked later on by detailed engineering studies. Similarly, the cost estimates would also be approximate for the most part.

The methodology for the preparation of the Master Plan was designed to be transparent, objective, and simple. Moreover, the involvement of all parties concerned from the very beginning of the process was sought so as to ensure their commitment. Accordingly, the following steps were proposed for the preparation of the Master Plan.

First, a workshop of district level policy-makers would be organized for discussion of policy issues such as functional issues to do with rural roads and criteria for prioritisation. Another seminar of NGOs and community-based organizations would prepare the ground to spell out conditions for GOs' and NGOs' partnerships in road construction, maintenance, and operation. These discussions would provide a certain basis for policy formulation for the proposed Master Plan.

Second, a series of meetings of DDCs would discuss and define the road prioritisation criteria. The PLRP professionals and experts developed a list of criteria, given below, which could be adapted according to the local situation and given certain importance for prioritisation of individual projects by the respective DDCs:

- population,
- investment cost (initial + maintenance),
- economic returns,
- accessibility (time, safety, reliability),
  - ◆ accessibility to nearest road head,
  - ◆ accessibility to the market centre and
- environmental impact.

The DDC meetings would also define the level of accessibility. Accordingly, the existing road networks and other physical and topographic factors, such as travelling time to the district

headquarters and market and service centres, would be assessed to define the zone of influence of road accessibility. The DDC would then call upon the road demand list from VDCs or any interested persons or groups. The road demand list would, in fact, be a collection of wishes of people, irrespective of the financial capacity of the district. Nevertheless, such a list enables us to gain insight into the perception of the people and also provide the opportunity to find more alternatives.

Third, secondary sources of information, such as district maps, land-use maps, main trail maps, demographic information, and other research studies, would be collected and consulted. Moreover, a study team would travel throughout the district to assess the existing road conditions, land-use patterns, settlement patterns, existing modes of transport, and so on. Structured interviews would be taken with different groups, as necessary. Based on secondary and primary sources of information, consideration would be given to different alternatives for prioritisation.

Finally, the entire set of exercises are structured into a report in a sequential order, starting from setting objectives. The report would include technical and financial assessments of all alternative routes for the consideration of the DDC and the final approval of the District Assembly.

### **2.7.2 Experimentation with the Low-cost, Environmentally Friendly and Self-help (LES) Approach in Palpa and Dhading Districts**

The LES approach was used experimentally during the pilot road construction directed by the Palpa Development Project and later extended to the Dhading Development Project. The Swiss Development Corporation (SDC) and German Agency for Technical Cooperation (GTZ) provided the technical and financial support. The Local Road Improvement Projects (LRIP) of Palpa and Dhading Districts were based on the following objectives:

- providing rural villages with better market and communication access to enable greater socioeconomic mobility among the people of the district;
- creating off-farm employment, during the slack agricultural period, by using labour intensive construction methods;
- retaining most of the investment in the road in the district by using only locally available resources such as manpower, skills, and materials;
- using technically sound and environmentally sustainable construction methods which will cause minimum damage to the environment during and after construction; and
- helping the district officials and staff to develop technical and administrative skills for local road construction and maintenance.

The model adopted a series of principles to address a broad range of technical, environmental, and socioeconomic issues (ARD 1994) as summarised below.

#### **Phase-wise construction approach**

In areas where the road had to cross steep slopes requiring considerable excavation, construction of the road profile was carried out in phases to allow for natural settlement and stabilisation. In the first year, a 1-1.5 metre wide track was opened. In the second and third

years, the width was progressively widened to 3.5 to 4.5 metres and, finally in the fourth year, it was extended to six metres. In this period, stabilising and strengthening work was carried out using gabion retaining walls and bioengineering methods.

#### Balanced cut and fill

In order to make the roads merge with the landscape, the LES approach minimised the excavation to the absolute minimum to cut the road profile along hill-slopes by positioning the centre line of the road so that all the material obtained from excavation on the mountain side was used in extending the road profile on the valley side. Surplus material was spread along the road alignment.

#### Management of water runoff

Traditional road designs called for drainage channels along the sides of the road, which interrupted the natural drainage patterns. In contrast, where possible, the LES approach used a five per cent cross-fall from the hill to valley side of the road that was designed into the road profile to shed the surface water. Thus, the natural drainage pattern was not disrupted and the need for a drainage channel was largely eliminated.

#### Bioengineering for slope protection

Vegetation with wide—spreading root systems bound the soil together and increased its shear strength, limiting the extent of slope failure. Large mature plants, such as bamboo clumps or trees, can support a slope by propping its base. In addition to contributing to the long-term sustainability of the fragile mountain ecosystem, the increased vegetative growth provided essential fodder for farmers and bound the road into the landscape. Vegetation planted at the beginning of one rainy season can be well established by the second rainy season.

#### Labour-intensive construction methods

In order to use the under-employed rural labour force, the road construction period coincided with the agricultural slack period from October to May. Labourers were employed from an area of up to two hours' walk from a construction site, so that they brought their own food and did not require accommodation along the road. Labourers were organized into groups of about 15, each with a locally-selected *Naike* (group leader). A supervisor directed two to four groups, which in turn were supervised by an overseer. An overseer managed up to five supervisors. An engineer supervised two overseers.

#### Use of indigenous skills, materials and tools

Stone, topsoil, and locally available vegetation were used in road construction. Stone was used for filling gabion and building dry stone walls and pitched drainage structures. The topsoil and vegetation were used to re-vegetate slopes and road surfacing. The labour force was familiar with and skilled in the use of local materials. Steel, cement, and concrete were avoided as far as possible because of cost, transportation problems, and the special skills required to use these materials properly.

#### Participatory approach

Collective responsibility to construct and maintain local roads required the involvement of local government and beneficiaries in all phases of the project. This was ensured by forming

project implementation committees at two levels: one at the DDC level for policy guidelines and the other at the project level for project implementation.

The technical standards used in the LES approach of road construction are summarised in Table 2.4 below.

### **2.7.3 Rural Infrastructure Development Project**

This project, funded by the Asian Development Bank (ADB), has the objective of reduction of rural poverty in three hill districts of Nepal, namely, Baglung, Tanahu, and Kabhre. This is to be achieved through the provision of rural infrastructure and associated increased economic benefits in the agricultural sector. There are three main components.

#### Development of rural roads and structures

About 250km of motorable fair-weather earthen roads, connecting village settlements with market centres, will be constructed in three hill districts, i.e., Baglung and Tanahu in the Western Region and Kabhre in the Central Region, using extremely labour-intensive methods with the minimum use of heavy equipment and explosives. These rural roads will be developed from improvements of existing trails and tracks and will follow, to the maximum extent possible, the existing alignments. The low-cost, environmentally-friendly and self-help (LES) approach used experimentally in Palpa and Dhading districts will be adopted for road construction. These roads can be used in dry season, during September to May, and will be closed to traffic during the period of heavy monsoon rains. They have been designed for light vehicles, such as jeeps, tractors, minibuses, and light trucks, with a maximum traffic of about 50 vehicles per day and speed limits of from 20-40km per hour. The maximum load capacity of the road is estimated at five tons.

#### Village-level institution building

Single story, multi-purpose buildings with a simple structure will be constructed at the road head in order to enhance village-level community development activities. The buildings will have concrete floors and columns and include a room of about 200 square metres with a small office and an open space for a *Bazaar*. These premises can be used for meetings, workshops, education, and NGO activities in villages and can also function as a market place for agricultural and dairy products brought from villages along the road.

#### Self-help and environmental awareness campaigns

Various awareness campaigns, including public meetings, study visits, and seminars will be organized at selected locations in the project area to increase public awareness on: (i) advantages of the LES approach in road construction and maintenance; (ii) importance of local self-help initiatives in development; (iii) need for women's active participation; and (iv) long-term risk of environmental degradation.

As the road construction methods of this project will be mainly based on labour, a minimum of 70 per cent of the labour force during road construction is expected from areas of influence along the proposed road corridors. Market surveys carried out during the Bank's feasibility study for this project indicated that local traders and wholesalers draw a profit margin of over 30 per cent of the farmgate price (ADB 1995). The provision of motorable

**Table 2.4: LES Road Standards and Specifications**

S.N.	Design Parameters	Unit	Recommended Value	Remarks
<b>A. Geometric standards</b>				
1	Design speed	kph	20-40	
2	Number of traffic lanes	no	1	
3	Carriageway width	m	3.50	
4	Shoulder width on each side	m	0.50	
5	Drain width case (a)	m	1-1.30	Short drains provided only in those places where surplus accumulated runoff flows into the road from the mountain side, viz, into paddy fields, and where the longitudinal gradient of the road is more than 8%. Such drains discharge into the nearest causeway, pipe culverts, or cross drains.
	Drain width case (b)	m	0	A 5% outward slope to the valley side is provided on the road surface in roads with longitudinal gradients of less than 8% and in longitudinal gradients of more than 8% and in other special cases, normally, diagonal drains towards the valley side are also provided.
6	Min length of passing bay	m	25	
7	<b>Formation Width</b>	m	4.5	
	a) In general			
	b) At places with side drains	m	5.50	
	c) At passing bay without a side drain	m	6.00	
	d) At very steep rocky cross slopes	m	3.5	
8	Ruling gradient	%	5	
9	Maximum gradient	%	8	
10	Exceptional gradient	%	12	
11	Maximum length of exceptional gradient	m	60	
12	Minimum radius of horizontal curve	m	10	This is in hairpin bends and switch backs.
13	Right of way from road centre line on each side	m	7.5	The total right of way would be 15m
<b>B. Other Standards</b>				
1	Type of road: Single lane road for use in dry season only.			
2	Passing places: On an average at 200 meters interval apart.			
3	Maximum loading capacity of the road: 6 Tons.			
4	Maximum traffic carrying capacity: 75 vehicles per day.			
5	Type of road surface: earthen.			
6	Period when vehicle is permitted: October to June.			
7	Period when vehicle traffic is prohibited: from July to September.			

Source: ARD Report 1994

access is expected to increase the marketing opportunities for remote villages in the hill areas significantly through the ability to move surplus agricultural produce to the market in bulk. The household income is expected to rise by over 50 per cent through the introduction of the rural road.

The project will be implemented over a period of seven years commencing in 1996. The Ministry of Local Development (MLD) will be the executing agency, responsible for channeling funds, monitoring project activities, and coordinating at the central level. At the local level, the respective DDCs will establish a District Implementation Office (DIO). The Local Development Officer (LDO) will be the head of the DIO. At the project level, local road committees will be established as a venue for public consultation and participation. The DIO will interact extensively with local road committees for specific road alignments and land acquisition issues. NGOs selected by DIOs will help organize and motivate local labour groups and will work closely with local road committees.

## **2.8 Conclusion**

The concept of a rural road is defined as an access to the market in order to realise the development potentials of the area. It includes track, mule trail, and suspension (wooden) bridges connected with rural motorable roads, which in turn connect to the feeder roads and highways. Such a combination would become the 'rural road network'. Among other features, great attention should be given to minimising the damage to the environment, as the alignments of rural roads are likely to pass through village settlements. Since various types of rural road are interconnected, the economic benefits from a rural road network are also likely to be inter-dependent.

In the Eighth Five Year Plan (1992-97), the lack of effective rural-infrastructure to facilitate access to agricultural inputs and outputs as well as basic services has been regarded as the main impediment to poverty alleviation. The Eighth Plan called for the development of an extensive rural road network in the country as a prerequisite to achieving the national objectives of faster economic growth and poverty reduction. During that period, several national level studies were made to identify the need for a rural road network in the country. The District Road Network Studies (1992-93) proposed the construction of over 14,000km of new roads representing an increase of over 150 per cent above the current level. The Agricultural Perspective Plan (1995) proposed the construction of an additional 6,200km of rural roads in the next 20 years in order to provide a reasonable road density for rural areas. The Priority Investment Plan (1996), although it did not sum up the total additional mileage, recommended the maintenance of the existing road facilities followed by construction of earth standard roads into areas currently not served by roads, especially in the hill districts.

Although plenty of work has been done at the national level for identification of rural road needs, the operational plans for these key studies were not clearly conceptualised. For example, the District Road Network Studies (1993) and Agricultural Perspective Plan (1995) seem to have taken for granted that the objectives can be achieved by strengthening the existing bureaucratic structure or creating a new one such as the Department of Agricultural Roads. However, in reality, the real implementing agencies are the DDC/VDCs all over the

country. DDC/VDCs have very limited technical capabilities for carrying out such large engineering works. Moreover, as the DDC/VDCs are self-governing statutory local bodies, they are competent enough to set their own priorities and operational procedures (Chapter 3). Therefore, the target set at the national level and the standards prescribed will only be meaningful when they are actually carried out at the local level with the same technical standards. Keeping these institutional linkages in mind, a clear rural road policy should have been prescribed as a part of the study. This would have helped to achieve the target. For the development of rural roads in a sustainable manner, several innovative experiments have been carried out, which have shown encouraging results. The concept of a District Transport Master Plan, which was developed and tested in a number of districts, can prove to be a useful document for the DDC in preparing annual programmes and planning for the maintenance and rehabilitation of district transport networks. Another innovative, low-cost experiment, which is environmentally-friendly and can use the self-help is the (LES) approach to rural road construction used in Palpa and Dhading districts. The LES approach, which is based on labour-intensive technology, has proved to be very suitable for a labour surplus economy such as that of Nepal. Another Rural Infrastructure Development Project in which rural roads will be constructed using the LES approach is underway in three districts, and has combined road building with community development activities.

The four road projects followed at the DDC level at the same time, three areas were studied in Bhojpur, Dhading, Kabhre, and Lam districts. These districts were selected based on the criteria listed below.

- 1. Bhojpur district was selected because most of the area has no access to a market. The Asian Development Bank has recently approved a project for the development of rural roads to connect the interior parts of the district.
- 2. Dhading district is a showcase of a successful experiment in building rural roads based on the LES approach. Apart from that, the district level planning mechanism is being strengthened through donor support.
- 3. Kabhre and Lam districts have fairly developed market economies based on export-led agricultural development.

The research methods used at the level applied for collection data include several techniques. Secondary level data information on the number of projects and their geographical location at different stages of rural road construction were obtained from village development committees and project files. Focused interviews with some key officials in the districts were conducted and the responses & own observations of the site were recorded used to describe the developments.

## 1.2 Profile of the Four Districts under Study

### 1.2.1 Bhojpur District

Bhojpur district is the mid hills, located in the Western Development Region of Nepal. It covers an area of 1,764 square kilometers and the total population is 722,406 (1991). The average household size is 5.2 persons. The district is at a rectangular shape and is bounded by the east by Farak, in the west by Kailash and Sikkim, in the north by Mustang, and in the south by Panchthar and Gorkha. Bhojpur, like most hill districts in Nepal, has a subsistence economy. The main crops are maize, potato, wheat, jowar, paddy,

# Chapter 3

## Planning and Implementation of Rural Roads at the Local Level - Case Studies from Four Districts

### 3.1 Introduction

Rural roads are planned, implemented and maintained by District Development Committees (DDCs) at the local level. As the DDCs are self-governing bodies, the actual process of planning and implementation followed at the local level varies among districts. Since 1995, when Village Development Committees (VDCs) also started to receive block grants from the central government, they followed the same procedures as the DDCs. This Chapter discusses the processes of planning, designing, approving, implementing, and maintaining the rural road projects followed at the DDC level. At the field level, these issues were studied in Baglung, Dhading, Kabhre, and Ilam districts. These districts were selected based on the criteria listed below.

- Baglung district was selected because most of the area has no access to a market. The Asian Development Bank has recently approved a project for the development of rural roads to connect the interior parts of the district.
- Dhading district is a showcase of a successful experiment in building rural roads based on the LES approach. Apart from that, the district level planning mechanism is being strengthened through donor support.
- Kabhre and Ilam districts have fairly developed market economies based on export-led agricultural development.

The case study research method used at this level applied for collected data through several different mechanisms. Secondary level data/information on the number of projects and existing institutional process at different stages of rural road construction were obtained from district/village development committees and project files. Focussed interviews with some key officials in the districts were conducted and the researcher's own observations of the site area were also used to analyse the data/information.

### 3.2 Profile of the Four Districts under Study

#### 3.2.1 Baglung District

Baglung is a district in the mid-hills, located in the Western Development Region of Nepal. The total land area is 1,784 square kilometres and the total population is 232,486 (1991). The average household size is 5.2 persons. The district is of a rectangular shape and is bordered in the east by Parbat, in the west by Rukum and Rolpa, in the north by Myagdi, and in the south by Pyuthan and Gulmi. Baglung, like most hill districts in Nepal, has a subsistence rural/agrarian economy. The main crops are maize, paddy, wheat, potatoes,

millet, and barley. The main commercial items produced are fruit and milk. Crafts from bamboo and cotton textiles are also made, but not in large quantities.

Until 1994, Baglung District was connected by mule trail from Syangja via Parbat District. Almost all household goods were purchased in Seti Dovan in Syangja District and carried by porter or mule caravan through Karki Neta via Kusma in Parbat District. There are airstrips at Balewa and Dhorpatan. The two road heads in Baglung District are Baglung Bazaar, the headquarters of the district in the extreme east, and Kharbang in the west. The first is accessed by the 68km long, all-weather black-topped Pokhara-Baglung Highway (completed in 1994), of which four km is in Baglung District, and the second is accessed by a self-help, dry-weather earth road (can be used by tractors) from Ridi in Gulmi District.

Almost all parts of Baglung District are linked by mule trails. There are several main trails in Baglung District such as the Baglung - Galkot - Dhorpatan trail, Baglung - Myagdi trail, Baglung - Kusmisera trail and so on. There are over 450 suspension bridges that connect the villages in the interior. Baglung District is an example of a success story in construction of low-cost suspension bridges using local technology and people's participation. It is known as the 'district of suspension bridges'. Mules and porters are the main methods of transporting goods in Baglung District. The main rural road network in Baglung District is shown in Map 2.

### The Rural Road Programme

This programme in Baglung District includes motorable roads, mule trails, and suspension bridges, which are part of the DDC programme activities. Previously, the MLD provided support for mule trail improvement and suspension bridges under other programmes. Since 1993, a separate budget under the Rural Road Programme was allocated by the MLD, and through this a number of rural motorable road projects began. Interestingly, while the money was allocated for the rural road project, some portion was actually spent to gravel and black-top the road in Baglung Bazaar. For example, in 1994, a sum of Rs 300,000 was allocated for the Baglung - Galkot Road Project, of which a sum of Rs 200,000 was actually spent on black-topping the road from the DDC Office to the SP's Chowk and 100,000 for gravelling the road from the SP's Chowk to the Campus Gate in Baglung Bazaar (UNDP 1994).

Recently, the Asian Development Bank has agreed to provide loan assistance to construct fair-weather motorable roads in Baglung, Tanahu, and Kabhre districts. The following projects have been identified for implementation in Baglung District.

- Baglung - Galkot - Kharbang
- Kharbang - Burtibang - Dhorpatan
- Baglung - Kusmisera - Shantipur

The road projects will use labour-intensive methods for road construction with minimum use of heavy equipment and explosives. The low-cost, environmentally friendly, and self help (LES) approach to rural road construction, which was developed in Palpa and Dhading districts, will be applied in the three projects proposed. For developing the roads, the exist-



ing trail will be extended and the existing alignment will be followed to the greatest extent possible (ADB 1995).

### 3.2.2 *Dhading District*

Dhading District lies in the Central Development Region of Nepal. It extends from the mid-hill region to the northern high mountain region. The total area of Dhading District is 1,926 sq. km., 35,291 ha (18% of the total land area) of which make up the agricultural land. The district borders on Nuwakot in the east, Rasuwa and the Tibetan Autonomous Region of China on the north, Gorkha on the west, and Chitwan and Makawanpur on the south.

Apart from a few, low fertile flat areas, such as Dhading Bensi and Salyantar, most parts of Dhading District are characterised as food deficit hill terrain. The district has a total population of 278,068 (1991). The average family size is 5.4 persons. Of the total of 49,438 households, 19,022 (38%) produce sufficient food for the whole year. Significant numbers of households supplement their income by working as wage labourers on the roadsides or in cities such as Kathmandu and Pokhara and in the Terai region. Considerable numbers of people, in some villages at least one from every family, work in India or abroad as porters, hotel boys, watchmen, or soldiers.

The southern part of Dhading District is accessible by road. Two major national highways; namely, Prithvi Highway and Tribhuvan Highway, cut across the District. Naubise to Jogimara on the Prithvi Highway (68km) and Nagdhunga to Sopyang (Sat Ghumti) on the Tribhuvan Highway (40km) fall in Dhading District. In addition, there is a gravel road from Malekhu to Dhading Bensi (20km). Additionally, two other roads, one from Dhading Bensi to Salyantar Khahare (42km) and an other from Bhimdhunga to Lamidanda (22km) were constructed by the Dhading Development Project (DDP). In the northern part of Dhading District, mule trails, along with suspension bridges over rivers, are the main transport network. The road network of Dhading District is shown in Map 3.

### The Rural Road Programme

The Master Plan for Rural Roads was prepared and approved by the District Assembly. Under this six key projects were identified. These projects are being carried out by the Rural Road Programme on a phase-wise basis. There are 14 other district-level road projects that are involve road improvements or construction of link roads to the main road. Dhading Development Programme (DDP), supported by the GTZ, is funding two rural road projects; namely, Bhimdhunga - Lamidanda in order to provide market access for the cash crops growing in southeast Dhading. Additionally, the Dhading Bensi - Salyantar road has been selected for implementation in order to connect the remote northern region with the market centre in the south.

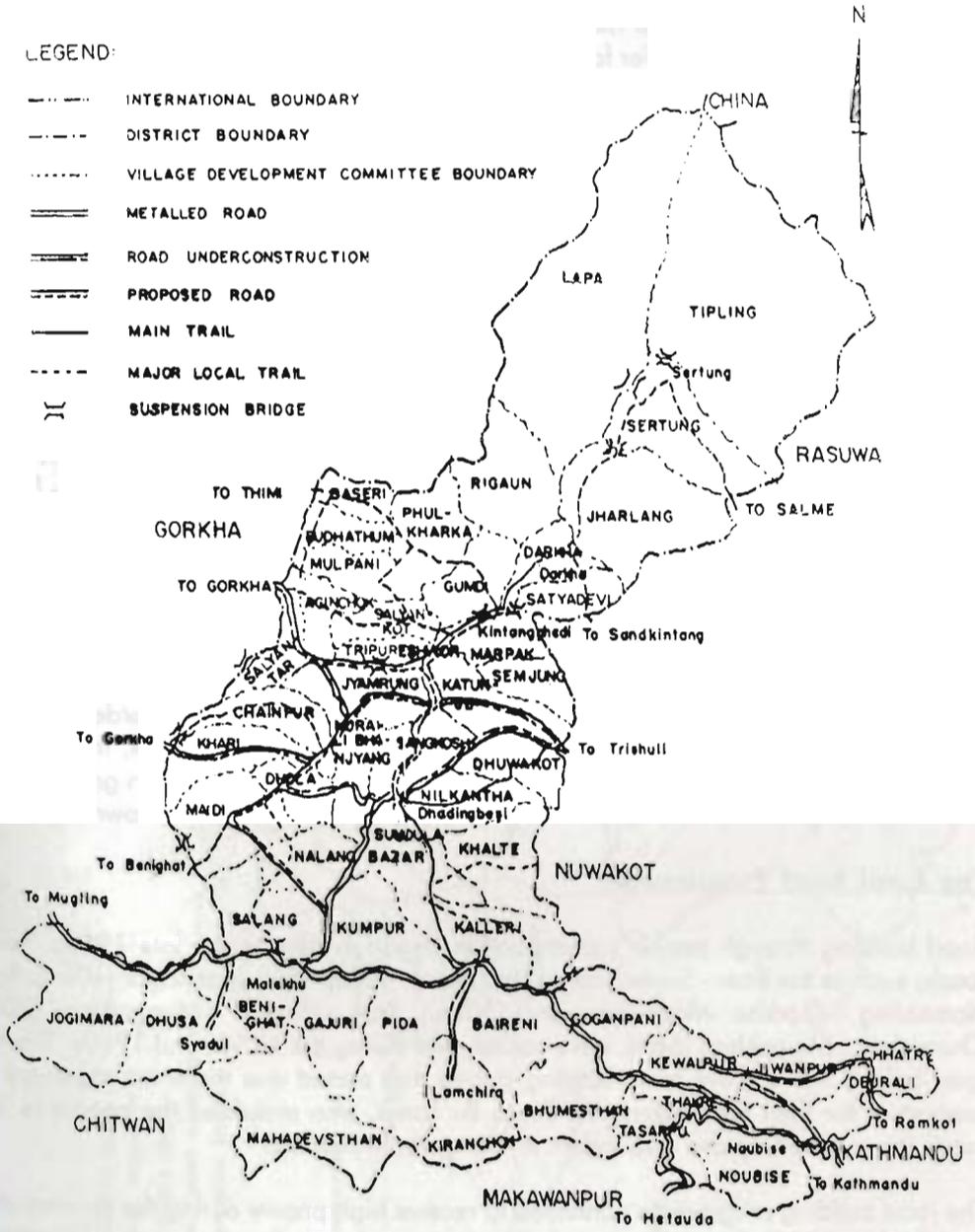
### 3.2.3 *Ilam District*

Ilam District lies in the mid-hills of the Eastern Development Region. It borders the West Bengal State of India in the east, Dhankuta and Morang Districts in the west, Panchthar District in the north, and Jhapa District in the south. It has a total area of 1703 sq.km. The

**Map 3: Road Network in Dhading District**

**LEGEND:**

- — — — — INTERNATIONAL BOUNDARY
- - - - - DISTRICT BOUNDARY
- ..... VILLAGE DEVELOPMENT COMMITTEE BOUNDARY
- ==== METALLED ROAD
- ==== ROAD UNDERCONSTRUCTION
- ==== PROPOSED ROAD
- MAIN TRAIL
- - - - - MAJOR LOCAL TRAIL
- ( ) SUSPENSION BRIDGE



existence of four main rivers, namely, Jogmai, Mai, Puwamai, and Dewmai, has given the name of *Char Khola* (four rivers) to Ilam District. According to the 1991 Census, Ilam has a total population of 229,214. The average household size is 5.5 persons. Over 95 per cent of the people are dependent on agriculture.

Out of the total land area of 104,263 hectare, 72,943 hectares (70%) are arable. A total of 10,330 hectares (10%) is under forest (Nepal Rastra Bank 1995). Although Ilam District is said to be famous for the five 'A's'; viz., *Amlisho* (broom flower), *Aalu* (potato), *Aduwa* (ginger), *Alaichi* (cardamom), and *Aolan* (milk), it is also famous for tea production. There are six organized tea estates, of which four are under the Nepal Tea Development Corporation (NTDC) and two are in the private sector. In addition, several small-scale tea plantations are coming up in a number of VDCs.

The main market centres of Ilam District are Ilam *Bazaar*, Pashupatinagar, Fikkal, Mangalbare, Aitabare, Sukrabare, Chisapani, Gorkhe, Manebhanjyang, Nayabazar, Rabi, and Jamuna *Bazaar*. Market centres are coming up along the road in places Harkate, Tinghare, Godak, Biblyate, Nepaltar, Rakse, and Ranke. Several link roads, mule trails, and tracks connected to the road heads from the surrounding villages have, in fact, increased the impact area of the road. Weekly market day is a typical feature of most of the *Bazaar(s)*, where people from the adjoining VDCs come to sell their products and buy necessary household items. Many of the *Bazaar(s)*, such as Sukrabare, Aitabare, and so on, are named after the weekly market days.

Ilam District has been linked to a motorable road for 40 years. Now the north-south Mechi Highway cuts across Ilam District in the middle, and it provides road linkages to Jhapa District in the southern *Terai* region and Taplejung District in the northern Himalayan region. A link road from Fikkal to Pashupatinagar provides road access to the border checkpoint with India. In addition, several VDCs are linked to rural roads. At present, the total road network in Ilam District is 360km, of which 64km are black-topped, 49km gravelled, and 247km are fair-weather rural road. The road network of Ilam District is shown in Map 4.

### The Rural Road Programme

Road building through people's participation began in Ilam in the late 1950s. Several roads, such as the Ilam - Sanischare (45km), Ilam - Fikkal - Pashupatinagar (40km), Ilam - Namsaling - Gorkhe - Manebhanjyang (50km), Ilam - Phutuk - Mangalbare (20km), Chureghati - Maipokhari (6km), were constructed during the 1950s and 1960s. The main spirit behind the massive road building during that period was the encouragement and support of the then *Badhakim*, Mr. Santa Bir Lama, who mobilised the people to build roads (as reported by one respondent in Mangalbare *Bazaar*).

The road building programme continued to receive high priority during the *Panchayat* period (1960 - 1990). Several earlier alignments were changed and new roads constructed. Table 3.1 gives some important road projects that have changed/cancelled the old alignments.



**Table 3.1: Alignment Changes in Rural Roads in Ilam**

Old alignment	New alignment
Ilam - Phutuk - Mangalbare	Nepaltar - Mangalbare
Ilam - Namsaling - Gorkhe -Manebhanjyang	Cancelled
Godak - Jogmai - Ilam	Godak - Rajduwali - Ilam (part of Mechi Highway)
Ilam - Kudule - Chisapani	Rajduwali - Chisapani

Source: Focussed discussion Ilam

Several reasons were cited for changing the old alignments. The first is the political reason. Many political leaders exerted influence to change an alignment in order to connect the road network to their own houses, villages, or areas of influence when they were in power. Second, there is no system of paying compensation for land used during road building. Rather, one is obliged to donate land for development work such as road building. Therefore, there is little cost involved on the part of the implementing agency in changing an alignment. Third, when an alignment was technically faulty or involves high costs for bridges and culverts, such as the Ilam - Kudule - Chisapani or Ilam - Phutuk - Mangalbare alignment road alignments were changed and connected to the Mechi Highway. Moreover, most of the rural road projects are not subject to detailed surveys and designs before they are implemented, therefore the alignment is also changed during project implementation, as and when needed. Most of the old alignments have now disappeared or are used as mule trails, as shown in the photograph below.

**Photo: An old alignment of a road used as a mule trail**



Since 1993, a separate budget has been provided by the Rural Road Programme of the Ministry of Local Development (MLD). Rural roads' projects are identified, along with other rural development activities, and approved by the DDCs and implemented through Users' Committees.

### 3.2.4 Kabhre District

The Kabhrepalanchok (Kabhre in short) District is situated in the eastern part of the Kathmandu Valley, surrounded by Sindupalchok in the north, Dolkha and Ramechhap in the east, Sindhuli and Makwanpur in the south, and Kathmandu, Lalitpur, and Bhaktapur in the west. It lies in the mid-hill region of Nepal at a height ranging between 350 metres (Dolalghat) and 3,018 (Bethanchok Narayan Danda) metres above sea level. Kabhre District has an area of 1446 square kilometres, of which 52.6 per cent is covered by forests and 43.8 per cent area is classified as arable land. Out of the total arable land, 64 per cent is upland and 36 per cent is low flat land (*Tar and Bensi* land). The total population of Kabhre District is 324,329 (1991) and the average family size is 5.7 persons. The large *Tar and Bensi* lands in Panchkhal, Dapcha, Khopasi, Panauti, Kusadevi, Sunkosi, and Indrawati Bensi have high population densities and are considered the grain baskets of Kabhre District (APROSC 1993).

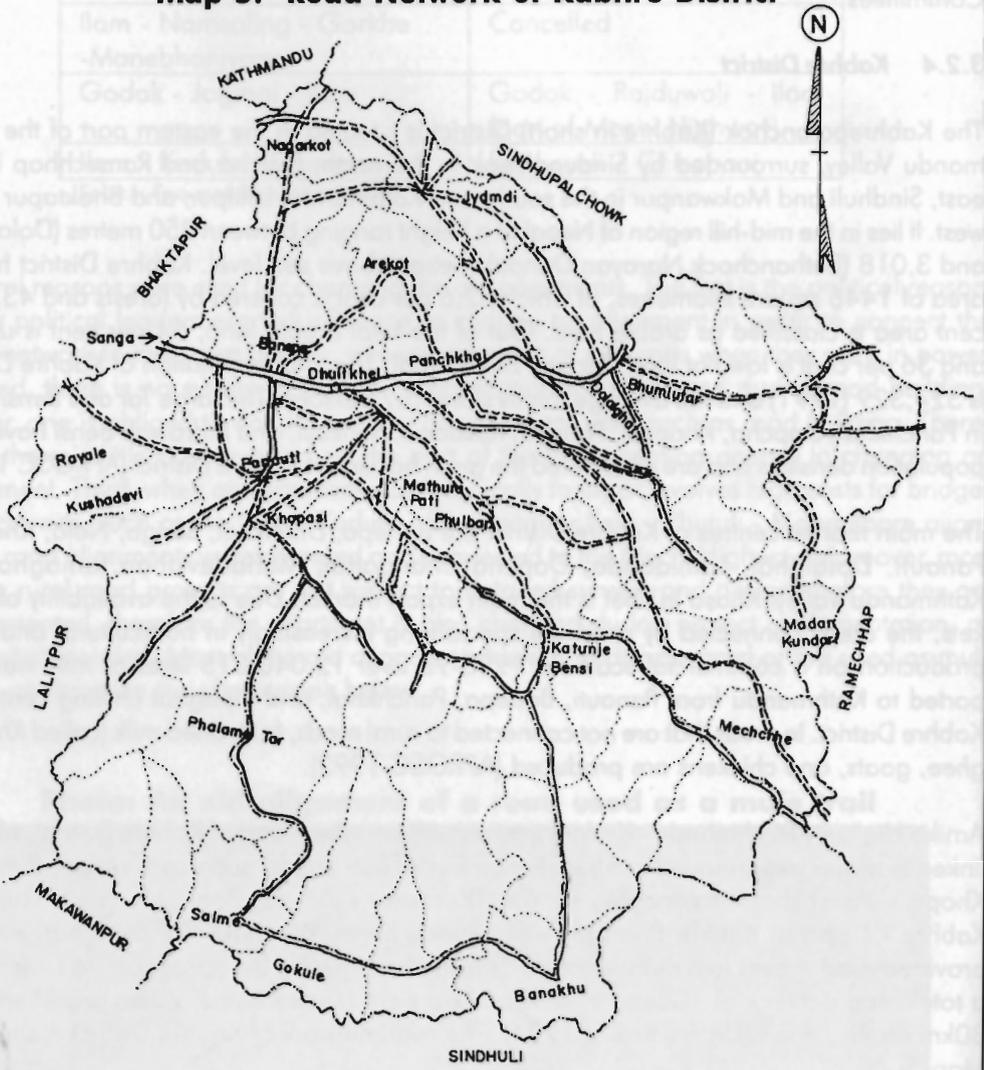
The main market centres of Kabhre District are Banepa, Dhulikhel, Sanga, Nala, Khopasi, Panauti, Dolalghat, Lamidanda, Dapcha, Mangaltar, Mahadevsthan, Tamaghat, and Kathmandu Valley. Khasa in Tibet is the main export market. Due to the availability of markets, the areas connected by road are specialising increasingly in horticultural and dairy production on a commercial scale. In 1995-96 over 12,040,015 litres of milk were exported to Kathmandu from Panauti, Banepa, Panchkhal, and Sipaghat chilling centres of Kabhre District. In areas that are not connected to rural roads, fruit, dried milk (called *Khuwa*), ghee, goats, and chickens are produced (APROSC 1993).

Arniko Highway (Kathmandu - Kodari) intersects the northern part of Kabhre District, which is linked with the main market centres. A number of link roads, such as Banepa - Panauti - Khopasi, Panchkhal - Palanchok, Panauti - Kusadevi - Rayale, Banepa - Nala, Panauti - Kabhre - Dapcha, Kabhre Bhanjyng - Bhakunde Bensi, Panchkhal - Sipaghat, etc, has provided road access to a number of VDCs from the highway. By 1993, Kabhre District had a total road network of 108km, of which 58km were black-topped, 20km gravelled, and 30km earthen road (District Profile 1994). The road network of Kabhre District is shown in Map 5.

### The Rural Road Programme

In Kabhre District rural roads are defined as all kinds of access to rural areas such as motorable roads, trails, and suspension bridges. This definition is based on the fact that each and every village needs access to the motorable road but, due to the steep slopes, rocks, and rivers, roads are not feasible everywhere. Improvement of the existing trail or just a suspension bridge over the river can link such villages with the road. Therefore the 'Rural Road Programme' includes activities such as construction and improvement of motorable roads, trails, and suspension bridges.

**Map 5: Road Network of Kabhre District**



**LEGEND:**

- DISTRICT BOUNDARY
- ..... V. D. C. BOUNDARY
- ===== BLACK TOPPED ROAD
- GRAVEL & EARTHEN ROAD
- PROPOSED ROAD
- )( SUSPENSION BRIDGE

The Ministry of Local Development (MLD) has been providing grant assistance from the Rural Road Programme (RRP) to the DDC to construct and improve the rural road network since 1993. Kabhre District, however, used the grant assistance in 1993 and 1994 to purchase a bulldozer. Apart from the RRP, a large number of rural road projects was implemented during 1995 and 1996 under the 'Build Your Own Village Programme' and 'Village Development and Self Reliance Programme', each VDC was provided a grant assistance of between rupees three and five hundred thousand for the respective programmes. Besides, there is a number of rural road projects under other programmes such as the community forestry programme, constituency development programme, and so on.

### 3.3 Planning and Implementation of Rural Road Projects

#### 3.3.1 Planning

According to the VDC\DDC Act 1992, all local development projects are planned at the local level. Local development projects are defined as those that increase the livelihoods, incomes, and employment of the people; increase agricultural production; use local resources and skills; and provide direct benefits to vulnerable groups and backward communities (HMG\N 1992). Project identification is initiated at ward levels. They are collected and used to prepare a village development plan at the VDC level.

In order to prepare the district development plan, all district-level projects recommended by VDCs are discussed at the *llaka* workshop, which is attended by all *llaka*\* level VDC Chairpersons and Vice-Chairpersons, DDC *llaka* members, and representatives from sectoral agencies at the district level. Projects approved at the *llaka* Workshop are sent to the Planning Committees at the district level for technical scrutiny. The appropriate Planning Committee (four subject-wise Planning Committees, e.g., agriculture; infrastructure, education, and health) submits the list of approved projects to the DDC for inclusion in the annual programme. The DDC prepares the annual programme and budget and submits these to the District Assembly for final approval. A summary of the planning process, as stipulated in the VDC\DDC Act 1992, is summarised by Table 3.2 below.

The actual planning processes in four districts were as follows. In Baglung and Kabhre Districts, which are covered by the UNDP-supported Participatory District Development Programme (PDDP), the aim has been to institutionalise the decentralisation of the planned development process at the grass roots' level. The local level development plan, as mentioned above, is followed by several innovative methods for planning projects at the local level. For example, in order to get more and more projects identified at the beneficiary level, a 'demand form' is available from the Ward Committee on which anybody can propose a project by giving certain information. The nine Ward Committees collect the demand forms and screen out at the meeting of the Advisory Council. Feasible projects are included in the annual programme by VDC.

In both Baglung and Kabhre districts, while following the planning process, a number of problems arose. Firstly, in the *llaka* Workshop very few representatives from the line agencies

\* There are nine *llakas* in a district, and they are used as political constituencies for DDC members and also for planning and review of projects at sub-district level.

**Table 3.2: Local-level Planning Process**

Level	Committees	Functions
VDC	<ul style="list-style-type: none"> <li>• Ward Committees</li> <li>• VDC</li> <li>• Village Assembly</li> </ul>	<ul style="list-style-type: none"> <li>• Identification at Ward Committee level</li> <li>• Collected, plan collated prepared at VDC level</li> <li>• Final approval by Village Assembly</li> </ul>
<i>llaka</i>	<i>llaka</i> workshop	Discuss, integrate & prioritise district-level projects
District	<ul style="list-style-type: none"> <li>• 4 subject-wise Planning Committees</li> <li>• DDC</li> <li>• District Assembly</li> </ul>	<ul style="list-style-type: none"> <li>• Technical scrutiny by Planning Committees</li> <li>• Drafting of District Development Plan by DDC</li> <li>• Final approval by District Assembly</li> </ul>

participated. The main reason for this was that the district-level line agencies felt that there was no point in discussing projects at the *llaka* level when they were implementing targets set by their parent organizations at the centre. Secondly, even when the District Assembly finally approved the projects, they were again sent to the respective Ministries for inclusion in the annual programme and budget. In many cases, projects were changed. Finally, in the case of projects funded by the DDC itself, the fund allocated by the DDC was too small. A large portion was to be borne through local contributions. Therefore, professionals were frustrated as no quality work could be expected from the allocated money.

In the case of Dhading District, with the support of the Dhading Development Project (DDP), the Master Plan for District Roads was prepared and approved by the District Assembly. Large rural road projects are being constructed based on this Master Plan. Other rural road projects, such as road improvements, construction of link roads, and so on, have been identified at VDC level. If it is a village-level project, which means having a low budget and covering only one VDC, it is approved by the VDC. If it is a district-level project, i.e., having a high budget and covering more than one VDC, the project idea is sent to the DDC for inclusion in the annual programme. All project ideas are collected and screened by the Planning Committee and then submitted to the DDC and, finally, to the District Assembly for approval.

But, in the case of Ilam District, the system followed is different. The VDC Chairperson directly sends requests for projects to the DDC Chairperson. Though the request is made on the VDC's official letterhead, it is usually not discussed and approved at VDC level. Sometimes a group of 'project beneficiaries' also submit a request to the DDC Chairperson. At the district level, no Planning Committees have met during the last few years for project screening. Projects are approved in two ways. One, the DDC Chairperson directly approves a project, called *Tok Adesh*, which is later submitted to the DDC's regular meeting for endorsement. Two, the regular DDC meeting approves a project on a case-to-case basis. All these projects, most of which would have reached the implementation stage by that time, are compiled and submitted to the District Assembly for endorsement. The District Assembly usually meets during the winter.

In fact, DDCs and VDCs plan, implement, and maintain rural works' programmes, which include improvement of mule trails and tracks, construction and maintenance of suspension\wooden bridges, and so on ever since the *Panchayat* period (1960-90). There are also numerous examples of construction and maintenance of rural motor roads, such as in Ilam, through the mobilisation of voluntary labour. After 1993, when the district road programme was handed over to the Ministry of Local Development (MLD) at the central level, in effect the DDCs and VDCs became the implementing agencies at local level.

### 3.3.2 Project Design

There is no prescribed design standard for rural road projects from the MLD. When the DDC technicians have to prepare project design and cost estimates, they follow some of the basic norms for feeder road standards of the DOR. In all four districts, the project designs are made after the final approval of the project by the DDC\VDC. In almost all VDCs, there is no technical manpower, therefore DDC have to provide technical support to all the village-level projects as well. Since the DDCs do not have sufficient technical manpower to carry out technical survey and prepare project designs for a large number of rural development projects, including rural roads (Table 3.3), at least one visit is made by an overseer or a sub-overseer from the DDC to the project area. On the basis of an Abney level (clinometre) survey for gradient alignment and an estimation of earth cutting and structural works, a rough alignment sketch and a tentative estimate are prepared for administrative requirements (for disbursal of money for project implementation). If the alignment itself is not found feasible, then the project is sent back to the DDC\VDC for cancellation or change.

**Table 3.3: Number of Projects and Available Technical Manpower in the Four DDCs in 1996**

Item	Baglung	Dhading	Ilam	Kabhre
<b>A. Number of Projects in the DDCs in 1996</b>				
Total number of projects	198	152	171	176
Number of rural roads	96	39	35	52
Total	294	191	206	228
<b>B. Technical manpower in the DDC</b>				
Engineer	2	1	1	3
Overseer	8	9	2	6
Sub-overseer	4	3	3	9
Mechanic	2	-	-	-
Water Supply Technician	1	-	-	-
Total	17	13	6	18

Source: DDC files

Note:

1. Rural road projects include motorable roads, trails and tracks, and suspension bridges.
2. In Baglung and Kabhre Districts, one engineer and two overseers each are for the ADB-supported rural road project; its office is located outside the DDC Office.
3. In addition to the above projects, the DDC technicians have to provide some technical support to village-level projects. The number of village-level projects was 577 in Baglung, 275 in Dhading, 396 in Ilam, and 651 in Kabhre in 1996

In Dhading District, there are two types of project designs, viz. one is for the Dhading Bensi - Salyantar Road Project which was designed as a part of the GTZ-supported Dhading Development Project (DDP) by a Kathmandu based consulting firm. The design standard was based on the LES approach, which was discussed in Section 2.7.2. Two, for other ongoing rural road projects of the DDC, in which the preliminary alignment survey and cost estimate, which was made during the preparation of the Master Plan, is followed. A portion from the Master Plan is selected by the DDC depending on the availability of money, the alignment and grading is fixed by Abney level and the approximate quantity is calculated by an eye survey based on the slope and rock conditions. Due to the lack of technical manpower, no cross-sectional measurement is carried out. The exact quantity is calculated while preparing the running bill.

Therefore, even in a district where the LES approach is being successfully carried out, the methods and techniques have not been used in other regular projects of the DDC. One of the problems identified in Dhading District was that, for technical design and supervision, in fact in all uses LES in both Palpa and Dhading Districts, Kathmandu-based private consulting firms were used. The same approach has been proposed for the ADB-supported Rural Infrastructure Development Project in Baglung, Tanahu, and Kabhre districts. While the use of private consulting firms enabled the Dhading Bensi -Salyantar Project to use several techniques and methods by deploying various types of technical personnel as and when needed, this practice overlooked the strengthening of local institutions for sustainable road development at the local level. Consequently, it has created a situation in which, on the one hand, more and more LES type road projects are required at the district level but, on the other hand, the expertise, experience, and credibility are available only with a few consulting firms in Kathmandu.

Moreover, in all four districts, except for donor supported projects such as the one in the Dhading Bensi - Salyantar Road Project, grant allocations for rural road projects from the VDC/DDC are not based on the cost estimate of a project. Most projects are under-financed. It is only assumed that the gap between the project cost estimate and the grant allocation would be filled by people's contributions in terms of free labour. One of the many reasons for under-financing a project is the lack of technical designs and cost estimates. Most of the projects are based on Abney level or eye surveys conducted in one visit by a junior technician. Had the total project been designed, a portion could have been taken up in a phase-wise manner. However, due to the absence of technical guidelines and supervision, the limited available resources, including the free labour of many poor households, are used for earth excavation, the widely-known method of constructing a road, which damages the environment rather than doing any good to the project and the people around it. Even then, project design and cost estimate are essential administrative requirements for project implementation.

In the recently (1996) drafted Decentralisation and Local Self Government Policy of HMG/N, a recommendation has been made to reorganize several technical units located at the district level into one engineering office called the District Technical Office (DTO). The DTO can have a number of desks for different types of project. If all technical staff and equipment scattered throughout several offices are collected into one office, better engineering services

can be provided to local-level projects, including rural roads. At the same time, if donor supported projects also used this office for technical design and supervision, perhaps, it would gain expertise and experience in handling local-level projects in a sustainable manner.

### **3.3.3 Implementation**

In all four districts, rural road projects are implemented through the users' committees. After approval of a project, the chief executive of DDC called the Local Development Officer (LDO) writes to the VDC (or VDCs if it covers more than one VDC) to form a users' committee for project implementation. The VDC calls a meeting of 'project beneficiaries' for the formation of a project users' committee. If a project covers more than one VDC, a joint meeting is held. The DDC is also represented in the meeting. After formation of the users' committee, the chairperson and the secretary of the Committee are invited to sign the project agreement.

In the agreement, the total project cost estimate and the actual allocation for the year are mentioned. For road projects under the Rural Road Programme, no advance money is given in Dhading and Ilam districts, whereas in Kabhre District up to 50 per cent and Baglung District up to 75 per cent advance is given after signing the agreement. In Dhading and Ilam districts, the running bill is reimbursed when it is checked by the DDC technician and approved by the LDO. Usually, a running bill is approved and reimbursed in from 15 to 30 days' time.

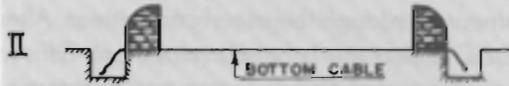
For the construction of suspension bridges there is an interesting case in Baglung District in which the use of indigenous technology, skilled labourers for transportation and construction, and clear guidelines for disbursement of money and materials is well developed. Baglung District has developed an indigenous technology for low-cost, cementless suspension bridges (Box 4). The maximum length of a low-cost suspension bridge is 100 feet. The DDC, under the BBLL programme, provides cables and other parts. The construction is done through the users' committee. For construction of a new bridge, the standard DDC allocation is Rs 250 per cu.ft. for stone work, timber planks, and wages for skilled workers. All unskilled work such as transporting parts to the project site, stone collection, earth work, and so on are carried out through people's participation when repairing suspension bridges, the standard allocation from the DDC is Rs 125 per sq. ft. to a maximum amount of Rs 12,500, which is used for replacing timber planks, buying nails, and paying skilled workers.

In other districts, suspension bridges are constructed following the BBLL manual. A users' committee is formed by the VDCs, connected by the bridge, which is approved by the DDC. All materials for suspension bridges are provided through the BBLL programme. A lump sum is provided by the DDC for construction materials and skilled labour, while the respective VDCs contribute unskilled labour and local materials. Fifty per cent of the DDC contribution is provided in advance once the project agreement is signed, while the remaining fifty per cent is given after project completion. Many of the suspension bridges have remained incomplete because a large portion of the contribution has to be borne by the local community. Large suspension bridges on the main trails are constructed through contractors.

## Box 4: Cement-less Technology for Suspension Bridges



DRY MASONARY ABUTMENT IS PREPARED



BOTTOM CABLE IS LAID



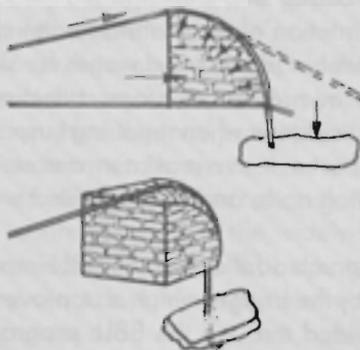
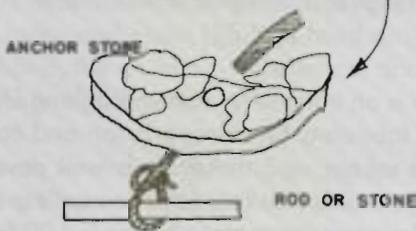
TOP CABLE IS LAID



ANCHOR STONE IS LAID



DEAD LOAD (STONE - RUBBLE) IS FILLED IN



1. ORDINARILY CEMENT IS USED TO SECURE THE ANCHORAGE AND TO STRENGTHEN THE ABUTMENT. THE BAGLUNG BRIDGE USES STONE WEIGHT FOR ANCHORAGE AND CABLE STRESSES FOR ABUTMENT CONSOLIDATION.

2. DIRECTION OF CONTACT AND CONSEQUENTLY LOAD DISTRIBUTION PATTERN ASSISTS THE CONSOLIDATION OF THE ABUTMENT MASONARY.

3. WITH THE ENLARGED CONTACT OF THE CABLE ALONG THE SHAPE OF THE ABUTMENT, A BETTER LOAD DISTRIBUTION IS ACHIEVED.

4. THE SHAPE OF THE ABUTMENT IS THAT OF A QUARTER CIRCLE BECAUSE SUCH A SHAPE SERVES TO CHANGE THE DIRECTION OF FORCES FROM INCLINED TO VERTICAL. THE VERTICALLY TRANSMITTED LOAD THERE AFTER IS COUNTERED BY GRAVITY OF THE DEAD LOAD PLACED OVER THE ANCHOR STONE.

-Sagar Prasai, Architect

#### **Box 4: Dhading Transport Union**

The Union has 40 general members. A majority of them are bus owners. It has a Working Committee of nine members. The Union charges an annual fee of Rs 101 for general membership. For registration to ply the Dhading route, the Union also charges Rs 6,000 for new and Rs 8,000 for an old bus. After registration, the Union includes the bus in the dial system, gives space for ticketing at the counter (with a fee of Rs 150 in Dhading and Rs 50 in Kathmandu per trip), provides necessary support in case of an accident, and acts as a medium for collective bargain. The Union also tries to prevent buses without registration running the Dhading route. The Department of Transport Management in Kathmandu fixes the bus fare. For the Kathmandu - Dhading road, the fare is Rs 50, but the Union has added Rs 20, bringing it to Rs 70. The reasoning given by the Union is that most of the buses plying the Dhading route are mini-buses and the road is rough enough to justify fixing a similar fare as the one for highways. But it was reported that the Union is monopolising the route despite the high bus fare. For example, it has prevented other Transport Unions from running their vehicles on the Dhading road, therefore other Unions have not allowed it to keep an office in the Kathmandu Bus Park. Moreover, *Sajha Yatayat*, a corporate bus company which charges only Rs 50 for the Kathmandu - Dhading route, has to ply the route under police protection. But, in the case of the Dhading Bensi - Salyantar Road, a road that has not been approved by the Department of Transport Management, the transport owners have fixed the bus fare themselves at a much higher rate. The transport owners argue that, since the road has not been approved, and therefore accident insurance is not covered, they have to bear the risk of any and all eventualities. Similarly, the truck owners have fixed the rate for transporting goods at Rs 70 per quintal on the Dhading Bensi - Salyantar route, and this is much higher than the rate fixed by the DDC. But, by the same argument, the DDC freight rate is also not applied. The Union has also made some contributions to road maintenance and social welfare. Last year, the Union employed five full-time labourers for regular maintenance work on the Malekhu - Dhading Bensi Road. The Union, along with the Dhading Transport Union, Dhading DDC, and the Red Cross Society, purchased an ambulance and provided ambulance services for a few years. Unfortunately, last year the vehicle was completely damaged in an accident. Compensation from the insurance company has been claimed and a new ambulance will be bought.

#### **3.3.4 Technical Supervision**

The Technical Division of the DDC is responsible for providing technical backstopping to a large number of rural development projects. All four DDCs lack sufficient technical manpower to handle various types of projects scattered throughout the difficult hill terrain. The following Table shows the total number of projects and the available technical manpower in all four DDCs.

The job of DDC technicians includes supervision of ongoing projects, measurement and certification of running bills, certifying project completion, and also preparation of survey and cost estimates for new projects. In Baglung District, supervision of one project requires a journey of several days because of the inaccessibility of the interior region. Therefore, no

technician is spared for a particular project unless it is absolutely necessary. In all four districts, an informal arrangement within the technical division is made to depute technicians area-wise, to carry out work along the way in one trip. In the case of the Dhading Bensi - Salyantar Road, a private consulting firm based in Kathmandu was engaged to supervise the project. In addition, an Engineer Advisor and some additional technicians were hired by the DDP to assist the DDC.

Another problem of the Technical Division of Ilam DDC is that it lacked necessary technical equipment. During the period of our field survey (1996), the DDC had two Abney Levels, three drawing boards, and a few measuring tapes. That was all the equipment available for surveying and designing 206 local development projects — including 35 roads, suspension bridges, and trails (Table 3.2). In fact, all projects have a contingency budget of usually about five per cent of the total, and this could have been used for purchasing technical equipment. But, as the technical aspect is given low priority by political leaders, the contingency amount is usually spent on administrative items such as travelling and daily allowances, office management, and vehicle fuel.

At the VDC level, the government posted one Technical Assistant (TA), junior technical personnel with only six months' training, for each VDC in 1996. However, it was alleged by the DDC/VDC authorities that many of them did not have the minimum educational background, let alone the required level of technical training, to provide technical support. Many of them were said to be political workers of the then Minister for Local Development. In almost all VDCs in the four districts covered under this study, TAs were not allowed to come into the office by the VDC/DDC authorities throughout our field survey.

One way of solving the problem of the lack of technical manpower would be, as also mentioned in Section 3.3.2 above to merge all technical offices undertaking similar projects that have enough technical manpower and equipment, e.g., the DDC, District Water Supply Office, District Irrigation Office, District Housing and Town Development Office, and so on, into one District Technical Office (DTO), and this was recommended in the policy on Decentralisation and Local Self Government (1996). This arrangement would make optimal use of the available technical manpower at the district level and, at the same time, would provide better technical support to the projects at local level.

### **3.3.5 Financial Disbursement**

Although the DDC technician prepares cost estimates for each rural road project, the budget allocation is not made on the basis of the cost estimate. A lump sum is allocated, depending on the number of projects and the size of the total, available budget in the DDC. But in the project agreement, the total cost of the project is mentioned against the allocation, giving an impression that the gap is to be met by people's contributions. Usually money is disbursed to the users' committee in three installments: the first installment is given as an advance after signing the agreement; the second installment is also given as an advance after submission of the running bill of the first installment; and the final installment is given after completion of the project. But, in the case of the Rural Road Programme of the MLD, the operational manual prohibits advancing project money, and only the expenditure incurred by the users' committee is reimbursed.

In some districts, the operational arrangements are different. For example, in Kabhre District, the first installment of the grant allocation, which is usually 50 per cent of the allocation, is disbursed after the agreement. This money is used to hire a bulldozer from the DDC and buy its fuel. The DDC charges Rs 10,000 per day as rent for the bulldozer while the Users' Committee has to buy the fuel. It was reported that, in Kabhre District the bulldozer had been used a great deal for building almost all the rural roads during the previous two years. For example, the DDC reported that the income from the bulldozer during 1996 was estimated at over Rs 2,000,000, even running at only 20 days per month on average.

In the case of Baglung District, up to 75 per cent of the money allocated is given in advance in the first installment after signing the agreement. This means that, in a large project, a huge amount of cash is given in advance to the Users' Committee. This was cited as one of the main reasons for the misuse of DDC allocations by the users' committee, which was reportedly quite high in the project under study. Moreover, with the presence of political leaders on the users' committee, there have been delays in project implementation. Pressure is applied to have the DDC approve expenditure accounts, whether they are correctly submitted or not, and political protection is given to wrong doers. When the project is completed, or the expenditure is made according to the project agreement, the users' committee submits the progress report and bills for expenditure to the LDO for accounting and to certify the completion of the project. The LDO sends a DDC technician to check the project and verify the accounts. Based on the technical report, the LDO submits its funding to the DDC to certify the completion of the project.

In Ilam, no advance money is given by the DDC after signing the agreement. When progress is made, the DDC technicians are invited to prepare the bills for running. These bills, which are approved and reimbursed by the DDC, are paid to labourers through their *Sardars* (group leaders). After distribution of the final bill, which means the completion of the project, the final bill is paid and the total expenditure on the project is made public in a general meeting organized by the users' committee.

In the donor supported Dhading Bensi - Salyantar Road Project, funds from the donor agency are channelled through the budgetary system of the Ministry of Local Development (MLD) and administered at the district level by the LDO. No advance is forwarded. Money is disbursed only to for work completed. The muster roll, prepared by the site supervisor and checked by the Project Construction Committee, is sent to the DDC every 15-30 days. The Accountant in the DDC checks and submits the accounts to the LDO for approval. Once the money is disbursed from the LDO, labourers are paid through their *Naike* (Group leader), and 25 per cent is deducted from their wages as a 'people's contribution'. Some problems related to the DDC are reported, e.g., delay in release of money in some months for wages because of delays in the disbursement of funds from the District Treasury, delays in-built in the financial management system of HMG\Nepal. During the field survey (October 1996), the DDC was awaiting a letter of authority from the MLD in order to release the year's budget from the District Treasury and pay two months' wages.

### 3.3.6 Maintenance

In all four districts, there is no inbuilt mechanism for road maintenance. There is no clear idea who owns the road: whether it is the DDC or the users' committee. In the case of the

Dhading Bensi - Salyantar Road, the DDC is regarded as the owner, because the DDC collects the toll tax and allocates money for road maintenance. Generally in all districts, as the road projects are continuous projects constructed on a phase-wise basis over several years, the construction budget itself is used to repair the damage incurred during the previous monsoon period. In other cases, the DDC allocates money for road maintenance as a separate project on a case-to-case basis. But there is no clear concept and arrangement for road maintenance.

However, in the case of the Dhading Bensi - Salyantar Road Project, the following road maintenance policy has been spelled out.

(a) The road is closed to traffic for three months from June\July to August\September in order to avoid damage during the monsoon season

(b) Heavy buses, trucks, and large tractors are not allowed to ply on the roads

(c) A toll tax is collected from all vehicles passing along this road. DDC has given a contract, in an open bidding, of Rs 151,000 for collecting toll tax for 1996. The present rate of toll tax is as follows:

Mini bus	-	Rs 80
Mini truck	-	Rs 100
Jeep	-	Rs 60
Car	-	Rs 40

(d) For routine maintenance, two labourers are required per kilometre for regular maintenance. However, during the field study it was reported that seven labourers under one *Naike* were working on a regular basis for a 20km portion of road that had been handed over to the DDC. Other labourers were engaged on an as-and-when-required basis.

(e) An agreement between the DDC and GTZ has been made to phase GTZ out of project maintenance commencing with GTZ providing 100 per cent of the maintenance costs for the first year, 75 per cent by GTZ and 25 per cent by the DDC for the second year and so on to completely phase out the GTZ by the fifth year.

In Kabhre District, an arrangement was made in 1992\93 for toll collection from vehicles plying the road. This stopped after a year as it was not found to be cost effective to collect toll taxes from a few vehicles. Until 1995, households around the road were asked to contribute money\labour for improvement of the road. Subsequently, when a large sum of money was received from the DDC and DOR in 1995, the Users' Committee (UC) did not bother to ask for contributions. Sometimes, the mini-trucks that ply the road regularly carrying milk voluntarily bring boulders and sand to fill up the muddy and rough parts of the road in order to make their passage easy.

On the Nepaltar - Mangalbare Road of Ilam District, there are no restrictions for heavy buses and trucks plying the road and no toll tax is collected for road maintenance. Here too,

trucks that run regularly on the road voluntarily bring boulders and sand to fill up the muddy and rough parts of the road.

In Kabhre District, respondents and local people argued in an open discussion that it is unfair to ask rural people to contribute for construction as well as for maintenance of rural infrastructure projects. It was thought that the government should provide support from internal or external resources for construction and maintenance of urban infrastructure projects and highways. As in the case of highways, the government should also own rural roads, collect toll tax, and maintain them regularly. In the case of rural roads, vehicle owners, who are the ones using the roads, do not pay anything. Each time, mobilisation of free labour, the easiest method for political leaders, is sought for road maintenance.

In fact, lack of regular maintenance has been one of the main problems of many rural roads constructed through people's free labour. One source of revenue for routine maintenance would be charging users a toll tax. But, in Ilam and Kabhre districts, there is no toll tax on vehicles. In Dhading District toll tax was charged for the Dhading Bensi - Salyantar Road, and this was also included in the revenue of the DDC. The road maintenance budget, which was said to be higher than the amount collected in toll tax, was allocated from the annual programme and budget of the DDC. However, this practice lacked a clear basis for allocation of a maintenance budget for different roads, on the one hand, and, on the other, did not succeed in a inculcating feeling of ownership into road users through their contributing to road maintenance. Similarly, there is also an administrative problem (Box-3) in that the road has to be cleared by the Department of Transport Management, therefore the district authority can not regulate bus\truck fares.

Mechanisms for authorisation for traffic plying rural roads, fixation of toll tax rates, fixation of fare\freight rates, and coordination routine maintenance work need to be properly institutionalised at the district level.

In the case of mule trails, there is no maintenance policy. However, an example was seen of the Baglung - Galkot mule trail, for which an arrangement was made by the DDC two years' ago to collect toll tax in Khahare, in Pala VDC, from those carrying commercial items along the trail. The rate of toll tax is as follows:

<u>Item</u>	<u>Tax rate</u>
1. Mules	Rs 5
2. Porters	Rs 3
3. Goats/sheep	Rs 1
4. Buffaloes	Rs 10

Note: Tax is levied only for commercial goods. No tax is levied for tourists' equipment.

There is a Maintenance Committee consisting of the VDC Chairpersons of Mulpani, Pala, and Biu. This committee regulates the toll tax collection and maintains the mule trail. The tax collection is given to a private contractor for Rs 7,500 per month through open bidding. After completion of the motorable road project, these arrangements can also be institutionalised along the mule trails in the interior.

### 3.4 The Phase-wise Construction Approach

In all districts, rural roads are regarded as continuous projects (*Kramagat Yojana*) that are implemented on a phase-wise basis over several years. In fact, in order to construct roads in an economical manner and according to the standards suitable for the expected level of traffic, the DOR has also defined five road development stages for feeder road development (Section 2.3). The stages, which are to be implemented in succession, are equally suitable for district road development. Among the five stages, the first stage is that of preparation, covering planning, engineering design, costing and, programming of the road construction. In the successive stages, the construction work is carried out from fair weather earth tracks in the second stage to all-weather bitumen roads in the fifth stage.

In the LES approach use in Dhading District, the phase-wise construction approach was conceived for three reasons. First, in areas with steep slopes where considerable cutting was anticipated, construction of road profiles is designed to be carried out in phases to allow natural settlement and stabilisation processes to take place. In the first year a 1.0 - 1.5 metres wide track is opened and, in the second and third years, the width is progressively widened to a minimum of 3.5 metres to a maximum of 4.5 metres. In this period, stabilisation and strengthening works are carried out using gabion retaining walls and bioengineering methods. Second, in order to take into consideration the management capabilities of the district to provide labour-intensive methods and to allow for the the availability of technical personnel to supervise the work, the process has to be slow. Third, in order to maximise the economic gain for local people, who work as labourers in road construction, the construction period should be planned to coincide with the slack period in agriculture.

In all four districts, except where there are donor-supported projects, the phases of road construction are not clearly defined. They are determined on an *ad hoc* basis largely dictated by the availability of money. In another study, Paudyal (1994) reported that during the period from 1985-90, the District *Panchayat* allocated only one to 12 per cent of the total cost for motorable road projects annually. One of the main reasons for this low level of allocation was that road projects were assumed to be 'continuous projects' as earth excavation was mainly carried out only to be washed away in the following monsoon rains thereby necessitating the same work year after year. Moreover, the phases are not interconnected but seen as separate projects. The budget and expenditure for the Nepaltar -Mangalbare Road project (Table 4.4) is an example in which each year there is a separate budget allocation for the project. The DDC regards each allocation to be a separate project and not a continuation of the earlier project. Therefore, the unspent balance from the previous year is not accumulated, but rather a new budget is allocated and a new users' committee is formed, although the same persons might comprise the new users' committee. The project completion is certified (called *Janch Pass*) when the users' committee submits accounts for all expenditure for each year's allocation. Therefore, the *Janch Pass* is related to expenditure, not to the completion of a project.

### 3.5 People's Participation

Four elements of people's participation are identified in road building: i.e., the involvement of the project beneficiaries in selecting the road alignment, their active involvement in for-

mation of a users' committee, cost sharing through the mobilisation of free labour, and benefit maximisation through economic use of the road. All four elements of people's participation were found to be low in all four districts. The system adopted to mobilise people's participation in the four elements mentioned above has been analysed below.

First, in the selecting the road alignment, very few people other than the local political leaders were involved. In the field survey, most of the respondents (Table 3.4) reported that they first learned about the construction of the road through neighbours or political leaders.

**Table 3.4: Respondents District: Knowledge about the Road Project**

Respondents knowledge through	Baglung		Dhading		Ilam		Kabhre	
	On	Off	On	Off	On	Off	On	Off
Neighbours	56	64	44	76	48	48	68	84
Local leaders	28	4	4	16	36	32	20	16
Own involvement	28	4	52	8	16	20	12	-
Participation in Users' Committee Meeting	12	-	-	-	20	8	4	4

Source: Field survey

Note: On = On the Road  
Off = Off the road

It was generally found that the political leaders were acting as the main players in development projects. The motive could be dedication to do something for the community or it could be hidden motives for economic or political gains. But, in effect, the local people, who were the beneficiaries of the road project, were not included in the process. This sometimes caused frustration and misunderstanding during project implementation. For example, in Baglung District all households along the road had signed an agreement in 1995 that they would have no objection to demolishing their *Pali\Pindi* (attached front veranda of the house) if so required for extension of the road. However, when the actual construction work was underway, it became evident that demolishing only the *Pali\Pindi* was not sufficient to widen the road from 3 - 4 feet to as much as 4.5 - 5.5 metres. Therefore resentment set in and interrupted the construction work. The agreement itself was interpreted, by the people along the road, that they had agreed only to demolishing the *Pali\Pindi*, while the DDC argued that the agreement was made for road extension and not for demolishing. In the field survey, about 70 houses were counted on the roadside, many of which were three-story buildings.

One of the unstated motivations for constructing a road with the DDC's own resources is related to the first three km section of the 55km long Baglung - Galkot - Hatiya road project funded by the Asian Development Bank (ADB). The unstated motive was to avoid the two alternative alignments suggested by the ADB project. Local leaders thought that both alignments would by-pass Baglung Bazaar, which might affect the future commercial growth of the Bazaar area. Therefore, if they managed to link the road from the middle of Baglung

Bazaar (e.g., Deurali Chowk) to the ADB alignment in Bayanabbe Danda, the issue of an alternative alignment would be solved. However, the issue was not discussed properly with the local people in the beginning. For example, the outlet of Baglung Bazaar in Deurali Chowk is only about four to six feet wide, too narrow for a vehicle. Therefore, the road needs to be widened from the Bazaar area itself. It is learned that widening the road in the Bazaar area is out of the question without proper compensation. Therefore, without discussion with the people from the Bazaar area and receiving clearance for the initial section there is no point in going any further.

On the other hand, in the case of Dhading District, the local people were involved in the decision about the road alignment. Therefore, 52 per cent of the respondents along the road said that they were involved in the planning process.

Regarding the second element in people's participation, it was found that in forming the users' committee, the operational rule for prohibiting the inclusion of local political leaders in the users' committee was violated in all four districts. The composition of the users' committee will be discussed in the next section. However, it should be mentioned here that the so-called beneficiaries, who were included in the users' committee as members, did not participate at all or participated in a passive way even if they were invited to the meetings.

The third element in people's participation was cost sharing through mobilisation of free labour. But it was found that, in reality, 'free labour' was not available. The percentage of people's contribution, which was an element of the project cost, was managed on paper in order to comply with accounting requirements. In Ilam District, an agreement was made between the DDC and the users' committee that the work would be completed from the amount disbursed, adding the percentage of people's contribution required. The people's contribution was fixed as given below.

- |                        |                  |
|------------------------|------------------|
| • soft soil excavation | 40 per cent,     |
| • hard rock cutting    | 25 per cent, and |
| • structural works     | no contribution. |

If the work completed covers the DDC's allocation and the level of people's contribution required, the expenditure is accounted for and the project is regarded as 'completed'. For example, the total cost estimate of a project is Rs 2,000,000, for which Rs 200,000 are allocated. If work costing Rs 280,000 is carried out this is sufficient to cover the DDC's allocation and a 40 per cent people's contribution and the expenditure is accounted for and the 'project' regarded as 'completed' for the year. Next year, another allocation might be made for the same project, and this will be accounted for in the same manner.

In project implementation, the users' committee divides the work and employs petty contractors or labourers on a daily wage basis, depending on the type of work. In both situations, the actual rate given is much lower than the DDC rate on which the estimate is based. While measuring the work carried out by DDC technicians, the rate is calculated on the basis of DDC rates, and the difference is regarded as the people's contribution. In fact, during the reference period (1991-96), there was reportedly no people's contribution to road construction, but the people's contribution is calculated in this manner.

In Kabhre District, most of the earth cutting is done with a bulldozer, for which the DDC charges Rs 10,000 per day. Limited free labour contribution are used to cut areas the bulldozer cannot reach. Earth cutting with a bulldozer is obviously much faster than by manual labourers. But the work is measured and calculated on the basis of the standard norm for man-days. This method shows that more work has been done manually than is the actual fact. Since the DDC contribution is only a small percentage of the total cost, this method is still not enough to account for the so-called 'people's contribution'. It was reported by the DDC that many projects have not yet given accounts for the expenditure of money mentioned in the agreements and have thus remained unaccounted for (called *Beruju*).

In Baglung District the total cost estimated for building a three km road is Rs 2,340,692, of which the DDC allocation was Rs 651,916 (28%), while Rs 1,688,776 (72%) was to be mobilised through people's contributions. Accordingly, commitments were made from almost all households along the road to contribute money ranging from Rs 500 to 1,000, but very few people actually contributed. During the field survey, it was learned that people were not satisfied with the quality of work. There were landslides in a number of places, because no structural work was carried along weaker sections of the road. Typically, the road surface was widened and the earth was pushed on to the river side embankment of the road, causing more mass wasting during the monsoon. Moreover, there was a feeling that funds had been misused by the Construction Committee, because the Committee did more work to widen the road surface; work that was visible and convenient for the purpose of accounting for expenditure. But such unskilled work could have easily been carried out by mobilising free labour. The money available should have been spent on structural work which needed skilled labour and money.

In Dhading District, while paying the labour bill, 25 per cent is deducted as a 'people's contribution'. The DDC argued that, as the wage rate was fixed on the basis of the district norm, the actual wage rate paid was still higher than the local rate. However, during the field survey people argued that the wage labourers, who are not the road users, are actually contributing 25 per cent of their wages, whereas the actual road users pay only a toll tax when the road is ready. Moreover, the actual road user gets a direct benefit by exchanging the toll tax for use of the road, whereas the wage labourers, who made a greater contribution (than road users) during road construction, do not get such benefit even after the road is completed.

Furthermore, people also argued that the land occupied by the road is also donated freely, and many households lose valuable agricultural land. There is no system of compensation for the land used by the road. This is unjust to those who donate land, whereas the benefit is received by all equally.

Finally, regarding benefit maximisation through economic use of the road, there is no objective set by the implementing agency beyond completion of the road. At best, completed projects are handed over to the users' committees for maintenance. This is also the case with the BBLL suspension bridge projects. In most of the donor supported rural road projects, it is assumed that improved transportation will open up markets and induce farmers to shift to higher-value commercial crop production. However, in the case of ADB-supported RIDP project, it has been recognised that, if labour intensive methods are applied, more funds (up

to about 70% of the total investment) will be diverted for wage payments. The capital brought into the rural community through labour payment should be used for infrastructural development or income generating activities which would ultimately increase the economic use of the road. Therefore, provision has been made to involve NGOs in helping farmers to explore options for investment of their wage earnings from the road project (ARD 1994).

### 3.6 The Users' Committee

A road users' committee is formed in the project area. Each committee has from seven to 11 members chosen from among the project beneficiaries. Although the rules prohibit inclusion of local political leaders as ex-officio chairpersons or member of users' committees, they are included in one way or the other in all four districts. In Dhading District, the DDC has decided that, for district-level road projects, the DDC *Ilaka* Member should be the Chairperson and the VDC Chairperson and vice-Chairperson of VDCs included in the project should be members of the Users' Committee. The same process has been followed in Kabhre District.

In the case of Ilam and Baglung districts, the DDC formed a users' committee of a district-level road project, in which social workers, teachers, and business persons were also included-apart from the VDC/DDC officials. A VDC Chairman and a VDC Secretary are selected as the chair person and secretary of the Committee. They are usually both from the same VDC to ensure better teamwork. For village-level rural road projects, however, the VDC concerned forms a users' committee of from seven to 11 members, and the chair person and members are selected from among the beneficiaries.

In the case of the Dhading Bensi - Salyantar Road project in Dhading District, the system was a little different. There are two project implementation committees: one, the Main Road Committee at the district level and, two, the Project Construction Committee at the project level. The members on the Main Road Committee are as follow:

DDC Chairman	Coordinator
Members of Parliament	Advisors
DDC <i>Ilaka</i> Member	Member
DDP Road Advisor	Member
Local Development Officer (LDO)	Member Secretary

The main committee is responsible for policy-level decisions such as approval of alignments and designs, personnel and fund management, and technical supervision. At the project level there is a Project Construction Committee, on which all the VDC Chairpersons and Vice-Chairpersons and Ward Chairpersons of VDCs and Wards connected by the road are members. The Chairperson of the VDC through which road is being constructed is the Chairperson and the DDP overseer is the Secretary of the Committee. The main functions of the Committee are as follow:

- to form labour groups,
- to nominate the *Naika*(s) and supervisors on the recommendations of the technical supervisors,

- to propose reasonable wage rates for the approval of the Main Committee, and
- to check the labour muster roll together with the supervisory staff and be present during payment of wages.

The committee members are also paid an allowance of Rs 75 for working days. The project also provides a primary health worker, a mechanic, a blacksmith, a storekeeper, and a guard (*chaukidar*) for the Project Construction Committee.

Numerous advantages were reported for including elected officials in the users' committee. First, to include officials already elected on to the committee is less disputable (politically) than electing a new one. Second, in projects for which beneficiaries can not be identified easily such as those for roads, trails, and suspension bridges it is difficult to elect a users' committee even if it is desirable to do so. Third, election is always a struggle between political groups, therefore it might be difficult for the committee to secure cooperation from all groups during project implementation.

In fact, the implementation of local level projects through users' committees has been tried ever since the 1980s when a Decentralisation Scheme (DS) was legislated during the *Panchayat* Period. But implementation of rural road projects through users' committees became a method of using cheap local contractors who do not have to compete in contract bids and pay contract tax, rather than a developing method of users' institutions for sustainable development. When the users' committee does the required amount of work, the LDO makes arrangements to check it and certify its completion, and the completion report is submitted to the DDC for approval. There is no role for the users' committee after completion of a project. Except for in suspension bridge projects under the BBLL, a project is not handed over to the users' committee after completion. However, the users' committee is not dissolved when a project is 'completed'. It is simply defunct or succeeded by another committee if there is an allocation for the same project next year.

### 3.7 Conclusion

In the literature a 'development project' is defined as "a set of interrelated development activities and resource inputs, designed to attain specific objectives/targets over a specific period of time, at specific costs and in a specific location under the responsibility of a demonstrable management unit" (van Dusseldorp 1993). Although most of the elements of this definition are found in DDC-level projects, they are incorporated more to meet administrative requirements than to achieve objectives. For example, a project is identified and designed, resource allocation is made, and a users' committee is formed in order to mobilise project beneficiaries for its implementation. But all these steps are fulfilled on paper to fulfill administrative requirements rather than to facilitate efficient use of available resources.

The policy framework and the institutional arrangements that exist at the central as well as at the local level are not used effectively. The number of stages in the development process planned and adopted in each district are different and the Manual for the Rural Road Programme, issued by the MLD (Section 2.4.2), is not followed at the operational level. The MLD, which is supposed to coordinate at the national level and provide policy and technical support to the local level, is not fully equipped to fulfill the tasks. The Technical Division of the

MLD, which is headed by a superintendent engineer, should have a strong role in implementing the Manual at the operational level. But the Division is generally ineffective in this regard. The district level programmes, which are technical in nature, such as Rural Road Programme, Food for Work Programme, PLRP etc, are handled at the Ministry level by non-technical divisions. Consequently, the district-level engineering projects do not receive continuous technical backstopping.

The policy guidelines are not implemented effectively in rural road projects. For example, the phase-wise construction method is prescribed in the policy of the DOR. In the LES experimental work also, the phase-wise construction method was used to facilitate natural stabilisation process for environmental protection and so that the construction period would coincide with the agricultural slack season to ensure availability of labour. But, at the local level, although roads are constructed on a phase-wise basis, there is no clear planning and inter-connection between phases, rather the phases are dictated by budget allocation from the DDC. Consequently, the road is always constructed on an *ad hoc* basis and, in many cases, the roads are constructed as a result of such low standards that they cannot be maintained.

On the technical side, the technical manpower is insufficient compared to the number and type of projects with the DDC. But ironically, the available technical manpower at the district level is scattered and not used effectively. The Decentralisation Policy has proposed that the scattered technical manpower and equipment should be pooled and a separate office, the 'District Technical Office (DTO)', is established. Donors should also use the DTO instead of highly paid consulting firms based in Kathmandu for designing and supervising projects, because then the DTO would ultimately have to bear the responsibility of project maintenance.

There is no clear policy for maintenance of rural road projects. Two issues, one of the ownership of rural roads and the other of the effective use of rural roads, are particularly relevant in this regard. On the ownership issue, the users' committee, even if it is organized and strengthened, cannot be the owner of a rural road project, as road users are unidentifiable. Besides, due to the large coverage of a rural road, the project users can not really elect a truly representative committee. The issue of effective use of a road cannot be tackled unless the local production is increased. In the absence of local production for export, the ultimate road users would be the outside producers and business community to carry in their merchandise, and, therefore, there would be little road use by the local community. As a result, toll tax collection for road maintenance cannot answer the road maintenance issue adequately. The above two points suggest that the owner of rural roads should be the DDC, VDC, or municipality, depending on the type of road, which should make plans to promote production and generate more revenue from the roads. Until the road is able to regenerate its own maintenance the DDC should prepare a regular rural road maintenance plan through the District Technical Office with a block grant that is made available to the DDCs for Rural Road Programme.

# Chapter 4

## Impact of Rural Roads in the Project Area

### 4.1 Introduction

Until recently, hill economies remained remote, isolated, and self-sufficient. This was inevitable given the lack of transport infrastructure to connect the hill and mountain regions with the wider market network. As long as there was additional land available to bring under cultivation, hill agriculture was able to meet the rising demands of the increasing population. But with the diminishing possibilities of area expansion and population growth at a high rate, there has been a strong tendency to encroach upon marginal lands for cultivation. The result has been decreasing returns on the inputs used, decreasing agricultural productivity, and adverse effects on the environmental stability of the whole region.

Recent studies indicate that the cereal grain monoculture, which is most prevalent in hill agriculture, is unsustainable because other resources, such as forests, pastures, arable lands, and so on, are beginning to deteriorate rapidly. It is necessary to move to a more diversified pattern of agriculture that seeks to promote not only food grains, but also vegetables, fruit trees, forests, grasslands, and pastures on the basis of eco-environmental and eco-technological considerations. Moreover, the climatic conditions offer tremendous prospects for promoting high-value horticultural\* development in the hills. Thus, alternative approaches to agricultural development in the hills need to be examined, because they can take advantage of not only the growing market system but can also exploit comparative advantages offered by the hills (ICIMOD 1993).

Complementarity between rural roads and the transformation process of agricultural development is not well understood in a traditional subsistence rural economy. While the visible impact of roads, such as ribbon settlement along the roadside and price rises for land along the roads, could be vividly seen, the more important invisible impacts, such as the process of social transformation from a subsistence to a marketable economy, with the account could be complex and difficult to understand. Studies indicate that even within one district the area of transformation is localised. In Ilam District, for example, only part of the district bordering on India has been transformed (Jodha & Shrestha 1993). Another study on eight districts of the Bagmati Zone concludes that, whereas environmental conditions are very favourable for expansion and development of horticulture, actual progress has been very slow on account of gaps in policies, programmes, infrastructure, and institutional support services (ICIMOD 1993).

It is difficult to isolate one factor, such as rural roads, and measure the impact on socio-economic transformation. However rural roads, being a visible and a leading infrastructure, are

\* Horticulture here refers to commercial vegetable and fruit farming — cash crop farming

seen here as an entry point for bringing about other changes. It is, therefore, important that the economic use of rural roads for sustainable rural development should be addressed at the project level. The present Chapter attempts to assess the impact of roads on socio-economic changes in areas served by roads.

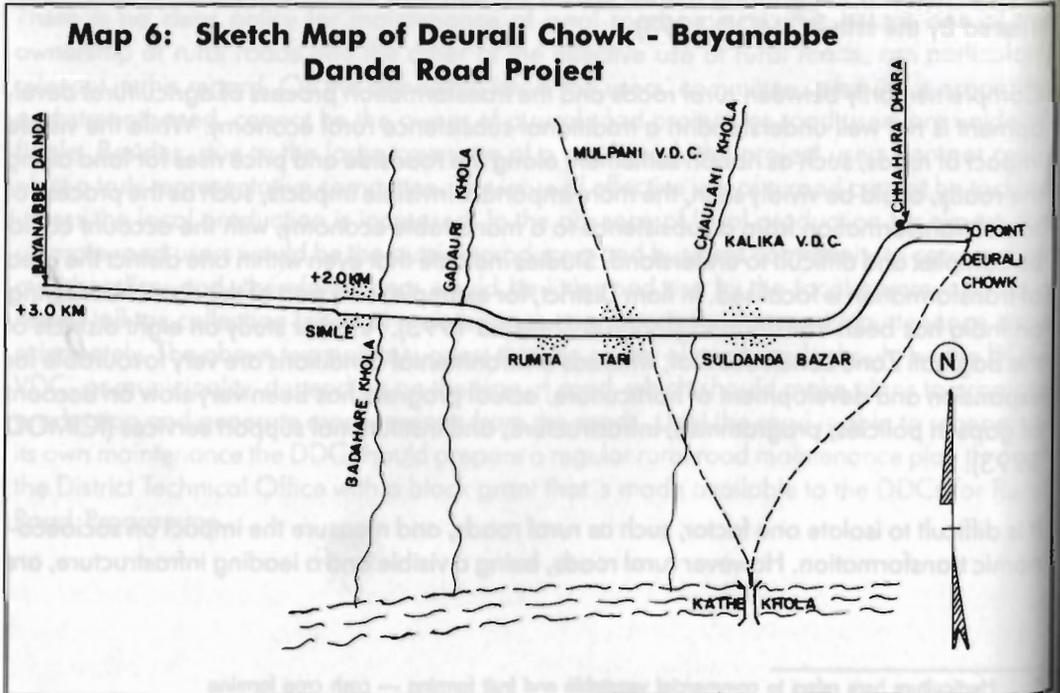
## 4.2 Profile of the Rural Roads' Projects

### 4.2.1 Deurali Chowk - Bayanabbe Danda Road Project of Baglung District

The project road starts from the western corner of Baglung Bazaar. The road follows the alignment of the main mule trail that links Baglung Bazaar with places in the western part of Baglung District such as Pala, Biu, Galkot, Kharbang, Burtibang, and Dhorpatan. The general setting of the existing trail is about four feet wide and stone-paved in difficult sections. There are several small Bazaar(s) along the way; the more notable among them being Suldanda, Simle, Dobilla, Biu Suldanda, Hatia, Deurali, Dahapani, and Rangini. Over 400 mule caravans and several hundreds of pedestrians pass by the road every day. A sketch map of the road is presented in Map 6 below.

The total length of the road project is three kilometres two of which have been completed. The road covers Kalika and Mulpani VDCs. This is the first section of a larger Baglung - Galkot - Hatiya rural motorable road project, connecting Baglung Bazaar with the western part of the district. The Asian Development Bank (ADB) has selected the larger portion of the project for construction. It was learned that ADB had made two alternative alignments: one from the top of Baglung Bazaar and the other along the bank of the Kathe Khola, near the Kali Gandaki Bridge on the Pokhara - Baglung Highway. The local leadership felt that both

**Map 6: Sketch Map of Deurali Chowk - Bayanabbe Danda Road Project**



alignments would bypass the Baglung Bazaar and affect its future growth. Therefore the DDC decided to construct the initial section of three kilometres from its own resources. The DDC alignment starts from the middle of Baglung Bazaar at a place called Deurali Chowk and ends at Bayanabbe Danda where both the alternative alignments of the ADB road meet. The cost estimate and expenditure for the DDC alignment for the three kilometres section are presented in Table 4.1 below.

**Table 4.1: Cost Estimate and Expenditure of Deurali Chowk - Bayanabbe Danda Road Project**

Project length	Total	3 km
	Completed	2 km
Fund Allocation	DDC Contribution	Rs 651,916
	People's Participation	Rs 1,688,776
	Total Cost	Rs 2,340,692
Expenditure	Expenditure	Rs 400,957
	Advance	Rs 150,000
	Total	Rs 550,957

Source: DDC, Baglung

It should be noted that, of the total estimated cost of Rs 2,340,692, the DDC provided 28 per cent and the rest was to be borne by the local community through contributions.

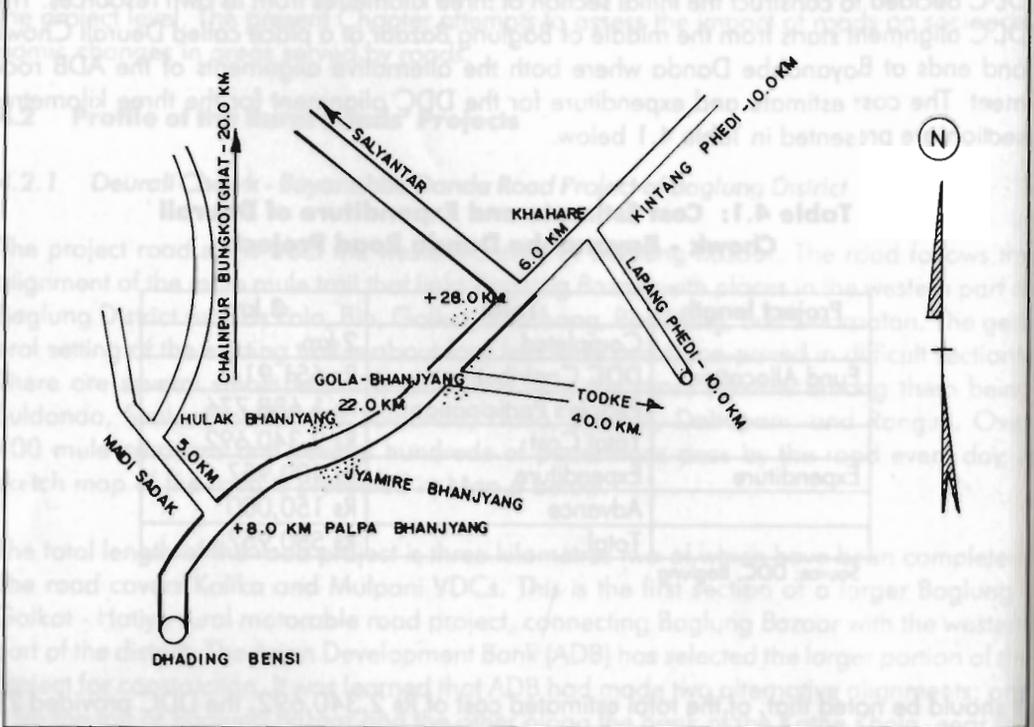
#### 4.2.2 Dhading Bensi - Salyantar Road Project of Dhading District

The Dhading Bensi - Salyantar Road Project was started in 1988 by the Dhading Development Project (DDP) supported by the GTZ. The road links Dhading Bensi with the northern remote areas of Dhading and Gorkha Districts. It starts from Dhading Bensi in Nilkhantha Village Development Committee (VDC), the Dhading District Headquarters, and passes through Murali Bhanjyang, Jyamrung, and Tripureshwar VDCs to reach to Salyantar. The total length of the road up to Salyantar is 42km, of which most sections have been completed. The remaining sections are under construction. Map 7 gives a sketch of the road project area.

The alignment of the road was made around existing trails. So it connects a number of existing market centres such as Murali Bhanjyang, Palpa Bhanjyang, Jyamire Bhanjyang, Nigalpani, Gola Bhanjyang, and Arughat. After the road project, some of them, notably Jyamire Bhanjyang, Gola Bhanjyang, and Arughat have become large market centres for the northern region. It was reported that over 10 mini-truck loads of goods are transported from Dhading Bensi to Gola Bhanjyang and Arughat daily. These growing market centres have reduced the dependency of the upper region of Dhading and Gorkha districts on Dhading Bensi for their market needs.

The Dhading Development Project (DDP) required that the road project be technically sound, environmentally stable, and constructed by the people themselves with help from their local

**Map 7: Sketch Map of Dhading Bensi - Salyantar Road Project**



organizations. It also stipulated that local people should be responsible for future maintenance of the road. Accordingly, the basic model of the Local Road Improvement Programme (LRIP) of Palpa District was used. The model was based on a series of principles to address a broad range of technical, environmental, and socioeconomic issues. Some examples are:

- an approach phased construction using to allow for natural settlement and stabilisation,
- balanced cut and fill in order to make the road merge into the landscape,
- bio-engineering for slope protection,
- labour-intensive construction methods in order to use the underemployed, rural labour force, and
- use of indigenous skills, materials, and tools and a participatory approach to road construction and maintenance.

Table 4.2 shows that the construction cost of the road project was about one million rupees per kilometre, excluding the cost of supervision which was done by a private consulting firm based in Kathmandu.

#### 4.2.3 Project-level Case Study: Nepaltar - Mangalbare Road, Ilam District

The Mechi Highway opened up a number of link roads, of which Nepaltar - Mangalbare Road is one. The road is 12.5km long and connects Nepaltar, the road-head of the Mechi Highway, with Mangalbare Bazaar, the main market centre in the western part of Ilam District.

**Table 4.2: Expenditure per km of the Dhading Bensi Salyantar Road**

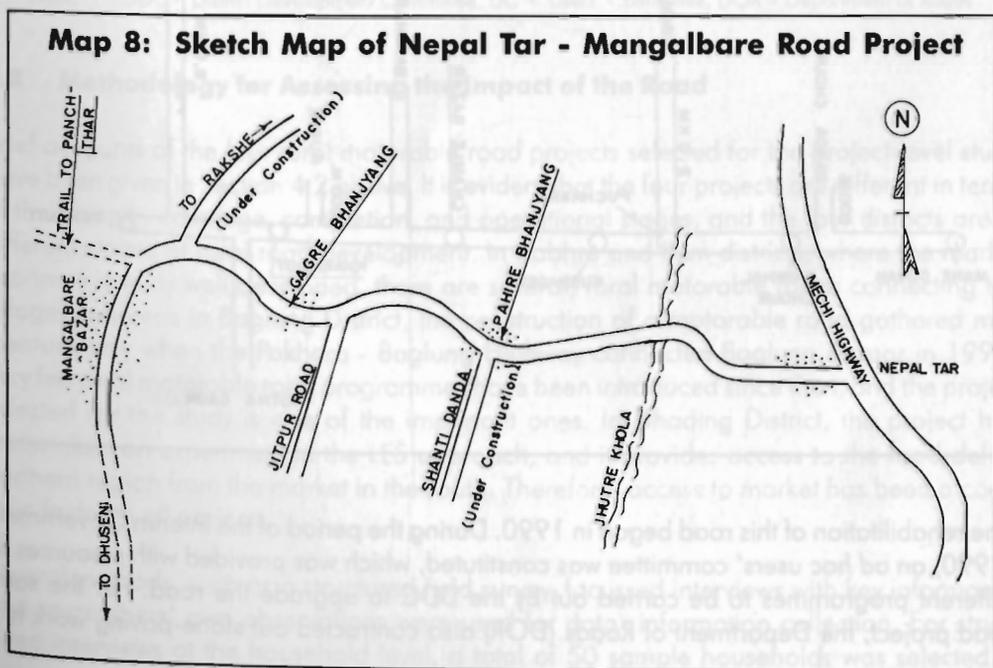
Total length of the project	42km
Cost per km (supervision cost not included)	Rs 1,007,000

Source: RIDP Final Report, ARD 1994.

tract. Mangalbare Bazaar has around 80 houses, among which are hotels/restaurants, wholesale/retail shops, tailoring shops, and public institutions and offices such as two high schools, two banks, agriculture/livestock service centres, two cooperative societies, two health posts, a post office, a police post, and a VDC office.

Road access to Mangalbare Bazaar was always given high priority. In 1959, the then *Badahakim*, Mr. Santa Bir Lama inaugurated the Ilam - Phutuk - Mangalbare Road, but due to lack of proper maintenance, the road remained non-functional and later disappeared. When the Ilam - Phidim portion of the Mechi Highway was under construction in the 1980s, the construction of an access road to Mangalbare from Nepal tar began. All the VDCs benefitting from the road constructed a section of the road with voluntary labour. A track road was completed, though it remained non-functional until it was taken over by the Department of Roads (DOR) in 1990. The road has been functional since 1992, and it has been continuously upgraded by the Rural Road Programme through the users' committee since 1993. Map 8 gives a sketch of the Nepal tar - Mangalbare Road.

The budget and expenditure for the Nepal tar - Mangalbare Road project is given in Table 4.3.



Thus, each year there is a separate budget allocation for the project. The DDC regards each allocation as a separate project, not the continuation of the same project. Therefore, the unspent balance from the previous year is not accumulated and a new users' committee is formed, although the same persons might be included in the new committee.

**Table 4.3: The Budget and Expenditure for the Nepaltar-Mangalbare Road Project**

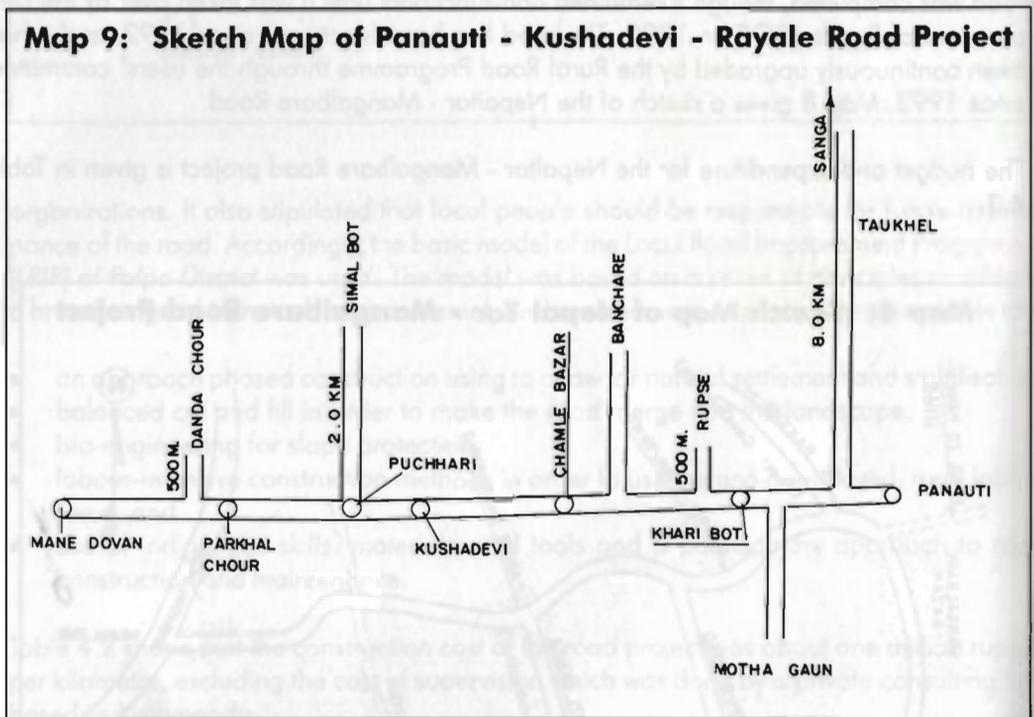
Year	Budget	Expenditure
1993	400,000	394,016
1994	400,000	342,395
1995	400,000	319,884
1996	700,000	126,900 (running)
Total	1,900,000	1,183,195

Source: Mangalbare VDC

#### 4.2.4 Panauti - Kusadevi - Rayale Road Project of Kabhre District

The Panauti - Kusadevi - Rayale road is 11 kilometres long. It was first constructed in 1955 but, due to the lack of regular maintenance, it remained closed until 1990. The road was used as the trail to link Panauti with Lalitpur. A sketch map of the road project is shown in Map 9 below.

**Map 9: Sketch Map of Panauti - Kushadevi - Rayale Road Project**



The rehabilitation of this road began in 1990. During the period of the Interim Government, (1990) an *ad hoc* users' committee was constituted, which was provided with resources for different programmes to be carried out by the DDC to upgrade the road. For the same road project, the Department of Roads (DOR) also contracted out stone-paving work to a

private contractor. The users' committee (UC) and the VDCs along the road complained to the DDC that the DOR should have given the work to the UC. The UC argued that had the project been implemented through the UC, there would have been twice as much progress. In 1995 the DOR provided Rs 12,00,000 to upgrade the road project. A new users' committee was constituted under the chairmanship of the *Ilaka* Member of the DDC. The progress is given in Table 4.4.

**Table 4.4: Work Progress of Panauti - Kusadevi - Rayale Road Project**

Year	Available Resources	Work Progress
1990	The DDC provided Rs 25,000. People contributed Rs 30,000	The UC hired a bulldozer to widen the road from Panauti to Kusadevi
1990	The DOR contracted out stone-paving work in Rs 440,000	Stone-paving work on 600m from Panauti to Kalimati was completed
1992	The DDC provided 25 bags of rice through the 'Food for Work' programme.	Constructed a culvert in Bokse Dhara
1993	The DDC provided Rs 300,000 through the Rural Road Programme.	Stone-paved 1.5 km of the road
1993	The DDC provided 45 bags of rice through the 'Food for Work' programme	Drainage system cleaned, upgraded and stone paving extended
1994	The DDC provided Rs 200,000 through Rural Road Programme	Bulldozer hired to extend the road from Kusadevi to Rayale (3 km)--stone paving extended further
1995	The DOR provided Rs 1,200,000 to upgrade the road.	A new UC formed--stone paving completed up to Kusadevi Bazaar--three culverts completed

Note: DDC= District Development Committee, UC = Users' Committee, DOR= Department of Roads

### 4.3 Methodology for Assessing the Impact of the Road

Brief accounts of the four rural motorable road projects selected for the project-level study have been given in Section 4.2 above. It is evident that the four projects are different in terms of their length, coverage, completion, and operational stages, and the four districts are at different stages of rural road development. In Kabhre and Ilam districts, where the market economy is fairly well developed, there are several, rural motorable roads connecting the villages, whereas in Baglung District, the construction of a motorable road gathered momentum only when the Pokhara - Baglung Highway connected Baglung Bazaar in 1994. Very few rural motorable road programmes have been introduced since then, and the project selected for the study is one of the important ones. In Dhading District, the project has undertaken an experiment in the LES approach, and it provides access to the food-deficit northern region from the market in the south. Therefore, access to market has been a common factor in all projects.

Several methods, such as a structured field survey, focussed interviews with key informants, and researchers' own observations were used for data\ information collection. For structured interviews at the household level, a total of 50 sample households was selected in

each project area, of which 25 were selected from along the road, while 25 were selected from locations that were off the road but dependent on it for market access. While selecting respondents along the road all the households were counted on each side of the road and every fifth household from each side was selected for interview. For off the road locations, local teachers and VDC officials were consulted about areas half an hour to one hour's walking distance from the road alignment but dependent on the road for access to the market. After identifying such a location, the village setting was mapped on paper with the help of local teachers and residents. After mapping the study area, every fifth house was selected for interview. The rural roads' projects selected for project level study and the field survey locations are shown in Table 4.5 below.

**Table 4.5: Field Survey Location**

District	Name of the road project	VDCs covered by the road project	Field survey location	
			On the road	Off the road
Baglung	Deurali Chowk-Bayanabbe Danda	Kalika, Mulpani	Suldanda - Bayanabbe Danda	Piplebans, Thapathar hamlets in Singana VDC
Dhading	Dhading Bensi-Salyantar	Nilkantha, Murali Bhanjyang, Jyamrung, Tripureshwar, Salyantar	Murali Bhanjyang - Jyamrung	Sunkhani hamlet in Chainpur VDC
Ilam	Nepaltar - Mangalbare	Sankhejung, Shanti Danda, Mangalbare	Shanti Danda - Mangalbare	Pungfung hamlet in Mangalbare VDC
Kavre	Panauti - Kushadevi - Rayale	Panauti, Taukhal, Kushadevi, Malpi, Rayale.	Thapagoun - Parkhal Chaur	Simal Chaur hamlet in Kushadevi and Rayale VDCs.

Source: Field note

The main characteristics of the respondents are shown in Table 4.6. Most of the respondents were small farmers. In terms of land holdings, there were more small holders in Baglung and Kabhre districts than in Ilam and Dhading districts. The educational status was higher in Kabhre and Ilam districts than in Baglung and Dhading districts.

Questions asked in the structured survey covered economic aspects such as time and cost saving, production and marketing pattern, price changes, and so on; social aspects such as the impacts on education, health, and social awareness; institutional aspects such as access to extension services, participation, local institutions, and so on; and environmental aspects such as landslide, pollution, and so on. The main findings of the survey are presented in this Chapter.

**Table 4.6: Characteristics of the Respondents**

District	Along the Road						Off the Road					
	Land holding		Gender		Education		Land holding		Gender		Education	
	<2 0	>2 0	M	F	Il	L	<2 0	>2 0	M	F	Il	L
Baglung	22	3	15	10	10	15	23	2	20	5	6	19
Dhading	15	10	19	6	13	12	17	8	17	8	13	12
Ilam	13	12	19	6	5	20	11	14	21	4	7	18
Kavre	22	3	20	5	4	21	22	3	19	6	7	18

Source: Field survey

Note: 1. Landholding expressed in Ropani (one ropani = 508.5 sq.m)

2. M = Male, F = Female, Il = Illiterate, L = Literate

For focussed interviews with key informants, such as local teachers, VDC Chairpersons' members and respondents from the road users' committee and officials working in different offices, a checklist was prepared and used as a reference point for discussion. Researchers' own observations on, among others, road conditions, environmental damage, and marketing structure have also been used to supplement the findings.

One of the fundamental limitations in examining the impact of rural roads was the problem of accounting for the benefits of a particular road in isolation. Because, in the road network, several roads are interconnected and interdependent, the impact of a road makes sense only when the benefits are also seen from a total perspective. For example, access to a better hospital for patients from Mangalbare Bazaar in Ilam District makes sense only when the Mangalbare - Nepaltar Road is connected with the the Mechi Highway and, in turn, with the Mahendra Highway in Jhapa District in order to reach better health facilities. Similarly, market access for milk from Kushadevi VDC in Kabhre District can be possible if the Panauti - Banepa road is connected to the Arniko Highway. This is true also the case of Mulpani and Singana VDCs in Baglung District, where the combined benefits are more attributable to the Pokhara - Baglung Highway, as the Deurali Chowk - Bayanabbe Danda Road, during the present study, was closed due to severe damage to the road by landslides. This limitation has been kept in mind while analysing the impact of rural motorable roads.

## 4.4 Economic Impact

### 4.4.1 Reduction of Travel Time and Cost

The case of Baglung District is unique in the context of reduction in travel time and costs, as the study area is just an hour's walk from Baglung Bazaar. Even when the road was operational (it was closed due to a number of landslides along the road at the time of our study), the mode of transport for household goods, such as rice, salt, kerosene, clothes, and others, from Baglung Bazaar to the study area was the same. Of course, a number of shops has also opened along the road selling various household items; people also buy retail household items locally. For items that are not available locally, they just walk to the Bazaar and carry the goods back themselves. When the road was operational, vehicles transported construction materials and other goods in bulk for shopkeepers, mostly tractors. After the

temporary closure of the road, porters and mule caravans were carrying goods even in bulk. However, in spite of this scenario, there has been a dramatic reduction in travel time and cost due to the presence of the Pokhara - Baglung Highway that was built in 1994. Before the Highway, most of the people in the households in the study area also walked to Pokhara or Naudanda to sell farm products such as ghee, fruit, honey, and handicrafts. They purchased household items such as salt, kerosene, clothes, and rice, and they were carried back by mule caravans, porters, or by themselves. The average time taken was three days and the cost was enormous.

After the opening of the Pokhara - Baglung Highway, almost every commodity became available in Baglung Bazaar. People can sell their products in Baglung Bazaar also. The price differential between Baglung and Pokhara for purchasing and selling items is less than before. Therefore, if the impact of the Pokhara - Baglung Highway is also combined, as the people from the study area also used walk to Pokhara or Naudanda before the highway was built, the travel time decreased from three days to three hours on an average. Moreover, the mule caravans, which used to ply the Pokhara\Seti Dovan - Baglung trail, have shifted to interior regions such as the Baglung - Galkot - Dhorpatan Trail and the Baglung - Myagdi Trail (Box 5). As a result, the transportation time and cost have decreased to some extent in the interior region as well. Furthermore, as more goods are available in Baglung Bazaar, more roadside retail shops have opened, therefore many goods are now available even at the retail shops on mule trails.

Before the construction of the Dhading Bensi - Salyantar road, people from the northern region of Dhading and Gorkha Districts, which is characterised by difficult mountain terrain, harsh climatic conditions, low fertility of land, and, therefore, a net food importer, were dependent on Dhading Bensi and Malekhu Bazaar for purchasing household commodities such as salt, kerosene, medicine, rice, clothes, and fertilizer. A journey of several days to Dhading Bensi\Malekhu Bazaar was required to purchase these items. Many of them carried these commodities by themselves, while others hired porters. With the opening of the road, people from the northern region have quick and easy access to market centres.

Now, except for three months during the monsoon period, there are regular mini-bus and mini-truck services from Dhading Bensi to Salyantar. So one can reach Dhading Bensi within a few hours. Second, with the opening of the road, almost all household commodities are available in local markets such as Arughat, Salyantar, and Gola Bhanjyang, with minimum price differences from prices in Dhading Bensi. Moreover, several local market centres such as Palpa Bhanjyang and Jyamire Bhanjyang, are developing along the road and many household goods are available. Therefore, people go to Dhading Bensi only if the item required is not available in the local market. Third, after the opening of the road some items are being produced locally. Chickens and eggs are good examples. There are 12 poultry farms in Murali Bhanjyang VDC, and these were established after the opening of the road. Interestingly, instead of supplying their products to the southern areas, e.g., Dhading Bensi and Malekhu, they supply to the northern remote areas, which is said to be more profitable. On the other hand, the southern part of Dhading district, which has fertile low land and warm climatic conditions and therefore a potential for cash crop production, has increased market access as a result of rural roads (DDC 1994).

#### Box 4: Story of a Mule Caravan Owner



Mr. Karna Bahadur Roka of Argal VDC, Baglung District, dropped out of school in Class 8 because his family could not afford the school expenses. His brothers and sisters are still attending school. Rather, his father withdrew Rs 140,000 from his *Dhukuti*, a traditional joint saving scheme based on mutual trust, and bought nine mules for him. Each mule can carry a load of 60 to 80kg. He runs his mule caravan on the main trail as well as in the interior region of Baglung District. The charges for each destination are shown below.

From	To	Rate per kg
Baglung	Muskat	Rs 3
Baglung	Tara	Rs 4.50
Baglung	Hile	Rs 4
Baglung	Argal	Rs 3.50
Baglung	Hatiya	Rs 3.25

Apart from his labour, the operating costs are as follow. Feed for the mules: one *Pathi* (5.3kg) of maize at the rate of Rs 35 per mule per day and some grass, say Rs 50, all told per day. If he is in Baglung Bazar, Rs 10 is charged per day for the mule stand, but en route if he purchases maize in the same shop, the stand is free. There is also a road tax of Rs 5 per mule in Khahare.

His net earnings are Rs 1,000 to 1,500 per week, which is not sufficient to pay back the *Dhukuti* into which his father has to deposit Rs 6,000 per month for 35 months. In 35 months many of the mules might die. Therefore this is not a profitable business, compared to the risk and labours involved. It is only a method of employment.

There are about 400 to 500 mules working in the interior region of Baglung District. There is too much competition. One has to be good and reliable for merchants to hire one's animals. The merchant usually makes an annual contract. Transportation during rainy season is difficult.

Karna Roka does not think that the construction of a road from Baglung to Dhorpatan will have an adverse effect on his business. According to him, having a road would increase the production and they would have more cargo to/from the road head and to/from the interior villages. The main problems for mule caravan owners are as follow. First, there is no local breed of mules. All are imported from India via Nepalganj. It takes time for these animals to adjust to the local climate. Some of them die. Since there is no risk-sharing mechanism, such as an insurance policy, investment in this business is very risky. Second, the mule caravan owners have no bargaining power with the merchants who always have the upper hand. The merchant always picks out one unfortunate episode to judge the performance of a whole year.

During the field survey, however, all respondents in Dhading District said that the road had not saved transportation costs. For example, the bus fare for one person and truck freight for 40kg from Dhading Bensi to Jyamire (13km), which is a two-hour walk, is Rs 35. Therefore, those without luggage prefer to walk. There is also an administrative problem in (Section 3.3.6) that the road has not yet been cleared by the Department of Transport Management, therefore the district authority cannot regulate the bus\truck fare.

In the case of Ilam District, before the opening of the Nepaltar -Mangalbare road, goods were purchased\sold either in Ilam *Bazaar* or in Sanischare *Bazaar* in Jhapa District. The average time taken to Ilam *Bazaar* was between six to 10 hours. In the case of Sanischare *Bazaar*, villagers from the same hamlet used to group together after the winter harvest, when the rivers had dried and short trek routes were opened, and carried their stocks of chickens, piglets, honey, ghee, oranges, and bamboo mats to sell in the market. In return they would purchase salt, kerosene, and clothes with the cash. The journey used to be of from five to seven days. With the opening of the road, people sell their produce either to middlemen at home or to wholesalers in Mangalbare *Bazaar*. All items for sale, such as fertilizers, rice, salt, kerosene, and so on, are bought at retail prices from Mangalbare *Bazaar*. The time taken to travel to the market is approximately one to two hours, depending on the respondent's village. Therefore, the transportation time and costs have been reduced substantially.

For the shopkeepers of Mangalbare *Bazaar*, the road has reduced time and cost in three ways. Firstly, before the road, goods were purchased in Birtamod, transported to Ilam *Bazaar* by truck, unloaded and stored in Ilam *Bazaar*, and then porters carried them from Ilam *Bazaar* to Mangalbare *Bazaar*. The whole operation used to take almost a week and the damage to goods in transit was considerable. Now, goods are purchased in Birtamod and transported to Mangalbare *Bazaar* by truck on the same day. The reductions in transportation time and cost have been dramatic. The transportation time for one truck load of goods has been reduced from one week to one day and the cost from almost three rupees per kg before the road to one rupee per kg after the road, from Birtamod to Mangalbare. Secondly, the whole operation has been very convenient and the loss of and damage to goods on the way have been reduced to the minimum. Thirdly, the scale of business in Mangalbare *Bazaar* has increased as a result of the road. Now there are about 12 wholesalers in Mangalbare *Bazaar* who buy cash crops such as ginger, potatoes, cardamom, broom flower, ghee, and so on and export to bigger markets.

In Kabhre District there is no regular bus service on the Panauti - Kusadevi - Rayale road. People still prefer to walk, as usual, which takes one to one-and-a-half hour's time from Panauti to Kusadevi or Rayale. If people have loads, they travel by truck, and this is not comfortable due to the quality of the road. Therefore, the road has not really reduced travel time. But there has been a considerable reduction in the transportation time and cost of several imported and exported items as described below.

Firstly, the scale of hay imports from Bhaktapur has increased several fold, because it has become convenient and cheap to carry a truckload. Previously, one labourer carried a load of hay in six to eight hours' time at a cost of Rs 50. Now, a mini-truck can carry 60-70 loads of hay at a cost of Rs 20 per load. Generally, one buffalo need 30-40 loads of hay per year, which is supplemented with feed and grasses. It was estimated that about 500 mini

truckloads of hay were imported to the Kusadevi - Rayale area during 1995. The sharp rise in the scale of hay imports is correlated to a rise in the scale of milk production.

Secondly, the purchase of household goods, livestock feed, and fertilizers has become very convenient, quick than before, and less costly. Before the road, was built these items were purchased in Banepa or Panauti and transported by porters. It took almost three to four hours and cost about one rupee per kg. After the road, a number of retail shops and dealers has opened near milk collection centres in Parkhalchaur, Kushadevi, and Thapagaun. They provide all household goods, e.g., soap, sugar, salt, and tea, as well as animal feed and fertilizers, on credit. On the 15th day, the credit is cleared when money is received from the milk collection centre. Thirdly, after the road, there has been a considerable increase in the use of imported construction materials to build houses along the road. The new houses are built in urban style. Now Kushadevi is almost like a *bazaar* area, having houses on both sides of the road. Finally, there has been a sharp rise in the scale of exports such as milk, *lapsi* (*Choerospondia axillaris*), and timber from that area.

However, some respondents, from Mangalbare Bazaar in Ilam District, also argued that the road had spoiled the walking habits of poor people. For example, the walking time from Mangalbare to Ilam Bazaar from the old trail and the bus time on the new motorable road are almost the same. But, even a poor person, not in hurry, now tends to wait for a bus rather than walk and save money.

#### 4.4.2 Change in Production and Marketing Patterns

All four districts under study, particularly Baglung and Dhading, are characterised by a large food deficit. On non-irrigated *bari*\* that form a large part of the arable land, the main items of production are subsistence food crops such as maize, millet, and pulses, and, on the irrigated *khet*, there are paddy, wheat, and maize. Vegetables and fruits are also produced for home consumption. Almost all households have a small stock of animals such as cattle, buffalo, pigs, and poultry. Cropping intensity is high on *Khet*\*\* in the lower region where irrigation facilities are available and the climate is warm. In the upper region, where non-irrigated *bari* predominate and the winter is severe, the cropping intensity is low.

In the study location of Baglung District, agricultural production has undergone a considerable change during the last few years. First, after the establishment of the Out Station Research Station (OSRS) of Lumle Agricultural Farm in Singana VDC in 1991, new varieties of seeds have been introduced for subsistence food crop production, and these have increased the yield and the total production. Secondly, production of fresh vegetables, off-season vegetables, plantation of fruit bearing and fodder trees, and breeding of improved varieties of livestock animals have gone up in Singana area, in which the OSRS has the main role. Thirdly, with technical support and market assurance from the KOSHIVEG, a vegetable seed production programme of Koshi Hill Area, the vegetable seeds' production has gone up considerably. For example, a single vegetable seed grower from Singana VDC sold about Rs 100,000 worth of vegetable seeds last year.

\* *Bari* refers to rainfed cultivated land

\*\* *Khet* refers to irrigated rice land

While the production of these items has increased and has the potential to increase further, the local market is not prepared to respond because most agricultural products are perishable in nature. For many items, such as vegetables and fruits, their freshness adds value in the market. Therefore, before increasing production, an efficient and direct linkage has to be established between the production area and the market point. Unless organized support is provided by the government and NGOs, especially in the areas of infrastructural development, market research, and the development of marketing channels, increasing production of perishable high-value crops is not feasible.

In Dhading District no substantial production of marketable agricultural cash crops is reported along the Dhading Bensi -Salyantar road, except for small quantities of vegetables, fruit and milk products in a number of nearby market centres that have appeared along the road side. The export quantity of local products is low. A Traffic Survey by the DSR calculated 2,383 tons of imports and 262 tons of exports through the road during 1994 (DDC 1994). A local teacher commented that a truck goes to Salyantar with a full load, but returns with empty bottles of beer and jute sacks.

In Ilam District, the production pattern has been undergoing considerable changes over the years from subsistence food crops to marketable cash crops. The main changes are as follows. Firstly, the marginal steep wet lands on the banks of local streams are covered with cardamom and tree plantations, as both have high commercial value. Secondly, the tops of hills, which were used for grazing animals, are covered with tea plantations. In about 153 hectares of land, tea has been planted in the surrounding VDCs of Mangalbare Bazaar, and 510 small tea growers from the private sector are involved. Thirdly, steep marginal dry lands and the edges of terraces are covered with broom grasses, the flowers of which are sold, the grass is used for animal feed and the stems are used as fuel. Fourth, livestock products, such as milk, ghee, goats, pigs, chickens, fish, and honey, and cash crops, such as ginger, potatoes, garlic, and oranges, are important sources of income in almost all households. In the field survey, all respondents (except one in 50 households) had income from at least one source mentioned above. There are many farmers (Box 6), who have made intensive use of their limited land for multiple crop production.

The scale of production of the above-mentioned items has gone up considerably with the opening of the road, as these can now be marketed locally. The scale of production of some of the cash crops in the surrounding VDCs of Mangalbare Bazaar, which uses the Nepal - Mangalbare road for export, is estimated in Table 4.7. This estimate was made by Mangalbare VDC, based on the experience of the previous year's sales and, in the case of potatoes and ginger, the sale of seeds in the local market.

The Kabhre District has access to markets, particularly to the Kathmandu Valley, on one side and Khasa, Tibet, on the other through the Kodari Highway for its horticultural and livestock products (Box 7). The Panauti - Kushadevi - Rayale rural road has extended the market-led agricultural production system to the interior region. In the study location, although most parts of the irrigated lowland have been used for subsistence crops such as rice, maize, and wheat, along with potatoes and some other vegetables, there has been a big change in the livestock subsector, especially in milk production, after the opening of the road. In all farm families, livestock are among the main components. The road has contributed to the in-

**Table 4.7: Estimated Production of Cash Crops in the Hinterlands of the Nepaltar - Mangalbare Road in 1996 (in quintals)**

Items	Estimated marketable production
Ginger	10,000*
Cardamom	1,200
Broom flowers	3,400
Tea	230
Potatoes	2,000
Beans	30
Goat	80,000\number\year

Source: VDC, Mangalbare.

Note: \* After germination, the ginger seeds can be harvested, they are called *Budi* or *Mau*. The average production of ginger is about five times the amount of seed harvested. The estimate is based on the sale of *Budi* in Mangalbare Bazaar.

crease in milk production. Before the road, few porters carried milk from this area to the chilling centre in Panauti, and it now exports over 13,000 litres per day.

The marketing network for milk is well developed in Kabhre District. There are a number of Milk Producers' Cooperatives that have 22 milk collecting centres in Kushadevi and Rayale area providing a convenient and assured marketing point for milk producers. There is a that use a simple technical procedure for measuring the fat content in milk. The price of milk is fixed on the basis of fat content. Each milk producer has a passbook in which the quantity of milk along with the fat contents are entered every day.

The milk is then collected in a big jar which is carried to the Panauti Chilling Centre by private mini-trucks. The milk has to be chilled before noon to avoid curdling. So far, the biggest and most convenient buyer of milk from the Kushadevi - Rayale area is the Nepal Dairy Development Corporation (NDDC), although a number of private companies have been opened. The NDDC pays every 15 days. On that day farmers go to the milk collection centre with their passbooks and collect their dues according to the quantity and the fat content mentioned in the passbook. Farmers are very clear about the whole procedure.

The vulnerability of the milk production sector was vivid during the field study, when the anti-Mahakali Treaty activists suddenly blocked the road from Banepa to Kathmandu in Bhaktapur town. The chilling centre in Panauti was already full and refused to collect more milk from the Milk Cooperatives. As a result, 1,060 litres of milk were thrown into the river. It was interesting to note that even the farmers did not have larger containers to keep or process additional milk, so they fed it back to their buffaloes.

People in this area prefer the high-breed variety of buffaloes rather than cows because milk is measured on the basis of fat content and buffalo milk contains high levels of fat. Buffaloes are also easy to dispose off after the productive age because they can be slaughtered for meat consumption. Respondents, however, complained that private traders import the high-breed varieties of buffaloes from the Terai and it takes time for the animals to adapt to the

### Box 5: Integrated Farming: A Success Story



Five cash crops that start from the Nepali alphabet "A" such as *Aolan* (Milk), *Amrisha* (Broom), *Aduwa* (Ginger), *Aalu* (Potato), and *Alaichi* (Cardamom) are said to be the main instruments that changed the income levels of many of the farmers in Ilam District. Mr. Sunil Shrestha, a local school teacher from Mangalbare High School, is one of such farmer who has increased his income mainly through the production of these five cash crops. Mr. Shrestha, aged 30 and educated up to S.L.C. level, is a resident of Chitre hamlet in Mangalbare VDC, about 30 minutes walking distance from the motorable road.

He owns 20 *ropanies* (one hectare) of land, of which about 10 *ropani* are *Khet* (low irrigated rice land) and 10 *ropani* is *Bari* (up land). He has also rented in about the same amount of land on crop-sharing basis. The main cereal crops for subsistence are rice and wheat on *Khet* and maize and millet on *Bari*. In addition, he produces a number of cash crops. He also owns a number of livestock animals. One cow, one buffalo, 12 goats, two rabbits, and 25 chickens. The production and sale of main cash crops during 1995 are shown in the following table.

Items	Area	Production	Quantity sold
Ginger	2 <i>Ropani</i>	400kg	400kg
Cardamom	8 <i>Ropani</i>	80kg	80kg
Garlic	1 <i>Ropani</i>	80kg	80kg
Broom Flowers	6 <i>Ropani</i>	400kg	400kg
Potatoes	2 <i>Ropani</i>	2800kg	1600kg
Milk		14 litres/day	10 litres/day

He has a family of six which includes his parents, wife, and two children. The daily working routine of his family is as follows. He gets up at 5 o'clock in the morning, cleans the cattle shed, collects grasses and fodders, and takes his morning meal before going to school, a 30-minute hike up the hill. His wife equally shares in the task of cleaning the cattle shed and collecting grass and fodder in the morning. His father delivers milk to Mangalbare Bazaar and sells to individual houses and teashops, since there is no milk collection centre. His mother prepares the morning meal for the family. During the day, his family members, except himself during school days, work in the fields. On Wednesday, which is the market day for Mangalbare Bazaar, his family carries household products to the Bazaar for sale.

local climate. Many of them do not give milk to their full capacity for certain lactation cycles. The intensive care needed was visible in almost all households where buffalo sheds were

## Box 6: (a) Chillies from Kabhre Attracting Money from Khasa



Kabhre, Kuntadevi (July 16, 1996). Mandan, Mahadev Sthan, Jyamdi Jaisithok, Deupur, and Naya Gaun in this district are the main horticultural production areas. Horticulture was first extended to these areas from Panchkhal and has now surpassed Panchkhal, especially in tomato and potato production. Mr. Keshav Koirala of Mandan Ranitar says that about 85,000 bags of potatoes (80 kg/bag) and about the same quantity of

tomatoes is annually exported to Kathmandu from Chakhola Phedi Bazaar alone. He recalls that they had collected Rs 75,000 a few years ago, when they levied one rupee per bag for the construction of Panchkhal Campus.

During the early 1980s, sugarcane was the main cash crop in Mandan. But, as the sugarcane required a lot of labour and fuel for processing, farmers preferred potato cultivation. Tomato production on a commercial scale first began in Jaisithok around 2040 B.S., and this was later extended to Mahadev Sthan. But the production was crippled due to the lack of a wholesale market in Kathmandu. The farmer had to carry the produce to the Indrachowk and Vedashing areas for sale. With the opening of a wholesale vegetable market in Kalimati in Kathmandu, and also with the availability of a transport, packing trays, sprayers, and vegetable seeds through the assistance of JICA, farmers are now encouraged to go in for mass production. Mr. Keshav Koirala reported that he bought tomato seeds from Panchkhal in 2040 B.S. for the first time. Now tomatoes are produced on over 50% of his land. Tomatoes are mostly produced in rain-fed areas, whereas on irrigated lowland, staple crops followed by more valuable vegetables such as potatoes, garlic, and onion are preferred.

Over the past few years, chillies have been the most popular cash crop in the Mandan area. The current market price of chillies in Khasa (Tibet) is Rs\* 1,160 per *dharni* (a little over two kg). Due to the road connection with Khasa from Dolalghat, farmers around that locality are said to be earning over one hundred thousand rupees per household from chillies alone. Mr. Ganesh Nepal, a schoolteacher from Mandan Kamidanda, said that his sister earned over Rs 45,000 from chillies during the last year from just one *ropani* of land.

News item in Kantipur, a Nepali National Daily, Saturday, 17 July 1996

\* There are currently Rs 67.37 to a U.S. dollar.

## (b) Kabhre Crossed Producing of Over 100,000 Litres of Milk Per Day

Banepa, Kabhre, 19 November 1996. In B.S. 2009 (1953), 500 litres of milk was brought to Kathmandu from Nala Tusal village of Kabhre District for pasteurisation, for the first time. Mr. Deepak Prasad Paudel, the Chairman of a Milk Producers Cooperative, said that after 44 years Kabhre District dairy cattle are producing over hundred thousand litres of milk per day. The production of milk has increased by 22% per annum. At present Nepal Dairy Development Corporation collects 50,000 litres of milk from Banepa, Panauti, Panchkhal, Sipaghat Chilling Centres and Nagarkot Cheese Factory. Other small and large private dairy and individual businessmen purchase over 20,000 litres of milk from different collection centres. The rest is sold and consumed locally.

After the establishment of Nepal Dairy Development Corporation, more farmers were encouraged to engage in dairy farming. In 2048 (1991), when the Cooperative Act was promulgated, Milk Producers' Cooperatives were organized to provide organized support for milk production. Now there are 148 Milk Producers' Cooperatives, through which training on cooperation, safe milk production methods, etc are provided to dairy farmers. The future plans of the Milk Producers' Cooperatives are the establishment of a milk processing factory, opening of technical training institute, development of other modes of transportation, such as ropeways or pipelines carry milk from the remote hill areas, and the establishment of additional chilling centres.

Several other agencies, such as the Agricultural Development Bank, District Livestock Office, and Nepal Dairy Development Corporation have provided enough support to the farmers. However, due to the lack of coordination among themselves, farmers are not receiving services in an integrated manner.

News item in Kantipur, a Nepali National Daily, 19 November 1996

made like houses to protect the animals from cold. In many houses, buffaloes are kept on the ground floor, and the family stays on the first floor. This system, though adopted by farm families, is unhygienic and can have far-reaching effects on human health.

The Panauti - Kushadevi - Rayale road has opened up markets for *Lapsi*, which was not considered a marketable product earlier. Before the road, it was collected and carried by porters to Panauti and sold at the price of Rs 25 per container (about 15-20kg). After the opening of the road, merchants themselves gathered the fruit and, paying Rs 132 per container. Now almost everyone has at least one *Lapsi* tree on his or her land. The *Lapsi* trees are planted on wastelands. A few processing plants, to make *Mada*\* from *Lapsi* have also been established. Apart from this, the production of oranges and the sale of timber from private forests have increased over the years. The export of some important items from the Kushadevi - Rayale area in 1995 was estimated to have been as follows.

Several problems related to increasing production of the above-mentioned items, reported during the field survey in all four districts, are summarised below. Firstly, in food deficit areas,

\* The raw material for a popular sweetmeat called 'fitauda'

**Table 4.8: Estimated Quantities of Items Exported from the Study Area**

Items	Quantity
Lapsi	100 mini truckloads\year
Milk	13,000 litres\day
Timber	500 truck loads\year
Oranges	100 mini truck loads\year

Source: Open discussion, Kushadevi

such as the northern regions of Baglung and Dhading districts, the first preference of farmers is to produce subsistence crops. To produce cash crops, sell in the market, and buy food items with the cash in return is a complex process, with which farmers are not accustomed, and needs reliability of input supplies, extension services, and markets. Moreover, small land holdings and the lack of irrigation facilities in most areas have limited the scope for winter crops.

Secondly, there is a lack of manpower, especially in Baglung and Dhading districts, in almost all farm families. Seasonal and long-term migration to cities, the *Terai*, and abroad for employment opportunities are common features of almost all farmhouses. In the study locations of both districts, in most households at least from one male member to a maximum of four members from one family have left for employment as labourers, watchmen, security guards, and to join the army in cities, the *Terai*, or abroad. They have left their wives at home with parents and children, so the women are busy looking after the old, sick, and the children of the family along with the farm. Therefore, they have no time and energy to increase production.

Thirdly, in order to start a market-oriented production culture, farmers need infrastructure and management support such as storage, transportation, and marketing, from government and public institutions. The few individual farmers who produce fresh vegetables and fruits on a marketable scale also have considerable difficulties in transporting to the *Bazaar*, storing perishable vegetables, and marketing to the middleman at fair prices. Therefore, the road is an essential but not a sufficient condition for socioeconomic transformation.

Fourthly, although the road has contributed to an increase in production in Ilam and Kabhre districts, a number of problems was reported concerning the sustainability of market-led agricultural development. One, the market mechanism for agricultural commodities is unreliable, particularly in the volatile market. For example, in Ilam District, despite new wholesale markets at the road head and weekly markets in many locations, there is a lack of knowledge about the projected size of markets for different commodities. Farmers need marketing knowledge for at least three to five years for short-term crops, and five to 10 years for long-term crops such as tea, cardamom, broom flowers, and so on. Without market knowledge, they face an unknown future. Some respondents recalled that about 10 years ago there was a bumper production of ginger. The wholesalers in Ilam *Bazaar* refused to buy even at two kg per rupee. A large quantity was thrown out as the price did not cover the cartage to Ilam *Bazaar*.

Two, considerable price fluctuations were experienced during the past few years. Nobody knows who controls the price and why it fluctuates. For example, one wholesaler in Mangalbare Bazaar in Ilam District commented that the price of agricultural commodities in Ilam Bazaar changes every day. As a result, the local wholesalers keep considerable margins to cover the risk of price fluctuations, and as a result farmers do not get a fair price. The price fluctuations of some of the cash crops in Ilam District are presented in Table 4.9, which shows that the prices of some commodities were reduced more than twice in one year.

**Table 4.9: Price Fluctuations of Cash Crops in Mangalbare Bazaar**

(Price per kilo)

Items	Maximum price in 1995	Price in 1996	Change in %
Cardamom	Rs 142.5	Rs 130	-9.6
Ginger	Rs 27.5	Rs 10	-175
Amrisho	Rs 32	Rs 10	-220

Source: Field survey

Finally, there is a social dimension to the production process. Not all communities have the same degree of industriousness for and interest in agricultural production, nor similar endowments of productive resources such as land and water. The *Limbu* community in Ilam District and the *Tamang* community in Kabhre District are examples of those who have lagged behind in the development process of the district. Earning from non-agricultural activities such as stone masonry work, joining the army, and so on has been common in these communities. In the study area, it is mainly these communities that have supplied the labour for the production process and transportation of products to the Bazaar or road head, but their involvement in terms of investment in and benefits from production as such have been minimal.

#### 4.4.3 Change in Prices

The price indices for buying and selling items, as well as the land prices are shown in Table 4.10. The year 1991\92 in all four districts is regarded as a 'before the road' situation and taken as the base year.

The Table shows that in spite of the reduction in transportation time and cost and less damage to goods along the way, prices of all goods have gone up in all four districts. Reduction in prices was seen only in the case of salt and kerosene in Baglung District, because of the Pokhara - Baglung Highway. However, even in a situation in which prices have increased over a period, one could argue that the price would have increased further had there not been a road network. First, after the construction of the road, even when the road was not operational as in Baglung District, a number of retail shops opened along the road and more goods were available on the doorstep. The Table shows that the price of buying commodities rose more in off-the-road locations than in on-the-road locations, which sug-

**Table 4.10: The Price Index for Buying and Selling Commodities in the Project Area**

(Base year 1991 - 92 = 100)

Items	1995\96							
	Baglung		Dhading		Ilam		Kavre	
	On	Off	On	Off	On	Off	On	Off
<b>Buying items</b>								
Rice	148.7	167	181.9	190.5	156.4	148.7	174.8	218.7
Kerosene	80.9	83.3	173.8	163.7	146.3	165	146.6	162.9
Salt	94.5	100	172.4	218	182	213	171.4	200
Fertilizers	291.9	233.6	196.5	217.9	194.5	223	200	215.3
Construction materials	177	200	-	-	159	266	162.8	163.4
<b>Selling items</b>								
Cardamom	-	-	-	-	159.5	159.5	-	-
Broom flower	-	-	-	-	326.6	343.9	-	-
Ginger	-	-	-	-	250	250	-	-
Potatoes	-	-	-	-	-	-	277.5	283
Lapsi	-	-	-	-	-	-	288	222.7
Milk	200	-	-	-	172.7	266.6	167	177
Ghee	-	-	-	-	200	176.9	-	-
<b>Land prices</b>								
Homestead land near road	213.9	-	416	-	291	-	363.6	-
Khet	215.9	179.9	266.6	330	319.7	214.3	389.5	390
Bari	233	204.4	247.3	252	302.7	236	306.6	306.8

Source: Field survey

Note: On = On the road, Off = Off the road

gests that the presence of the road has made a difference in prices. In the case of fertilizers, the price increased as a result of government policy. But the price in off-the-road locations was generally higher because of the additional transportation costs.

Second, on items sold by farmers, although there is no definite trend in a number of items, the price of off-the-road locations is lower, as they need further transportation to reach the road head. However, a note a caution should be given in that, apart from the proximity from the road, there are other factors such as quality and quantity of goods and selling period that equally determine the price of items on sale. Finally, in all districts, it was reported that the price differential between goods at the market centre and the road head has decreased after the road. For example, the price differential between Dhading Bensi and the road heads of the Dhading Bensi - Salyantar Road such as Gola Bhanjyang, Salyantar, and Arughat have declined. During the three months' monsoon season, the price again rises because the road is closed to vehicles and porters transport goods at a high cost. In Ilam District, the price differential in trading between Mangalbare Bazaar with the larger market centres, e.g., Ilam Bazaar, Birtamod, and Sanischare, has declined, therefore people do not

spend an inordinate amount of time travelling to *Ilam Bazaar* or *Sanischare Bazaar* to sell their stocks and purchase household goods.

In the case of *Kabhre District*, the price differential in essential items such as cattle feed, fertilizers, construction materials, and so on used to be at least one to two rupees per kg between *Panauti* and the local road head market. This has decreased after the road. If goods are bought in bulk, such as chickens or cattle feed, the traders in *Panauti*, *Banepa*, or even from *Bhaktapur City* provide transport to the road head inclusive in the price. Similarly, while selling goods in bulk such as live chickens, potatoes, and *Lapsi*, whole-sellers pay the *Panauti* price at the road head. This suggests that the price discrepancies between the market centres and the motorable road heads in rural areas decreases when goods are transported in bulk by vehicles.

In order to compare the price rises in the project area with the general price index, the urban consumer price index in the hills in the corresponding period is presented in Table 4.11. Although there are no data available on all items covered by the study, one can see the general trend from the items given here.

**Table 4.11: Urban Consumer Price Index: Hills (Base year 1991\92 = 100)**

Year	Overall Index	Pulses	Food & beverages	Rice	Wheat & flour	Vegetables & fruits	Meat, fish, & eggs	Milk & milk products
1991\92	100	100	100	100	100	100	100	100
1992\93	107.3	97.67	105.9	105	107.8	102.7	112.7	104.2
1993\94	114.1	95.9	112.6	111.4	108.8	120.8	123.4	113.8
1994\95	123	131.1	122.6	122.3	117.9	131.5	131.3	117.2
1995\96	132.8	160.8	135	137.8	117	162.5	142	122.9

Source: Computed from the Economic Bulletin 1995\96, Nepal Rastra Bank, Kathmandu

Table 4.11 shows that although the general price index for urban hill areas has increased over the years due to inflation, the incremental rate has been much lower than in the project area. One of the reasons for the discrepancy with the price index of the Nepal Rastra Bank (NRB) could be the difference in sample locations; the sample location of this study being a rural area. Even then the discrepancy is quite substantial. The main reason, perhaps, could be that the saving in transport cost of the sellers was not passed on to the consumers but added to their own profits. Therefore, even when a substantial transport cost saving was made as a result of the road, the price level remained unchanged. The inflation could have added to the already high, base-level price.

Regarding land prices, Table 4.10 shows that the price has increased two to four times during the past five years in all districts. The main reason given for rises in land prices in all districts is an increasing demand for land as a result of population pressure. The homestead land along the road has been more expensive, and the road has a direct effect on it. One important factor for the rise in price of farmland in *Ilam District* is the prospect for higher economic returns from cash crop production. The sharp increase in the price of farmland

near the roadside in Ilam District could be due to the locational advantage of closeness to the Bazaar. Moreover, in Baglung District, some of the persons employed overseas bring a lot of money on their return or during home leave, and they tend to buy land at a high price. This has also caused the price of land to rise.

## 4.5 Social Impact

### 4.5.1 Impact on Education

The impact of roads on education should be seen along with the government policy on education, changes in the economic status of the people, local leadership, and social awareness through mass media and NGO activities. In this context, the road has also contributed, among others, to uplifting the standard of education in the following ways. First, in Ilam District, the road has changed the feeling of isolation and remoteness in the area, therefore more educational materials and text books are available and teachers are willing to stay longer in the area. In Kabhre District, as the area became accessible, good teachers from outside started to come to local schools, because easier became convenient for them to go to Kathmandu and also make occasional visits to their homes. As a result, the standard of general education in local schools has improved. Similarly, in Ilam and Kabhre districts, the road has also stimulated local school graduates to go for college education in town by reducing the travel time, on the one hand, and also reducing the cost of living in town by making it convenient to carry home-grown rice and vegetables in vehicles on the other. In Kabhre District, several college students also travel by bicycles.

Second, the road has made some contribution to girl's education. Although many of the respondents were of the opinion that their own experience coupled with mass media propaganda such as TV, radio and newspaper — involvement of NGOs, and gradual social awareness about girls' education are the main factors in the rise in the number of girls going to school. One women respondent from Ilam District said *"More than anything else, my own suffering led me to educate my daughters"*. Nevertheless, some of the respondents commented that the issue of a girl child's education has been reinforced by the increased social contact with educated women from outside. Girls' enrollment in high school in the study area of four districts, shown in Table 4.12, indicates that the percentage of enrollment of girl students in every class has increased during the past five years. Parents in the interior region were also encouraged to send their daughters to colleges when the travel time decreased and it became convenient.

Third, in Ilam and Kabhre districts private sector English Boarding Schools have opened along the road during the last five years. In Ilam District, almost all teachers and over 25 per cent of the students in three Boarding High Schools of Shantidanda and Mangalbare Bazaar are from outside the area. All three High Schools are reported to be running reasonably well. The road was one of the stimuli for these schools and also helped to bring in teachers and students from outside.

However, in Dhading District, although a number of schools is adjacent to the road, no qualitative change in education is reported as a result of the road. For example, availability of qualified and good teachers, vocational education, and good results in SLC have not

**Table 4.12: Ratio of Girls' Enrollment of High Schools in the Study Area of Four Districts**

(In % of girl's enrolment)

Class	Baglung		Dhading		Ilam		Kavre	
	1992	1996	1992	1996	1992	1996	1992	1996
6	35	56	25	24	40	47	30	44
7	38	53	21	27	51	42	33	37
8	34	30	27	35	37	50	37	36
9	28	48	-	36	36	51	22	34
10	27	49	-	39	32	41	22	50
Total	32.4	47.2	24.3	32.2	39.2	46.2	28.8	40.2

Source: High School records

Note: High Schools covered were as follow: 1. Mulpani High School, Baglung; Chondeshwari High School, Dhading; Bhanubhakta High School, Ilam; and Kushadevi High School, Kavre

been observed in local schools after the road opened. The school dropout rate is high (21 boys and 11 girls in the 50 sample households). The main reasons reported in the field survey were poverty, household work, cattle rearing, and fodder and firewood collection. It seems to be the norm that, in most households, the male members are working outside, other family members, including children, have to share responsibilities for household work. The road also has not changed the mode of transport for students travelling to school. There is no preference or concessions for students in buses or trucks. It has become rather inconvenient for children to go to school because of the dust pollution on the road. No private boarding schools have opened in the area. At present, using the road to travel to institutions of higher education in Dhading Bensi is also not feasible, because of the unreliable transport system and expensive fare (Rs 35 x 2 = Rs 70 per day in the study location).

#### 4.5.2 Impact on Health

In the study location of Baglung District, there is no health post. People have to go to Baglung Bazaar for all medical services. However, the impact of the road is also closely linked to the road networks. For example, in Baglung District the presence of the Pokhara - Baglung Highway has made a considerable difference in the availability of health services in Baglung Bazaar and in providing access to better services in areas where they are not available locally. For example, as the hospital in Baglung Bazaar is not well equipped with doctors, medicines, and equipment, the road has provided the alternative to go to other places such as Pokhara and Kathmandu for X-rays, surgery, and other services. Moreover, quite a number of patients, especially emergency delivery cases, still die on the way to health posts in the interior region. When the rural roads connect the interior region of Baglung District with the Highway, they make convenient for patients to come to the hospital in Baglung or beyond. In areas where motorable roads are not connected, it was suggested that the trek and mule trails, which link villages from the road head, should also be extended so that patients can be carried on stretchers.

In Dhading District there is a health post in Salbas in Chainpur VDC. This health post caters to the basic health and immunisation needs of the adjoining VDCs. After the road, two private medical halls opened up in Hulak Bhanjyang and Gola Bhanjyang and medicines and check-ups by a compounder are available. For hospital services people have to go to Dhading Bensi, the district headquarters. The road has made it easier for people to reach the hospital in Dhading Bensi in two ways. Initially, there was an ambulance service, though that has stopped because of an accident. Requests had to be made word of mouth, of course, in the absence of a communication network. Nevertheless, it was relatively easy and quick. In the sample survey of 50 respondents, none had ever used ambulance services though they cited examples of other users in the locality. Most respondents carried patients either by bus or the other transport services that are now available. The second advantage is that the road has made it easier to carrying a patient on a stretcher even at night.

In Ilam there has not been a visible change in the health services in Mangalbare Bazaar after the road. There were already two health posts: one allopathic and one Ayurvedic. The availability of health workers and medicines has not changed much after the road. But the road has effected the health sector in three ways. First, as the level of income has increased, the demand for better medical services has also increased. Apart from Ilam, people have also started to go to Biratnagar or Bhadrapur for medical check-ups, as the Mangalbare - Nepalatar rural motorable road is linked with the Mechi Highway. Second, although there is no ambulance service, patients have managed to travel by bus or truck. Previously, a contingent of porters was required to carry a patient on a *Doli* (like a stretcher) or in a *Doko* (bamboo basket). Such methods were time consuming and expensive. Third, rural roads have helped the immunisation programmes achieve greater impact. For example, one health worker commented "*In the last polio immunisation programme, the polio drops ran short in Jitpur camp. Had there not been a road the camp would have had to close. But the polio drops were made available within hours and the camp was continued.*"

In Kabhre District, there is a health post in Kushadevi Bazaar and a dispensary in Rayale Parkhal Chaur. There is also a private medical clinic in Kushadevi Bazaar. For primary health services, people in this locality go to these health posts and, for hospital services they go to Banepa Hospital. Respondents in Kushadevi/Rayale areas felt that the road had provided better and more reliable access to the hospital in Banepa. During the day, a patient can ride on the milk truck. In the case of an emergency at night, they can call an ambulance and reach hospital. Although none of the respondents have ever used the ambulance service, there is a feeling of confidence among the people that they can call an ambulance in the event of need. Second, transportation of hay by road has brought positive consequences to the health of women, because they no longer have to carry hay from Bhaktapur for seven to eight hours per day all through winter.

Regarding family planning, the road has contributed in three ways. First, in Ilam and Kabhre districts a pick-up and dropping service is provided as far as possible for patients having operation to reach them to the road head. This has encouraged the use of permanent family planning methods. Second, more village workers, from both GOs and NGOs, are now available for regular visits to the village. With the intensive visits to the villages, the general feeling that the vasectomy operation weakens the health of men has been reversed. Now male members are also accepting surgery. Moreover, there are more post-operative

follow-up visits for unsuccessful cases, and this has also helped to instill confidence. Third, with the opening of the road, more NGOs are visiting with demonstration materials on family planning, and this has encouraged more people to use family planning methods.

#### 4.5.3 Social Awareness

In respect of social awareness, the indicators used are reading newspapers, political meetings, and use of the toilet. The findings are presented in Table 4.13 below.

**Table 4.13: Impact of Road on Other Social Indicators**  
(Yes in %)

Area of impact	Baglung		Dhading		Ilam		Kabhre		
	On	Off	On	Off	On	Off	On	Off	
Reading newspapers	36	48	36	16	52	48	52	44	
Involvement in political rallies	20	16	28	16	20	16	76	84	
Use of the toilet	Open	28	-	48	60	4	-	28	4
	Pit	44	88	52	32	52	96	4	80
	Water sealed	28	12	-	8	44	4	68	16

Source: Field Survey

Note: On = On the road, Off = Off the road

Generally, there is no regular supply of newspapers or newspaper stalls in the study locations in any of the four districts. Reading newspapers is only occasional when one goes to the district headquarters. Generally, there are more newspaper readers along the road, except in Baglung District. Political meetings and rallies are seasonal and take place only during election periods. On such occasions, political rallies pass by on the road and meetings are organized in several places. Respondents support their groups. Interestingly, people felt reluctant to admit to participation in political rallies, as it is not generally looked upon positively. In Kabhre District, however, respondents were quite frank in stating their involvement in political rallies and meetings in which more respondents from off the road participated than those along the road; the case was just the opposite in the other three districts.

Regarding social consciousness about safe sanitation practices, it was found to be poor in the study location in Dhading District. Building toilets is not a priority. A majority of the people, more from off the road locations, are still using open spaces in nearby farm or forest areas. A few economically well-off and industrious farmers have water-sealed toilets, to which septic tanks are added and the human waste mixed with cow dung for biogas production. Women's development groups in Murali Bhanjyang VDC are running a programme about building toilets and raising awareness about sanitation. The success, however, is modest.

In Ilam, as Table 4.13 shows, pit latrines are common in the study areas. Recently, especially after the road, the use of water-sealed toilets combined with biogas plants has increased. The government policy to provide financial aid through ADB\N and access to the road for transporting construction materials have led to the establishment of a number of biogas plants in the area. However, such toilets are found more in the homes of higher income

groups along the road. In Kabhre District, 80 per cent of the respondents on the road used water-sealed toilets. In fact, there are a number of NGOs, such as the Red Cross Society, Water Aid, etc, who have provided a lot of support for small water supply and sanitation programmes in the project area. The Red Cross Society alone has given support to 11 water supply projects and 425 water sealed toilets in the project area. For building toilets, a household is asked to contribute 50 per cent of the cost of materials, and the Society provided materials, transportation, and technical support. The situation was similar in off the road locations in Baglung District where the Mothers' Club has helped 150 households build toilets on a cost-sharing basis. Though, in both districts, there is no direct relation between sanitation the road, it was reported that the road had contributed to raising awareness and about the problem and also made it possible to transport construction materials.

#### **4.6 Impact on Input Delivery and Extension Services**

Agricultural and livestock development are the main activities in the study area. The role of institutions in these activities is reported to be marginal and ineffective in all four districts. The JT/JTAs, who were posted to Agricultural Service Centres as the main extension agents, rarely visited the programme areas. In the field survey, very few of the respondents in all four districts reported that they had met a JT/JTA during the past year. One respondent from Dhading District jested, "We listen to the JT/JTAs on the radio with Budi Ama, but not in the field." The area-specific agricultural packages, such as 'mini-kits' were reportedly distributed to relatives and friends. On the livestock side, though the progress is impressive, especially in Ilam and Kabhre districts, the fodder development, distribution of high-breed animals, and so on were carried out mostly by households on an individual basis or by private traders.

In focussed discussions in Dhading District, people argued that extension workers seemed to be responsible only to their line agency, but not to the people. Some admitted that it was their fault also for not demanding their services. A JT/JTA, who is responsible for a number of VDCs, cannot go from door to door and ask whether services are needed. JT/JTAs could have, at least, provided information, through VDC Offices, on the availability of inputs, credit, and seeds. On the other hand, in Ilam District people commented that the JT/JTAs should have showed up in the area. Then only would people have been encouraged to learn and try something new. For example, Pakhribas Agricultural Centre, Dhankuta, has a field programme in Mangalbare, Ilam District, and Lumle Agricultural Centre has a field programme in Singana, Baglung. Their field staff make frequent visits to the programme villages and thus create a demand for their services.

The main reason for JT/JTAs not visiting the programme areas is the lack of supervision by their superiors. They get field allowances for which they are supposed to visit field areas for certain days. In reality, they visit only on paper. If they can get field allowances without field visits, why should they visit? Although the accessibility of the area has increased as a result of the road, neither have the JT/JTAs increased their field visits nor have the supervising offices monitored their activities. Moreover, their salary structure is so low that they cannot bring their families to the field, and this could have ensured a longer stay in the working area. Consequently, most of them, who are not local, stay alone and make frequent visits home.

In Kabhre District, respondents said that Kushadevi - Rayale area is endowed with good quality soil and water for irrigation. The road has connected the area to the market also. Now people want know-how about alternative cropping patterns to take advantage of the situation. The Agricultural Service Centre, located in Kushadevi, has a programme only for subsistence crops, as in any other district. However, the JT/JTA working in Kushadevi felt that the people in this area were not industrious that they did not grow crops requiring a lot of labour and continuous care. The JT/JTA thought milk production was popular because it gave them an opportunity to travel to the collection centre and gossip with others in the teashop the whole morning. They seemed to be satisfied with the present level of income.

On the livestock side, although Kabhre District is famous for milk production, the Livestock Development Office does not have any supportive programme activities. For example, there is a great demand for well bred buffaloes that are mostly imported from the Terai by private traders. It takes a considerable time for these animals to adapt to the local climatic conditions and become productive. But there is no breeding centre at the local level. Although the Livestock Office has distributed a few male buffaloes for local breeding, this has had only a marginal impact in relation to the level of demand. Likewise, there is no risk-sharing mechanism such as animal insurance. If an animal dies at the beginning of the lactation period, it is indeed difficult for a typical small farmer to recover from the debt trap. A mechanism exists, but with complex bureaucratic procedures, for ADB\N to support livestock husbandry. But such mechanisms do not cover the animals, purchased privately which constitute the majority in the area.

On the credit side, although there is not much of a problem about access to institutional credit it was argued that ADB\N should act as a development banker. For example, it gives production credit for a number of items on the assumption that all factors are within the control of a farmer. But, in reality, the supporting agricultural institutions are ineffective at providing inputs and extension services on time, there is a marketing problem for the goods produced, and the price fluctuations are very high. With due regard to its security concerns about credit, the Bank should also have some concern about these aspects.

Among other institutions, the Mothers' Club has evolved as a powerful instrument for developing community awareness in the areas of health, sanitation, and gender issues. In Singana VDC in Baglung District, the club is involved in water conservation, water tap construction, conscientisation about the need for toilets, and tree plantation in erosion prone areas.

Regarding the effect of the road on local artisans such as tailors and blacksmiths, it was found that they have maintained their traditional relationships with the community. Although in most cases, they live within the same hamlet, they are *Pani Nachalne\** (untouchable) castes. They are affiliated with the *Bista* (client) families through a *Bali* system, by which they receive foodgrain annually. For the tailors, the *Bali* (amount of grain) is fixed based on the number of family members while for blacksmiths the amount is fixed on the basis of operational land holdings. The main work of both tailors and blacksmiths is to make new items and repair the old ones in the *Bista* houses. At first glance, the road does not seem to have affected the traditional artisans as they are continuing with the old relationship. Unless the

\* *Pani nachalne* means 'higher' castes will not take water from them or eat what they touch.

technology of local artisans is improved and necessary support provided to help them compete with the market, they will be affected when cheap readymade items penetrate the interior villages through the road.

#### 4.7 Environmental Impact

In the field survey, two questions, one on soil erosion and landslides and an other on smoke and dust pollution were asked about environmental aspects. The response is presented in Table 4.14 below.

**Table 4.14: Environmental Impact of Road as Perceived by the Respondents**

(Yes in %)

Area of impact	Baglung		Dhading		Ilam		Kavre	
	On	Off	On	Off	On	Off	On	Off
Landslide	92	76	52	20	52	20	40	68
Pollution	48	52	96	88	24	44	52	-

Source: Field Survey

Note: On = On the road, Off = Off the road location

In Dhading District, the environmental aspect, which was mainly defined as landslides and mass wasting, was given a lot of consideration in road construction. Several measures, such as phase-wise construction, labour-intensive methods, use of bioengineering techniques, and so on, were taken to reduce adverse environmental effects on the road. After construction, the road is closed for three months a year during the rainy season to reduce the damage caused by vehicles on the soft earthen road. Although more respondents along the road felt that the road had caused landslides, no such evidence of serious landslides was visible during the field survey.

On the question of pollution in Dhading District, respondents from both sides said that there is a high level of pollution due to the road. It was reported that during the dry season, there is a lot of dust pollution caused by the road. An area of about one kilometre in radius from the road alignment is covered by dust during that period. All the respondents along the road complained that they have to close their doors and windows to minimise dust pollution inside the house. One old man related an incidence of buying millet flour in a *Dalo* (bamboo basket). He went to graze the animals for the day. On his return in the evening, the flour was beneath a thick layer of dust because the doors and windows were left open. Several examples of dust pollution were cited during open discussions. The dust factor is so intense that one respondent said that one could not recognise oneself when one reaches Dhading Bensi! Almost all respondents complained that the dust pollution could have a severe effect on health.

The effect of dust pollution was also reported on grasses and fodder trees. Livestock — do not eat grasses and fodders covered with dust. On fruit trees, such as mangoes, dust pollution has reduced yield by effecting the pollination process. One respondent, who owned a

fruit orchard, said, "In fact a 'green road' was conceived to preserve the greenery around the road. Tree plantation on both sides of the road was also part of the programme which, however, did not materialise. At the end, the soil was exposed to the sun and the road turned out to be a 'dust road'."

In Ilam District, more people along the road felt that there were more landslides due to the road. Some landslides along the road were natural in weak and steep topographic sections, while others, perhaps the majority, were due to the lack of necessary supporting structures such as retaining walls and drainage, as shown in the photograph below.

It was reported that landslides are related to the construction method used for building the road. Until 1992, the DOR used to construct district roads through local contractors. However, after the local elections for VDCs and the DDC, the local political leadership in Ilam District felt that the work could have been done better through the users' committee. Accordingly, the DDC Ilam wrote to the MLD with the following arguments.

- The DOR used contractors for road construction, so there was no scope for people's participation.
- If the available resources, along with people's free labour, could be used for earth excavation, vehicles could ply on the road. Structural work could be completed on a phase-wise basis.

Since 1993, when the rural road projects were handed over to DDCs, the project under study has been implemented through the users' committee. As the users' committee did not have technical manpower, no detailed survey was carried out and no technical profile of different sections of the road was prepared before construction. People's free labour contributions were mobilised for road construction and priority was given to constructing road surfaces so that vehicle movement could commence as early as possible. Consequently, there were more landslides along the road. Earlier, when the road was constructed through the DOR, although a large sum of money was misused to the contractor's profit and because of corruption, the DOR had enough technical manpower for an alignment survey and preparation of a profile of the total road project before construction began. Therefore, depending on the availability of money, structural work on selected sections was carried out.

Even then, landslides and soil erosion were reported to be comparatively less in the road area in Ilam than elsewhere in Nepal due to the use of several fast-growing species such as *Uttis*, Broom grass, Bamboo, etc. These species have contributed to controlling soil erosion along the road.

Regarding dust and smoke pollution, it is interesting to note that more respondents in off-the-road locations felt that it had increased due to the road. There are two explanations. First, it was felt during the survey that people along the road had accepted dust and smoke from the road as necessary trade-offs for achieving greater benefits from the road. In other words, the benefits they have gained from the road have more than off-set the cost of pollution, while those off-the-road had to accept the dust without any benefits from the road. Second, some respondents along the road said that, due to the low traffic volume, there was no pollution. Yet if traffic volumes increase, the pollution might also increase.

## Road damage due to the lack of necessary structural works



In Kabhre District, although the road has passed through a relatively flat area, and was, in fact, constructed by extending the existing trail, some landslides were visible along the road. Nearly half of the respondents, more in the off-the-road location, felt that such landslides had occurred because of the use of the bulldozer to extend the road destabilising the land around the road alignment and also making the slopes of mountain sides almost vertical. Similarly, only the surface of the road was extended with soft soil, without supporting structures such as retaining walls, drainage, etc. On agricultural land, through which the road alignment passes, landslides are usual, because the soil of the roadbed is wet with water most of the time. The *Khet* around the road remains covered with crops most of the time and is not given time to stabilise by means of tree plantation.

Regarding pollution, half of the respondents along the road said that both dust and smoke pollution had increased after the road. They explained that on a rough road, there is more vehicular emission than on a 'finished' road. Moreover, many of the vehicles that ply the road are old and naturally emit a lot of smoke. Likewise, as the road is not well surfaced, there is a problem of mud deposits during the wet season and dust during the dry season.

### 4.8 Conclusion

In all four districts, visible changes were observed in the study locations in all spheres of life. It was found that the road had reduced the feeling of isolation and remoteness among the population and had inculcated a sense of 'connected tree' through the road with the mainstream development process such as markets, social services, and development institutions. Moreover, the decisive control of traders in frontier locations over hinterland trade had been

## The Use of Bamboo on Roadsides Controls Soil Erosion



weakened as a result of the road extension beyond the frontier market. For example, in Dhading District, the traders of Gola Bhanjyang, Salyantar, and Arughat import directly from the larger market in Kathmandu and Narayanghat, instead of depending on the local traders of Dhading Bensi. Similarly, in Ilam District, the control of trade by Ilam Bazaar over the hinterland market centres, such as Mangalbare Bazaar has weakened as the latter deal directly with larger market centres such as Birtamod and Biratnagar. Moreover, transport cost, time, and damage to goods in transport have decreased considerably, and the volume of business in the area influenced by the road has increased significantly.

However, the prices of essential goods, except for salt and kerosene in Baglung District, did not decrease in spite of the savings in transport costs because of the roads in the study area. In fact, prices increased everywhere, the road was a factor reducing the price differential between the main markets and area although served by roads. The road did contribute to an increase in the availability of merchandise in areas connected by road and to a decrease in price differential between the larger market centres and the road head. However, as the price did not fall below the base level set before the road was built, but increased over a period of time, it suggests that the benefits from savings in transport costs are not always passed on to the consumers. Thus, on the whole, the net beneficiaries were the transport owners and retailers, rather than those who donated land for the road free of cost and contributed free labour for the 'development project'.

The scale of production has increased, although with considerable variations throughout the study areas. Many of the locally available, non-marketable items, such as *Lapsi* in Kabhre District and Broom flower in Ilam District, also became items commercially profitable items.

Production of valuable cash items with low shelf value, such as vegetables and milk, benefitted from the roads, especially in Ilam and Kabhre Districts. It was observed that the potentials for increasing production existed in all study locations. But serious limitations were noticed in terms of input supplies, technology transfer, marketing networks, pricing policies, and risk sharing mechanisms. Important factors among these constraints are described below.

First, although rural roads are expected to bring about economic transformation in the areas connected by roads by increasing local production and export, there are no supporting institutions to help achieve such a goal. The existing institutional setting is not designed to play a supporting role to a market-led economy. Each line agency at the district level is implementing targets set by its parent agency in Kathmandu. The administrative culture and values are traditional and bureaucratic. Therefore, it is natural that the front-line extension agents in agriculture, the JTs and JTAs, see themselves as office workers to whom the needy should come to request help rather than extension agents for change. Those who are working extensively in the field are also found to be motivated more on the basis of individual quality and capacity rather than on the basis of institutional incentives and values. The gap between demand for and supply of technology, inputs, and extension services is enormous. Some activities, such as importing well-bred varieties of buffaloes from the Terai to Kabhre District, breeding jersey cows in Ilam District, or importing mules in Baglung District, have been taken over by private traders or on a farmer-to-farmer contact basis. But the private sector is more motivated by profit than by area development. It is, therefore, important that, in order to achieve transformation of these areas from isolated subsistence economies to market-led integrated economies, the official institutional mechanism should be revamped and NGOs also involved in developing such mechanisms.

Second, the marketing mechanism for agricultural commodities is unreliable, particularly in the volatile market. In spite of the fact that the wholesale market has extended beyond the front-line market as a result of the road, there is a lack of knowledge about the size of the market for different commodities over a period of years. Without market knowledge farmers cannot use land on which they farm subsistence crops for longer-term cash crop production. It is interesting to note that, on the one hand, the government has been pursuing an agro-led development strategy, which may have wider distributive effects on the rural economy, and, on the other, agricultural producers are unable to procure a reliable market for their produce. Farmers, such as Sunil Shrestha (Box 5), claimed that they could have produced more had there been prior knowledge of an assured market. In order to bridge the gap between producers and the market, the government could use the District Agricultural Office which has a nationwide institutional network for collecting and updating the market information for different types of agricultural products and inform farmers through JTs and JTAs.

Third, considerable price fluctuations have been experienced for agricultural products. For example, in Ilam District, prices of some commodities have declined more than twice in a year. Nobody knows who controls prices and why they fluctuate. As a result, local wholesalers keep a considerable margin to cover the risk of price fluctuations, and, therefore, farmers do not get fair prices.

Finally, there is no risk-sharing mechanism in the agricultural and livestock sectors for crop failure, price fluctuations, and death of animals. In Kabhre District, most of the buffaloes are

imported from the Terai and in Baglung mules are imported from India via Nepalganj. It takes time for these animals to adjust to the local climate. Some of them die. Since there are no risk-sharing mechanisms such as insurance policies, investment in these businesses is very risky. It was alleged that ADB gives full consideration to the security of its credit, while overlooking other risks, such as crop failure and price fluctuations, which a farmer may have to face in the production process. For ADB-supported livestock animals, an insurance mechanism exists, but it has very complex procedures. There is no insurance policy for privately purchased animals, which constitute the majority in the area.

In other sectors, such as education and health, the road has made a positive contribution, although the road is not the sole contributor to change. In education, the road has reduced the feeling of remoteness and isolation, therefore, good teachers from outside have also moved in to teach in local schools. In the health sector, the road has made it possible to get patients to better hospitals quickly.

Regarding environmental impact, two conclusions can be made. First, in the 'green road' concept of Dhading District, tree plantation on both sides of the road was also included in the programme but, however, did not materialise. One of the problems in enforcing tree plantation on roadsides is that the road occupied land donated freely, therefore the right of way cannot be effectively demarcated and trees planted. If the land occupied by the road is purchased by the public authority it can control the road better as well as have right of way, and people would not feel that they have given something for nothing. Therefore, in order to make tree plantation a part of the road project, the land occupied by the road and the right of way should be procured through compensated to the owners. Second, for DDC/VDC managed roads, the available resources, along with people's free labour, are used for excavation of earth in order to enable vehicles to ply the road as soon as possible. This ad hoc approach to road building, as discussed in Chapter 3, has had serious effects on the environment. The road policy of the DOR has prescribed five stages for road construction (Section 2.3) in which Stage I must precede all stages with detailed engineering design, costing of construction/upgrading a road project, and planning the construction process. This policy should be enforced at the project level. For rural motorable roads, appropriate technologies, such as the LES method which has shown positive results in minimising environmental damage, should also be incorporated in the policy and enforced.

# Chapter 5

## Summary of Findings and Recommendations

### 5.1 Introduction

The study was undertaken based on the premise that rural roads are essential for sustainable development. In this broader context, it examined the policies, institutional arrangements for rural roads, and their linkages with production processes at policy, programme, and project levels. The main findings, along with the problems identified at various levels, are summarised in this Chapter. Based on the findings, some policy and programme level recommendations and suggestions are made for the development of environmentally friendly rural road programmes for sustainable development.

### 5.2 Summary of Main Findings

#### 5.2.1 Policy Level

In the conventional literature, and also in practice in Nepal, rural roads are defined as district- and village-level motorable roads providing access to higher level roads or market places. But, given the difficult terrain in the hill and mountain areas of Nepal, there are technical, financial, and environmental limitations to the extent to which motorable roads can and should be constructed. Therefore, in this study the concept of rural roads is defined as a way of providing access to markets in order to realise the development potentials of an area. The definition includes track, mule trails, and suspension (wooden) bridges that are connected by rural motorable roads, which in turn connect to feeder roads and highways. Such combinations would become a 'rural road network'. While designing rural roads, among others, greater attention should be given to minimising the damage to the environment, as the alignments of rural roads are likely to pass through village settlements. Since various types of rural road are interconnected, the economic benefits from the rural road network are also likely to be interdependent.

In the Eighth Five Year Plan (1992-97), the lack of effective rural infrastructure to facilitate access to agricultural inputs and outputs as well as basic services has been recognised as the main impediment to poverty eradication. The Plan called for the development of an extensive rural road network in the country as a prerequisite to achieving the national objectives of faster economic growth and poverty reduction. During that period, several national level studies were carried out to identify the need for a rural road network for the country. The District Road Network Studies (1992-93) proposed to construct over 14,000km of new roads representing an increase of over 150 per cent above the existing level. The Agriculture Perspective Plan (1995) proposed to construct an additional 6,200 km of rural roads in the next 20 years, in order to provide a reasonable road density for rural areas. The Priority Investment Plan (1996), although it did not sum up the total additional mileage, recommended the maintenance of the existing road facilities followed by construction of earth standard roads into areas currently not connected by road, especially in the hill districts.

Although a lot of work has been done at the national level to identify the need for rural roads, the operational plans of these major studies were not clearly conceptualised. The national level studies seem to have taken for granted that the objectives can be achieved by strengthening the present bureaucratic structure or creating a new one. For example, the District Road Network Studies assumed that, by strengthening the District Road Offices under the DOR, the additional work, could be carried out, while the APP proposed to create a separate organization, e.g., the Department of Agricultural Roads. The PIP (Vol III) talks about the technical and economic aspects of the projects identified, remaining silent on strategies for their implementation. In reality, the implementing agencies are the DDC\VDCs all over the country, which have very limited technical and managerial capabilities for carrying out such large projects. Further, as the DDC\VDCs are self-governing, statutory local bodies, they are competent enough to set their own priorities and operational procedures (Chapter 3). Therefore, the target set at the national level and the standards prescribed would only be meaningful when they are actually carried out at the local level with the same technical standards. Keeping these institutional linkages in mind, a clear rural road policy should have been prescribed as a part of the study.

In order to develop rural roads in a sustainable manner, several innovative experiments have been carried out that have shown encouraging results. The concept of a District Transport Master Plan, which was developed and tested in a number of districts, can prove to be an useful document for the DDCs in preparing annual programmes and plan for the maintenance and rehabilitation of district transport networks. Another innovative experiment of a low-cost environmentally friendly and self-help (LES) approach to rural road construction has been carried out in Palpa and Dhading districts. The LES approach is based on a series of principles to address a broad range of technical, environmental, and socioeconomic issues such as the phase-wise construction method to allow natural settlement and stabilisation, balanced cut-and-fill so that the roads merge into the landscape; bioengineering for slope protection; labour-intensive construction methods in order to use the underemployed rural labour force; use of indigenous skills, materials, and tools; and a participatory approach to road construction and maintenance. The LES approach could be very suitable for labour surplus and environmentally fragile countries such as Nepal.

### **5.2.2 Programme Level**

At the programme level, although most of the elements in the concept of a development project, such as development objectives, activities, resources, targets, and specific locations, are found in the DDC level projects, they seem to be included to meet administrative requirements rather than to achieve objectives. For example, a project is identified and designed, resources allocated and a users' committee formed for implementation. But all these steps are fulfilled only in a formal sense without being oriented towards and used for efficient use of available resources to achieve the stated objectives.

The policy framework and institutional arrangements that exist at the central as well as at the local level are not used effectively. For example, stages in the planned development process adopted in each district are different and the Manual for the Rural Road Programme, issued by the MLD, is not followed at the operational level. In fact, the local self-governing bodies such as the DDCs\VDCs are autonomous and set their own priorities and operational rules.

The MLD, which is supposed to coordinate at the national level and provide policy and technical support to the local level, is not properly equipped to enforce national policies at local level.

Similarly, a number of innovative experiments has been carried out on the development of a District Road Master Plan at the local level, as well as a low-cost, environmentally friendly and self help (LES) approach to rural road building (Chapter 2). However, these experiments do not seem to have impressed the policy-makers and implementing agencies (such as DDCs and VDCs) who have continued to follow their own practices in project selection and implementation. For example, the phase-wise construction method is prescribed in the road policy of the DOR; it prescribes a detailed engineering survey and design, costing of the construction/upgrading project, and planning of the construction works as a necessary initial phase. The construction of roads through the LES approach, the phase-wise construction method, is used to allow the natural stabilisation process for environmental protection and to coincide with the agricultural slack season so that labour for construction is available. But in the DDC/VDC managed projects, although roads are constructed on a phase-wise basis, there is no clear planning for inter-connection between phases, rather the phases are dictated by the budget allocations. Consequently, roads are always constructed on an *ad hoc* basis and, in many cases, the resulting roads are of such a low standard that they cannot be maintained. On the technical side, there is a lack of sufficient technical manpower for the projects run by DDCs, and the available technical manpower at the district level are scattered and not used effectively.

Finally, there is no clear maintenance policy for rural road projects. Two issues, one about the ownership of rural roads and the other about rural road users, are related to designing a road maintenance policy. On the ownership issue, the users' committee, even if it is organized and strengthened, cannot be the owner of a rural road project, as road users are identifiable. Due to the wide coverage of a rural road, the project users cannot easily elect a truly representative users' committee. In addition, there are regulatory functions for the operation of a rural motorable road such as closure of traffic during the rainy season, prohibition of heavy vehicles, or load limit, toll tax collection, tree plantation on the right of the way and regular maintenance work that could be difficult to enforce through a body such as the users' committee which is designed for increasing people's participation. For other types of rural road, such as trails, tracks, and suspension bridges, the users' committee, constituted either from the locality or of the lay officials of the VDC/DDC, could regulate periodic maintenance work through self-help.

The issue of effective use of a road is linked to the increase of production in areas connected by the road. The use of the road should be to provide inputs and technology from, and produce to, the market. In the absence of local production, use of the road would be only to carry in industrial products for retailers. As a result, the regeneration of capital for road maintenance through toll tax collection will be limited. Therefore, for the regulatory function, a separate body can be created at the district level that can coordinate all rural roads for the purpose of operation and maintenance. For increasing production in areas connected by a road, the DDC, VDC, or Municipality, depending on the type of road, should be involved in making plans to promote production, and this will ultimately generate more revenue from the roads.

### 5.2.3 Project Level

At the project level, it was found that various roads are interconnected and the economic benefits are also interdependent. On the whole, the road has reduced the feeling of isolation and remoteness among the population and has inculcated a sense that they are connected by road with the mainstream of development such as markets, social services, and development institutions. Moreover, the decisive control of the traders from frontier locations over hinterland trade has been weakened as a result of road extension beyond the frontier market. And, indeed, the transport cost, time, damage to goods in transit, have decreased considerably and the volume of business in the area of influence of the road has increased considerably.

The prices for staple goods did not decrease, except for salt and kerosene in Baglung District, in spite of the savings in transport costs in the study area. The road did contribute to an increase in the availability of merchandise in the areas connected by road and to a decrease the price differential between larger market centres and the road head. However, as the price did not fall below the base price already set before the road was established, but increased over a period of time, it appears that the benefits from saving transport costs were not passed on to the consumers. Thus, on the whole, the main beneficiaries were transport owners and retailers, not those who donated land free of cost and contributed free labour for the construction of the road.

The scale of production has increased, although with considerable variations throughout the study areas. Many of the locally available, non-marketable items, such as *Lapsi* in Kabhre District and Broom flower in Ilam District, have also become commercially profitable items. Production of valuable cash items with short shelf life value, such as vegetables and milk, benefitted from the roads, especially in Ilam and Kabhre districts. It was observed that potentials for increasing production existed in all study locations. Nevertheless, serious limitations were noticed in terms of input supply, technology transfer, marketing networks, pricing policies and risk sharing mechanisms.

In social sectors, such as education and health, the road has made a positive contribution, although the road is not the sole contributor to change. In education, a visible impact of the road is that good teachers from outside have also moved into teach in local schools. In the health sector, the road has made it possible to reach hospital more quickly.

Regarding the environmental impact of roads, two problems were observed in the road projects studied: manifest in landslides and soil erosion on the one hand and the unsound quality of the road resulting in problems of maintenance, on the other. First, the plan to plant trees along the roadside did not materialise even in the technically well-planned LES project in Dhading, primarily due to the confusion about right to the land by the roadside. Second, for the DDC/VDC managed roads, the available resources, along with people's free labour, were used mainly for earth excavation in order to enable vehicles to ply the road as soon as possible. This *ad hoc* approach to road building has had a serious impact on the environment. The road policy of the DOR, prescribing five stages for road construction (Section 2.3) in which Stage I must precede all stages for detailed engineering design, costing of construction/upgrading a road project, and planning the construction process has not been effectively enforced at the project level.

## 5.3 Recommendations

Based on the findings mentioned above, the following recommendations have been made.

### 5.3.1 Rural Road Network

The concept of rural roads, as defined in this report, is as an access to market in order to realise the development potential of the area; it includes rural motorable roads, tracks, mule trails, and suspension bridges. All of them interconnect with each other, making the motorable road the centre of the hierarchy which, in turn, connects to the feeder road and the highways. Such a combination would become a 'rural road network'. The strategy for the development of rural roads should include all these components, so that the positive impact of the 'rural road network' is realised.

### 5.3.2 Rural Road Policy

The policy framework for rural roads is weak and unclear, and many the policy guidelines are not enforced effectively at the project level. A comprehensive rural road policy to include the following elements is required and recommended.

#### (a) An Institutional Mechanism

Currently in Nepal, the authority for identifying needs planning projects, implementing them, and maintaining and operating rural roads is too defused and uncoordinated. Coordination at one point is needed so that the resources are used efficiently. For the regulatory functions at the local level, such as closure of traffic during the rainy season, prohibition of heavy vehicles, load limits, toll tax collection, tree plantation on the right of the way, and regular maintenance work, a public office such as a District Road Authority, accountable to the local government, needs to be established at the district level. At the same time, in order to make the road economically viable by increasing production in the areas connected by it, the local government should coordinate the activities of sectoral agencies, NGOs, and private sectors in production, transportation, storage, and marketing of local products.

The rural road programme also needs financial, technical, and policy support at the national level. Therefore, there should be a proper institutional setting at the local as well as the national levels. Local level institutions should work at identifying needs; planning projects, and implementation, maintenance and operation of rural roads, while the national level institutions should be concerned with policy formulation, technology, quality control, and mobilisation of internal and external resources.

#### (b) Technology for Rural Roads

There are two points for serious consideration. First, the employment opportunities generated by rural road projects must be retained locally as far as possible. Second, since rural roads are likely to pass through farmland and village settlements, the environmental considerations must receive top priority. Among the currently available technologies in Nepal, the LES approach seems to be an appropriate one. Such technology should be used widely for

the development of rural roads. Moreover, further research is required to adapt other indigenous technologies, e.g., cement-less suspension bridges (Box 2), for the development of a rural road network.

### 5.3.3 The Road Head Concept

In all districts, development of *Bazaar(s)* along the roadside, typically with teashops and hotels, were observed. Though some of these *Bazaar(s)* have developed as marketing points for agricultural produces from adjoining villages, they lack physical facilities, usually the space for collecting, processing, packing, storing, and loading and unloading goods. Therefore, in order to develop organized marketing centres along the road, suitable areas that are connected with the main mule trails near major settlements and are potential areas for the development of a 'road head' could be identified during the alignment of a rural motorable road. Some infrastructural support, such as land stabilisation and construction of link roads, could be given during road construction. Most likely, settlements in such stabilised areas will be spontaneous, but some external support may be needed to avoid unorganized mushrooming of structures. Eventually, the road head could be the market outlet for the surrounding villages. It would also discourage ribbon settlement along the road; dangerous in terms of road safety as well as in terms of human health.

Through the 'road heads', institutional support, such as inputs, credit, and technology, can be spread throughout the hinterlands. One method would be to use the JTs\JTAs as effective contact points at the road head. If JTs\JTAs were supported to open retail shops for vegetable seeds, fruit saplings, and other inputs at road heads, the people concerned could reach them and also find out about cropping methods. At the same time, the JTs\JTAs could be marketing channels for certain locally-produced items, such as vegetable seeds, that could be supplied to other places where there is a demand. In this way, the JTs\JTAs can earn enough to live with their families in the field and be available to provide services to the farmers in the area.

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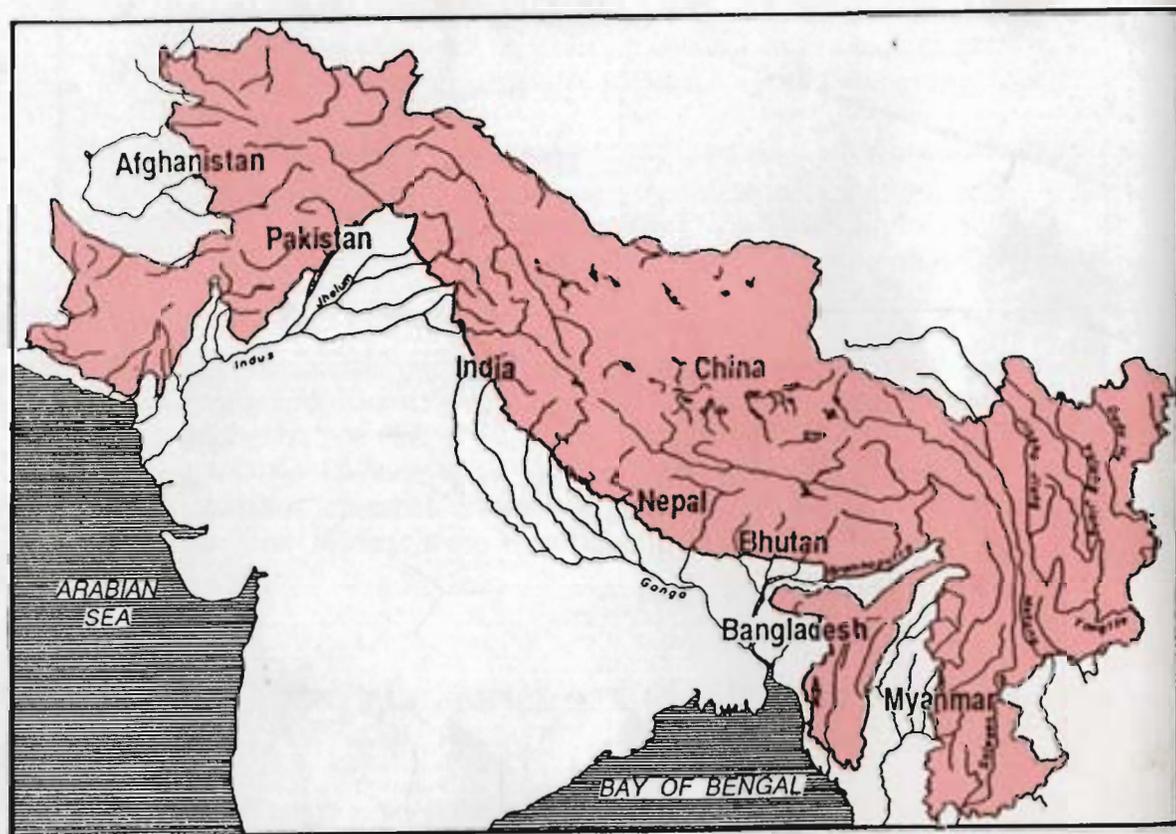
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# PARTICIPATING COUNTRIES OF THE HINDU KUSH-HIMALAYAN REGION

- ❖ Afghanistan
- ❖ Bhutan
- ❖ India
- ❖ Nepal

- ❖ Bangladesh
- ❖ China
- ❖ Myanmar
- ❖ Pakistan



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