

Japan International Cooperation Agency (JICA)
His Majesty's Government of Nepal

No. 2

**THE DEVELOPMENT STUDY
ON
INTEGRATED WATERSHED MANAGEMENT
IN THE WESTERN HILLS OF NEPAL**

**FINAL REPORT
VOLUME I SURVEYS**

JANUARY, 1988

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ON
INTEGRATED WATERSHED MANAGEMENT
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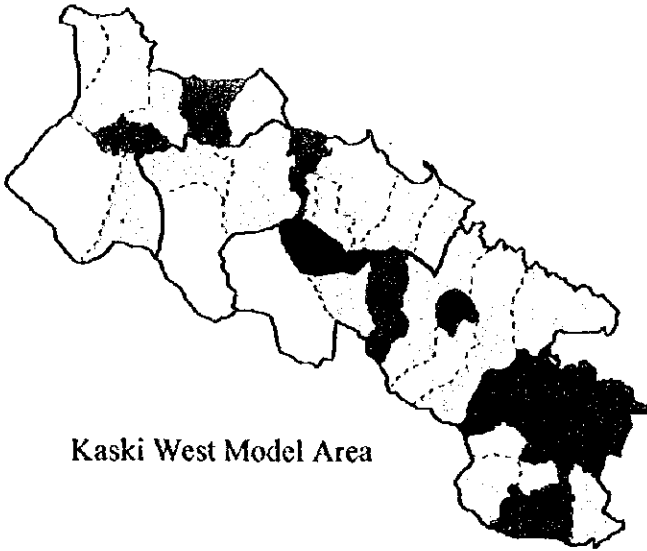
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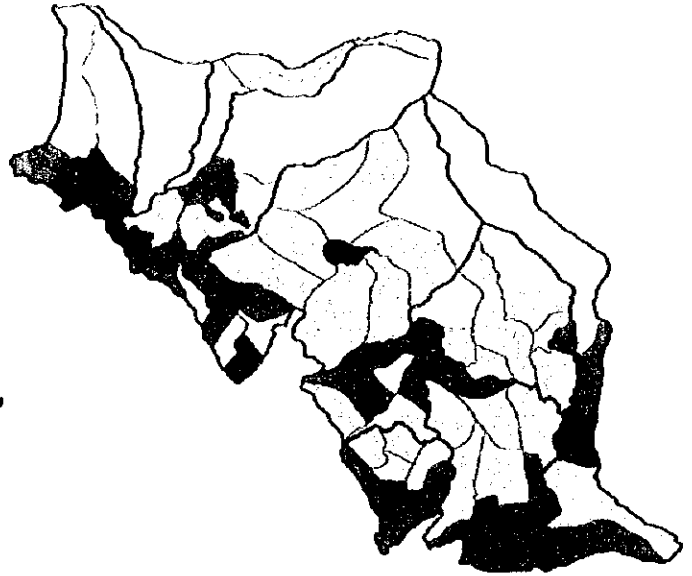
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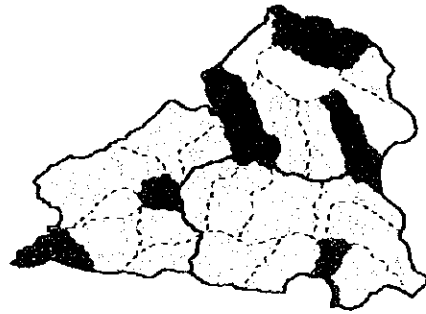
Kaski West Model Area



Kaski North Model Area



Parbat North Model Area



Kaski East Model Area



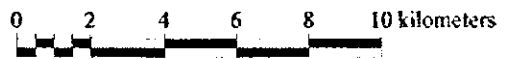
Parbat South Model Area

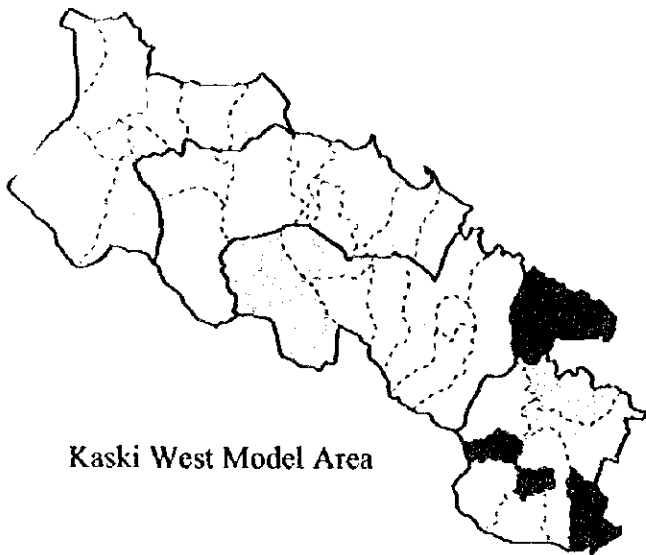
LEGEND

	Pop. density <= 100
	100 < Pop. density <= 300
	300 < Pop. density <= 500
	500 < Pop. density <= 700
	700 < Pop. density

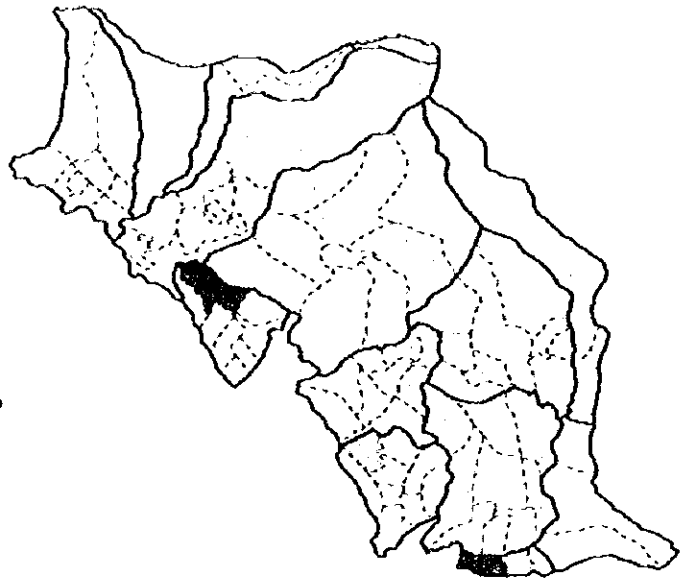
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 Population data by Ward : VDC/Ward Profile
 Ward area : Measurement by GIS

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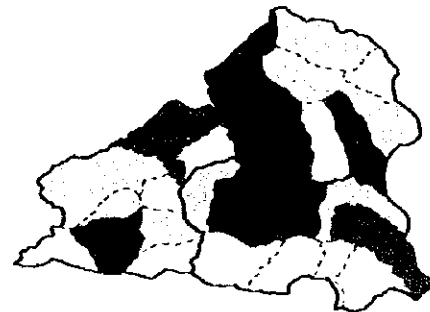
Kaski West Model Area



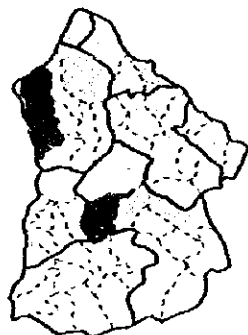
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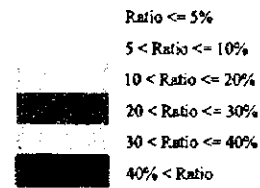


Kaski East Model Area



Parbat South Model Area

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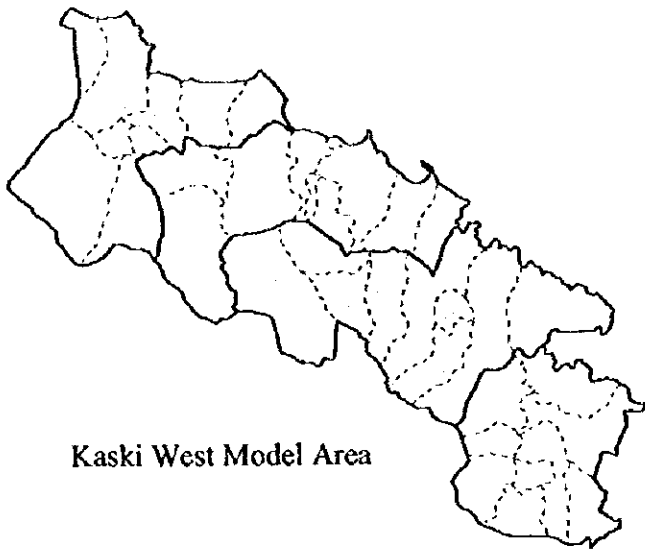


Data Source:
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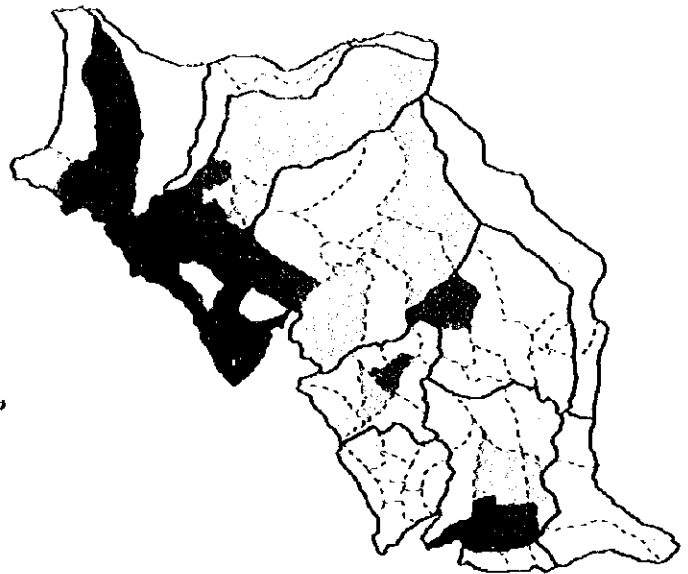
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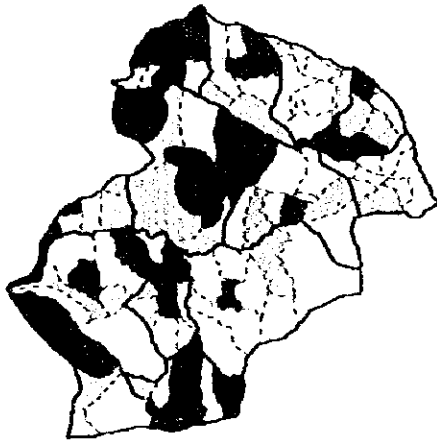
2 Proportion of Households Facing Severe Water Shortage in Dry Season



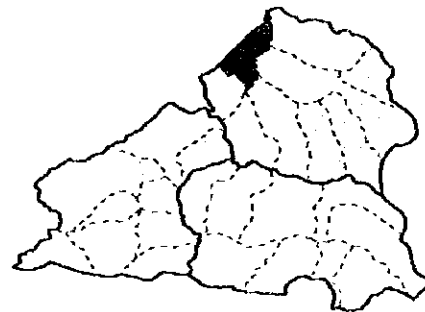
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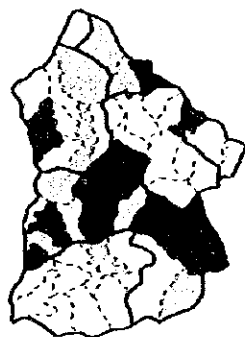
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Parbat North Model Area

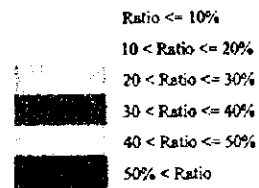


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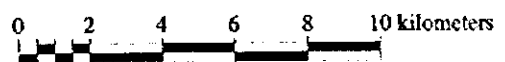
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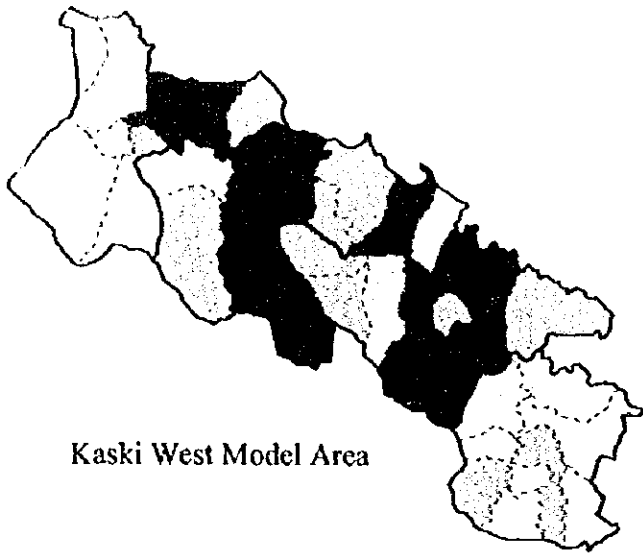


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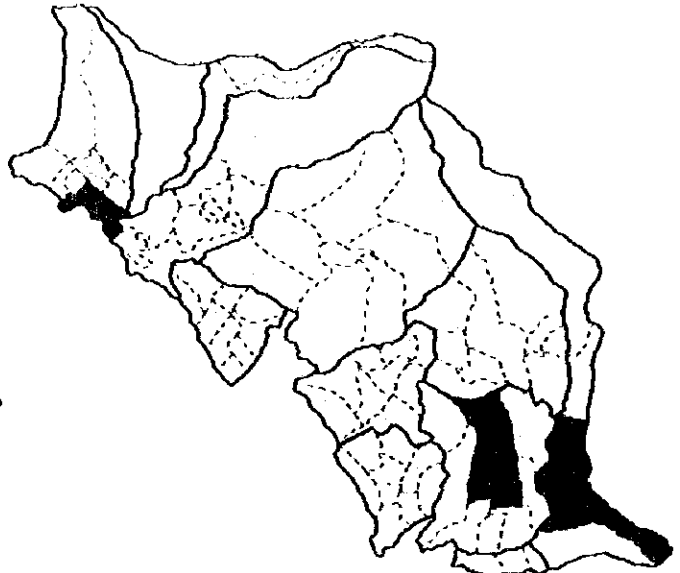
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3 Proportion of Households Facing Severe Difficulty in Obtaining Fuelwood



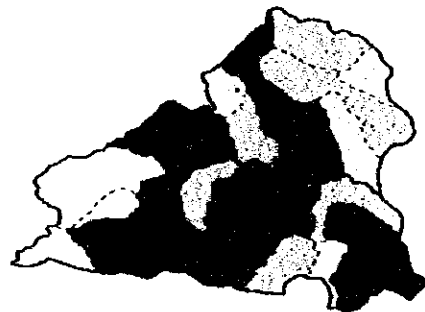
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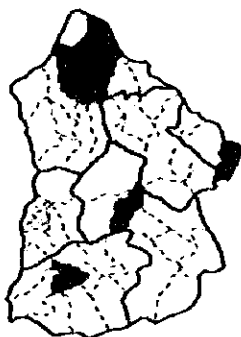
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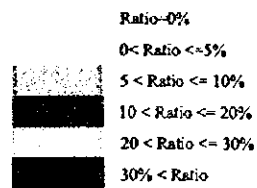


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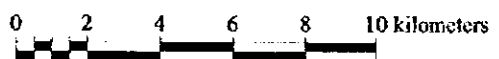
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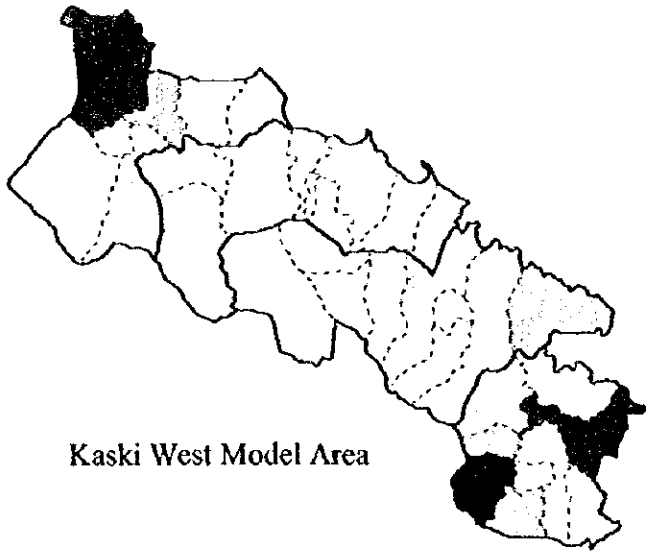
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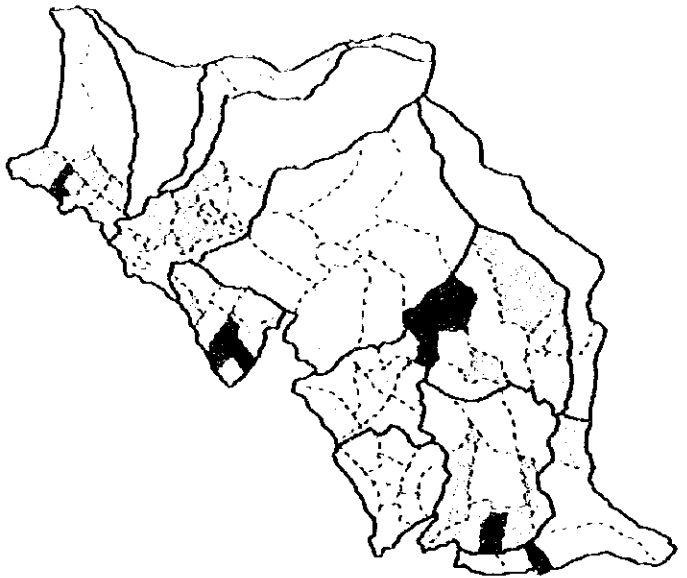
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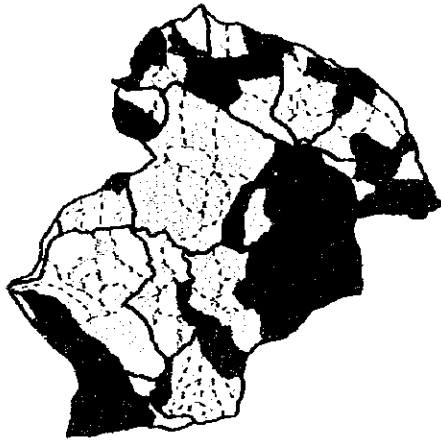




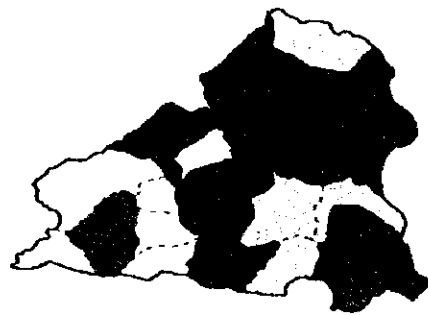
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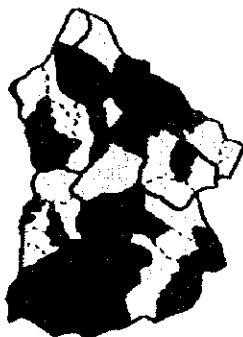
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Parbat North Model Area









Kaski East Model Area



Parbat South Model Area

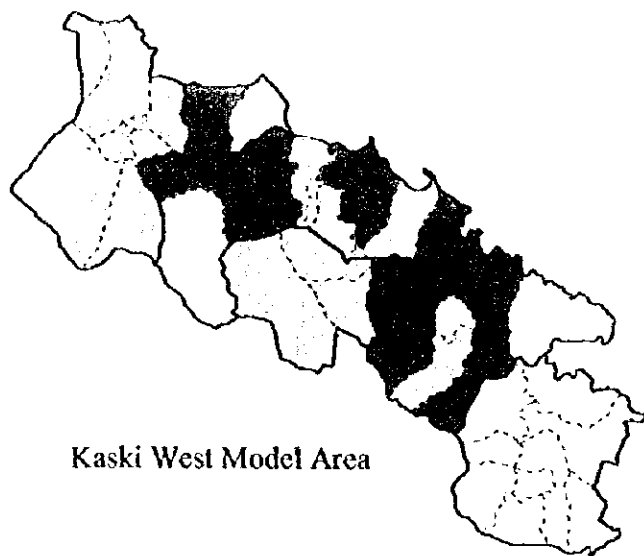
LEGEND

-  Ratio = 0%
-  0 < Ratio <= 20%
-  20 < Ratio <= 40%
-  40 < Ratio <= 60%
-  60 < Ratio <= 80%
-  80% < Ratio

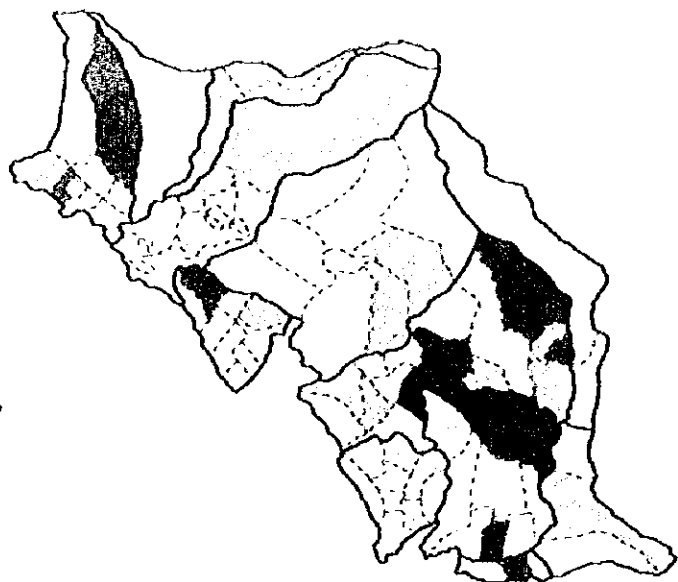
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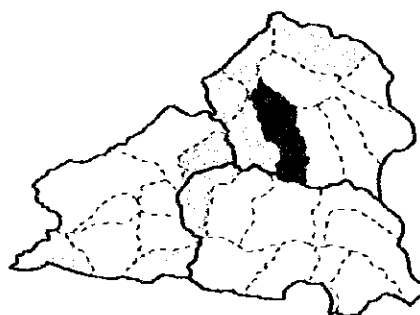
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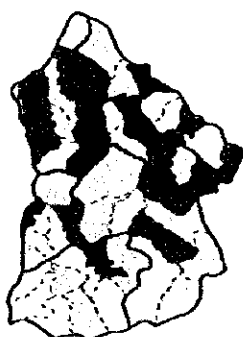
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Parbat North Model Area

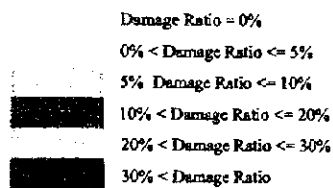


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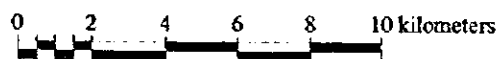
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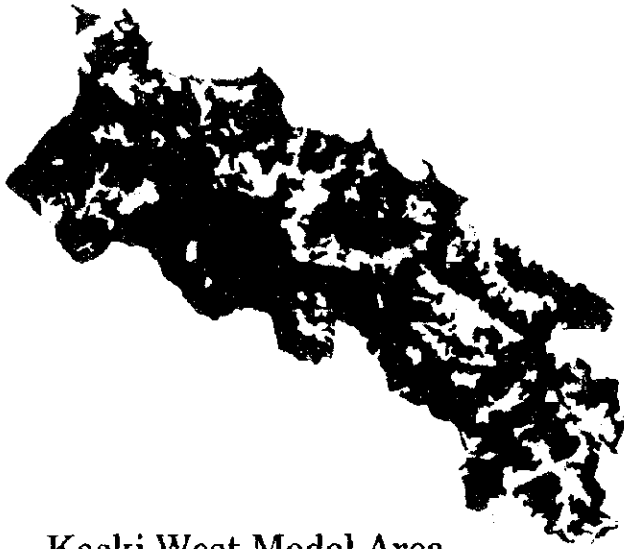
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Data Source:
Household Survey (Q-III-2)

Scale : 1/200,000





Kaski West Model Area



Kaski North Model Area



Parbat North Model Area



Kaski East Model Area

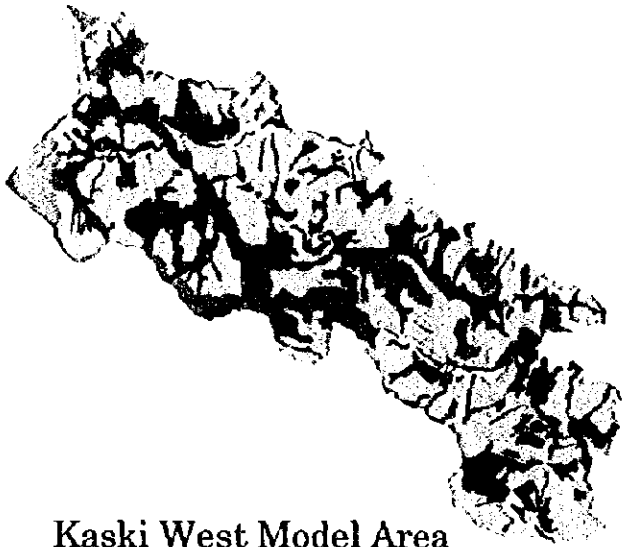


Parbat South Model Area

LEGEND

	Forest(crown density 40% >)
	Forest(crown density < 40%)
	Khet land
	Shrub land
	Bari land
	Grassland

Scale: 1/200,000



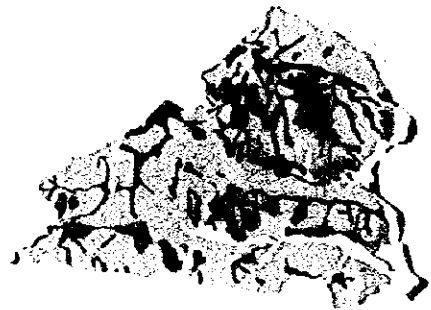
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Kaski North Model Area



Parbat North Model Area



Kaski East Model Area

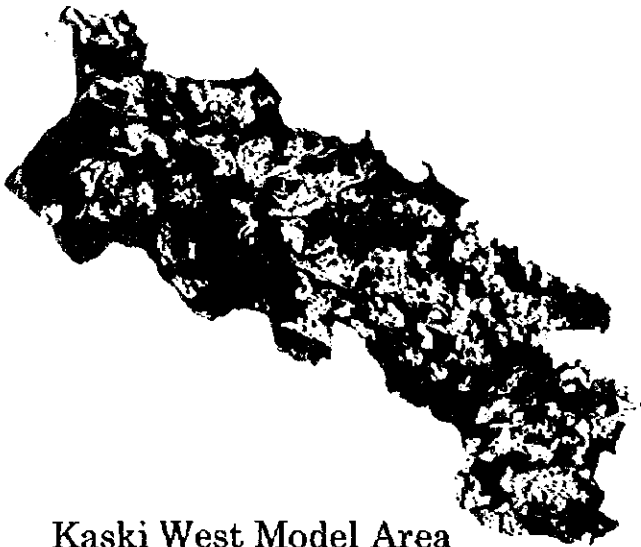


Parbat South Model Area

LEGEND

	FLe/d
	FLc
	RGc
	RGd
	LPd
	LPk
	CMc
	CMd
	CMu
	ENb
	ACb
	ALb
	S
	C
	LVb/ALb

Scale: 1/200,000



Kaski West Model Area



Kaski North Model Area



Parbat North Model Area



Kaski East Model Area

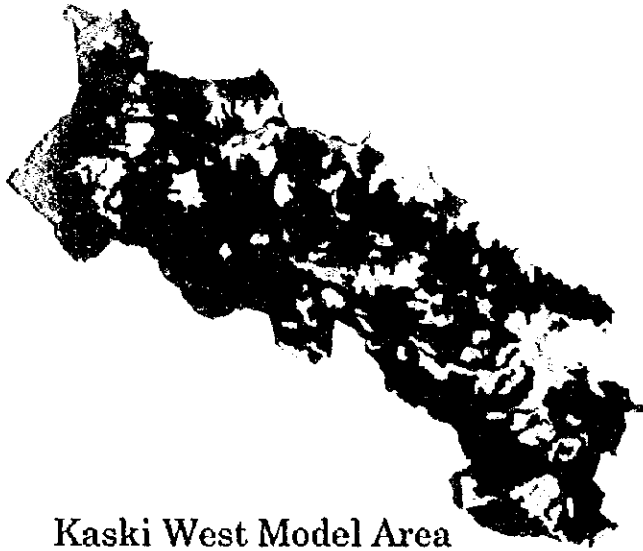


Parbat South Model Area

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Kaski West Model Area



Kaski North Model Area



Parbat North Model Area

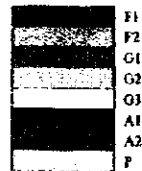


Kaski East Model Area



Parbat South Model Area

LEGEND



Scale: 1/200,000

PREFACE

In response to the request from the Government of Kingdom of Nepal, the Government of Japan decided to conduct the Development study on Integrated Watershed Management in the Western Hills of Nepal and entrusted the study to Japan International Cooperation Agency (JICA).

JICA sent to Kingdom of Nepal the study team headed by Mr. Yasuyuki Suzuki, Japan Forest Technical Association, five times between December 1995 to November 1997.

The team held discussions with the officials concerned of the Government of Kingdom of Nepal, and conducted field studies in the study area. After the team returned to Japan, further studies were made and the present report was prepared.

I hope that this report will contribute to the promotion of the project and to the enhancement of friendly relations between our two countries.

I wish to express my sincere appreciation to the officials concerned of the Government of Kingdom of Nepal for their close cooperation extended to the team.

January, 1998



Kimio Fujita
President

Japan International Cooperation Agency



FOREWORD

This Final Report presents the Integrated Watershed Management Plan based on the findings of the Phase I Study and Phase II Study in connection with the formulation of a master plan for the Study on Integrated Watershed Management in the Western Hills of Nepal (the Study) agreed upon by the UMG of Nepal and the Japan International Cooperation Agency (JICA) on June 14th, 1995.

The Study intends the formulation of an integrated watershed management plan to ensure forest and environment conservation in the subject watersheds of the Model Areas through people's participation where forests and farmland coexist based on the principles of (i) alleviation of disasters, (ii) preservation of land productivity, (iii) effective utilisation of forest resources and (iv) improvement of local life. The Study also intends the preparation of guidelines for integrated watershed management plan formulation in the Study Area based on the formulated integrated watershed management plan.

The particular attention has been given to the following points in compiling the Report.

- ① It will be a master plan which aims at conservation of the natural environment as well as national land in a watershed (area).
- ② It will have the ultimate goal of conducting watershed management through local development.
- ③ The existing conditions will be precisely understood so that a plan can be formulated with accurate knowledge and understanding.
- ④ The formulated plan will reflect the relevant policies of the Government of Nepal, i.e. the relevant scheme of the Department of Soil Conservation.
- ⑤ There will be constant awareness that, while the immediate user of the plan is the existing JICA project, the end user is the Department of Soil Conservation which is the C/P organization.
- ⑥ Although the principal rule for the formulation of an implementation plan is that it is formulated by a user with the participation of local people, the plan will describe the required plan formulation process.
- ⑦ As people's participation in the plan is assumed, there should not be excessive dependence on external support.

- ⑧ Various types of information and data will be provided for the user so that the formulation and implementation of the implementation plan can be easily conducted.
- ⑨ The proposed programmes will be feasible in the subject watershed (area) in terms of size, cost and period, etc.
- ⑩ The plan achievements should prove useful for further extension and education.

The most important point of the plan formulation is how to positively apply the findings of the socioeconomic baseline survey to land use improvement and other plans. Another key point is how to facilitate the implementation of these plans. With regard to the first point, the survey findings have been extensively analysed to identify the current conditions and problems of the subject watersheds from the viewpoints of (i) the utilisation of available resources by people, (ii) soil erosion and (iii) social condition and proposals have been made in relation to the appropriate land use, control of erosion, improvement of infrastructure and measures for an improved living environment. With regard to the second point, a ward planning profile has been prepared to link the planning stage to the implementation stage through the provision of the necessary information, incorporating people's needs, the existence of erosion hazard and various measures, in order to facilitate discussions between the plan implementation body and people (including inhabitant's groups and village administrators).

The process upto the formulation of an implementation plan are discussed, taking the required level of data accuracy for master plan formulation into consideration. For the actual implementation of the plan, implementation plans incorporating more accurate data which reflects the actual site conditions must be formulated based on the findings of more detailed field surveys. It must, therefore, be noted that the information provided here provides a set of criteria which must be modified to reflect the specific site conditions before the formulation of a concrete plan. It is hoped that the master plan presented here will prove effective for national land conservation and also for the utilisation as well as conservation of forest resources.

The Final Report is composed of three volumes as described below.

Introduction

Summary

- ① Volume 1 Surveys
 - Chapter 1 Outline of the Study
 - Chapter 2 Watersheds and Watershed Management in Nepal
 - Chapter 3 State of Model Areas
 - Chapter 4 Problems in Model Areas

② **Volume 2 Plan**

Chapter 1 **Basic Principles of Integrated Watershed Management Plan**

Chapter 2 **Proposed Integrated Watershed Management Plan**

Chapter 3 **Plan Implementation Method**

Chapter 4 **Environmental Care**

Chapter 5 **Monitoring and Evaluation**

Chapter 6 **Plan Justification**

③ **Volume 3 Appendixes**

We would like to express our utmost gratitude to the Department of Soil Conservation (which is the C/P organization), the Ministry of Forests and Soil Conservation and the many other organizations related to the Study without whose assistance the Study could not have been completed as scheduled.



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SUMMARY

1. Objectives

- (1) Implementation of a socioeconomic baseline survey in five Model Areas established in the Study Area.
- (2) Formulation of the Integrated Watershed Management Plan (Master Plan) based on the findings of the socioeconomic baseline survey and natural conditions survey in each Model Area.
- (3) Preparation of guidelines for the formulation of an integrated watershed management plan for the Study Area.

2. Current Conditions of Watersheds

In the western hills of Nepal, i.e. the Study Area, until now farmlands have been expanded and forests have been felled to secure the food supply for the increasing population and firewood to sustain the lives of local people, putting tremendous pressure on the natural resources. Under severe natural conditions in terms of the climate, topography, geology and soil, soil erosion is widespread in the Study Area and there are many sites with a high erosion hazard. In terms of the lives of local people, all land which appears to be suitable for cultivation has been developed as farmland to supply food despite the steepness.

Nevertheless, the limited constant supply of water for agricultural purposes means that sites which can be used as Khet land (irrigated paddy land) as desired by local people are limited. Accordingly, sloping land from the hillside to the summit is used as Bari land (rainfed terraced land) for the cultivation of wheat, maize, millet, etc. The resulting insufficient income forces local people to seek employment away from home and has led to insufficient land management and even the abandonment of farmland. In turn, this has caused erosion in numerous places during the monsoon and other periods of heavy rainfall.

3. Identification of Problems

The Study Area is characterised by a number of fundamental causes of the insufficient implementation of soil conservation measures, which are common in Nepal, including poor accessibility, population increase, insufficient external support, shortage of farmland, insufficient cash income, daily over-work and priority of daily needs. The Study has identified

three crucial issues of watershed degradation, i.e. "decline of land productivity" originating from soil loss due to erosion, "forest degradation" originating from the presumably excessive use of resources and "the occurrence of disasters" which affect those people living in hazardous areas.

4. Principles of Integrated Watershed Management Plan Formulation

Upto the present, watershed management has been conducted as a national policy and it is important for the administration to formulate and implement the relevant plans covering wide areas. However, the continuation of large-scale projects appears difficult from both the financial and organizational point of view. The lives of people living in hilly areas are dependent on forests and other natural resources. In other words, natural resources are closely related to the daily lives of local people. It is believed that the implementation of various projects which will directly improve local life with the participation of local people will reduce the pressure on forest use and achieve sustainable watershed management in an effective manner. In the formulation of the Plan, the following overall targets have been set to solve the three crucial problems and various programmes have accordingly been formulated.

- (1) Preservation of land productivity
- (2) Conservation and utilisation of forest resources
- (3) Hazard mitigation and reduction of disasters

At the same time, local development programmes to meet the needs of local people have been formulated to facilitate the participation of local people.

5. Proposed Integrated Watershed Management Plan Contents

(1) Land Use Improvement Programmes

In order to successfully achieve the three targets, appropriate land use methods have been examined for existing forests, grassland and farmland from the viewpoint of conservation (hazard) and production (land suitability classification) to prepare land use improvement programme which incorporates the need of local people.

- ① Forests are classified into forests for soil and water conservation (forest improvement programme 1) and forests for timber production and income generation for local people (forest improvement programme 2) to achieve the conservation and utilisation of forest resources.

- ② Grassland which requires the highest care from conservation viewpoint is classified into grassland for conversion to forests depending on the degree of hazard (grassland improvement programme 3), grassland subject to silvopasture (grassland improvement programme 2) and grassland for improvement (grassland improvement programme 1).
- ③ Farmland is classified into Bari land subject to terrace improvement (farmland improvement programme 1), Bari land subject to agroforestry (farmland improvement programme 2) to preserve and improve the land productivity and to Khet land subject to maintenance for soil and water conservation (farmland improvement programme 3).
- ④ It is also planned to establish nurseries to produce the seedlings which are required for the implementation of various programmes.

(2) Erosion Control Programme

The erosion control programme has been prepared to reduce the occurrence of disasters by deciding control measures and methods for subject sites depending on the scale and type of erosion and objects to be protected.

- ① In regard to landslides, the rehabilitation and control of small landslides are planned using simple structural and bioengineering measures. As far as large landslides are concerned, their prevention and rehabilitation will require major engineering undertakings such as construction of large structures, treatment of ground water, etc. the implementation of which will require special skills and large investments. Therefore, emphasis is placed on simple mitigation measures, such as surface run-off control and monitoring, applicable by people at the community level to prevent further enlargement of these landslides.
- ② Planting, diversion channels and check dams, in which local people find it easy to participate, are combined to control gully erosion. The materials used in gully control work are those readily available in the locality and are easy to handle and maintain by people.
- ③ The use of simple structural and bioengineering methods such as creation of riparian belt is planned to control bank erosion.

(3) Living Environment Improvement Programme

For the implementation of the programmes described above to ensure watershed conservation as well as environmental conservation, it is necessary to obtain the understanding and cooperation of local people while solving their day-to-day problems. Based on this understanding, the following living environment improvement programme has been formulated.

- ① The planned components of infrastructure development consist of trail improvement and road improvement, incorporating the viewpoint of erosion control. The feasibility of new road construction, which is high on the list of local people's needs, is examined. In regard to drinking water supply, the proposals include improvement of areas around permanent springs and the necessity to establish a piped water supply system.
- ② Further proposals include the construction of suspension bridges, the introduction of rice polishing mills and the rehabilitation of irrigation facilities, all of which are related to improvement of the living environment for local people.
- ③ The programme refers to the necessity to install toilet facilities in connection with public health and hygiene and to the promotion of literacy education and the proper maintenance of schools in connection with education.
- ④ The programme also proposes the introduction of improved furnaces and biogas in connection with the conservation of forest resources.

(4) Income Generation Programme

People in the area are extremely interested in improving their income as well as improving their living environment. This programme hopes to achieve increased interest in and understanding of projects aimed at improving the lives of women and occupational castes and alleviation of the daily workload of women through its implementation.

- ① For local people, cash income through farming is familiar and, therefore, the introduction of cash crops is easy to understand and to adapt to. The programme proposes the introduction of wheat, vegetables and fruit trees. Important things are the provision of market information as well as communication and coordination with related organizations on planting methods. In addition, the raising of goats should increase the level of income. Together with carefully considered measures to prevent

the possible adverse impacts of goat raising on the land, it will be possible to achieve income generation and forest conservation.

- ② The prospect of introducing small-scale processing industries is not particularly good at present as there are few resources which can be exploited for such purposes except such traditional crafts as bamboo crafts. The current prospect of growing fruit and vegetables is also not bright. The future of these activities will depend on the demand trend in consumption areas, particularly Pokhara.
- ③ The emergence of abandoned farmland due to men working away from home presents a problem not only from the viewpoint of agricultural production but also from the viewpoint of soil conservation, making the introduction of measures designed to return the workforce to the Model Areas particularly important. In the immediate future, projects can provide employment opportunities for cash income. In the long-term, however, it is hoped that the development of local processing industries will provide local jobs.

(5) Extension and Education Programme

As extension and education activities are meant to clarify the incentives for self-reliant watershed and forest conservation activities by local people, they should not constitute the one-way conveyance of environmental conservation methods to local people. This programme is particularly important to improve the knowledge and technical levels of those persons (local people, NGO staff members and field officers, etc.) related to plan formulation and implementation. It is also important in terms of shifting the responsibility for plan implementation from government agencies to local people.

6. Implementation Method

(1) Implementation System

For the implementation of the Plan, it is expected that such related government organizations as the Department of Soil Conservation will cooperate with local people and other related persons to establish a project team.

(2) Plan Implementation Process

Under the Plan, each Model Area is regarded as constituting a watershed which is then used as the planning unit. Plan implementation by each administrative unit within the planning unit is desirable in view of the efficient organization of local people, execution of

the budget and maintenance in the post-plan period. For the Plan, a VDC is regarded as the plan implementation unit in view of the appropriation of the national budget, plan implementation priority decision, liaisoning within the VDC and the smooth progress of follow-up activities in the post-plan period, etc. and the actual subjects of plan implementation are "Wards".

(3) Plan Implementation Period

The length of the plan implementation period depends on the size of the actual plan, organization system in place and degree of self-reliance on the part of local people. When taking the necessary preparations for plan implementation, the empowerment of local people and the required maintenance in the post-plan period into consideration, it is assumed that two years and 3 - 5 years will be necessary for preparation and plan implementation respectively. Accordingly, the project period for one VDC should be approximately five years.

The idea is to use the actual results in those VDCs where the Plan is implemented as model cases as lessons to be learned for the implementation of subsequent plans with a view to gradually shifting the responsibility for plan formulation and implementation to local people to encourage their self reliance.

(4) Use of the Plan at Field Level

- ① At the DDC level, the Plan (Master Plan) should be used to select the subject VDCs based on various data and information.
- ② At the VDC level, the subject Wards should be selected based on the requirements of the Plan and the VDC planning profile (VPP).
- ③ At the Ward level, the Ward Planning Profile (WPP) should be used as basic data and information for the preparation of an implementation plan.

Here, a case study is made for the following five wards using their respective WPPs.

- | | | |
|----------------------------|-----------------------|--------------|
| a. Kaski North Model Area | : Arba Vijaya VDC | - Ward No. 2 |
| b. Kaski East Model Area | : Siddha VDC | - Ward No. 7 |
| c. Kaski West Model Area | : Pumdi Bhumdi VDC | - Ward No. 5 |
| d. Parbat North Model Area | : Katuwa Chaupari VDC | - Ward No. 9 |
| e. Parbat South Model Area | : Tribeni VDC | - Ward No. 7 |

7. Environmental Care

(1) Initial Environmental Survey

The Plan follows the Forestry Sector Assessment Guidelines in Nepal for environmental care and uses the similar JICA guidelines regarding the survey method and survey items. The survey in question involved a fact-finding survey and the establishment of environmental factors and used the scoping technique to judge the existence of any environmental impact.

(2) Issues to be Considered for Plan Implementation

There are many issues to be considered in connection with plan implementation, including the restriction of stock raising, minimum volume of civil engineering work, adequate run-off control method and coordination with local people.

8. Monitoring and Evaluation

As the present Plan is a master plan indicating overall targets and aiming at implementation with the participation of local people, it does not specify the subject area(s). Here, the necessary monitoring and evaluation items and methods in the post-plan period are described.

9. Plan Justification

Achievement of the following benefits and effects are anticipated through the implementation of the programmes to be formulated under the Plan.

- (1) Conservation of forest resources
- (2) Alleviation of disasters (erosion)
- (3) Increase of food production
- (4) Improvement of the living conditions of communities
- (5) Income generation for local people
- (6) Maintenance of drinking water sources
- (7) Improvement of the knowledge, technical expertise and ability to solve problems on the part of local people
- (8) Improvement of the management and technical abilities of DSCO staff members

- (9) Improved continuity, cost reduction and efficiency of projects by means of their implementation with the participation of local people
- (10) The Plan intends to achieve the empowerment of women and the socially weak, all of which are closely related to forests, in order to facilitate the participation of local people in projects. The subsequent improvement of the standard of living of local people will promote understanding of and interest in forest conservation and watershed conservation to ensure the continuity of projects designed to achieve conservation targets.

10. Recommendations

The recommendations following the formulation of the Plan are restricted to those of a general nature to avoid any concrete infringement with the policies adopted by the Department of Soil Conservation which is the C/P organization.

- (1) The basic approach adopted by the Plan, i.e. watershed management with people's participation, has its own limitations when dealing with erosion control in the Study Area. In the case of such mass movement as a large landslide, national measures, including the evacuation and relocation, etc. of local people, must be introduced.
- (2) Along with the Plan, supporting programmes are proposed to create a situation in which local people can positively participate in watershed management. The implementation of these programmes will require consolidation of the coordination system of related organizations and also of the supporting system.
- (3) The formulation of a watershed management plan and the effective implementation of such a plan demand accurate understanding of the prevailing conditions. In this regard, the accumulation of data is necessary which in turn demands the establishment of an efficient data gathering system.
- (4) It is desirable that further qualitative improvement of all related people be made for the effective implementation of the Plan. It is, therefore, necessary to educate as well as train all related staff in regard to their knowledge and technical expertise.

VOLUME I

SURVEYS

1. OUTLINE OF THE STUDY

1. OUTLINE OF THE STUDY

1-1 Background of the Study

Land, water and forests are the most important natural resources in Nepal where more than 90% of the population live in rural villages. While the ecological balance between human life and the utilisation of natural resources was roughly maintained upto the 1960's, excessive grazing and inappropriate land use under the pressure of an increasing population have accelerated the soil loss and the excessive collection of fuelwood and fodder trees, etc. have depleted or degraded the forests, forcing the Government of Nepal to make urgent attempts to prevent further deterioration of the present situation and to improve the living standard of rural populace. Unlike the depletion of forests in Terai areas due to commercial felling, the depletion or degradation of forests in the hills in particular has been caused by an increased level of general forest use, presumably causing the following problems.

- ① Difficulty of maintaining agricultural production due to the shortage of fertiliser or fodder which are essential for agriculture or stock raising.
- ② Increased burden on women and children who are responsible for the collection of grass and fuelwood due to the longer distance to forests where fodder grass and fuelwood can be collected.
- ③ Possible worsening of the living environment in wide areas, including the lower reaches, due to the erosion of farmland and drying up of water sources caused by the declining soil and water conservation function of degrading forests.

HMG prepared the Master Plan for the Forestry Sector in 1988 in accordance with global activities designed to conserve tropical forests, especially those of Tropical Forest Action Plan (TFAP) since 1985. The Government of Japan agreed to assist the forestry extension sector which is part of the said Master Plan and carried out project-type technical cooperation for the Forestry Extension Project in Nepal for 3 years from July, 1991.

Recognising the importance of the achievements of the Forestry Extension Project, the HMG classified the community development and forest conservation programme in the "Soil Conservation and Watershed Management" category of the Forestry Master Plan and, in December, 1993, requested the Government of Japan's combined assistance for 3 projects, i.e. (i) Community Development and Forest/Watershed Conservation Project

(CDFWCP), (ii) "Greenery Promotion Cooperation Project (GPCP) backed by the JOCV and "The Development Study on Integrated Watershed Management in the Western Hills of Nepal" (the Study).

According to the Letter of Request for the Study, the depletion of forests in the Western hills has caused land degradation, flooding and soil erosion due to the local topographical conditions, damaging productivity of local lands. In addition, the lack of an integrated watershed management plan is said to be partly responsible for the deterioration of natural environment and local standard of living and it is believed that a development study for the preparation of an integrated watershed management plan will help to prevent the degradation of national land and promote the rehabilitation of already degraded land.

In response to this request, the Government of Japan sent the Preparatory Study Team to Nepal in December, 1994, followed by the dispatch of the Scope of Work Preparatory Study Team in June, 1995 which concluded the Scope of Work (S/W) with the Nepalese side following confirmation of the contents of the Study and the scope of Japanese cooperation. Based on this S/W, the Study is now being conducted by JICA with the Department of Soil Conservation of the Nepalese Ministry of Forests and Soil Conservation acting as the counterpart (C/P) organization.

With the above-mentioned history and background, the Study is expected to not only prepare an integrated watershed management plan designed to improve the living environment for local inhabitants and to contribute to appropriate land management but is also expected to enhance the overall aid effects of Japanese technical cooperation for Nepal as one of the 3 components of an integrated approach together with CDFWCP and the GPCP projects by means of implementing the baseline survey on long-term cooperation and showing the master plan detailing overall targets for these projects.

1-2 Objectives of the Study

The objective of the Study is the preparation of the "Integrated Watershed Management Plan" with a view to conducting appropriate watershed management in the Kaski District and Parbat District which are located in the western hills of Nepal. Based on the understanding that it is of paramount importance to conserve forests and the environment in the subject area through appropriate land use supported by community development and people's participation, a socioeconomic baseline survey was conducted as part of the Study to clarify the actual conditions of the subject area and to provide the basis for

evaluation of the cooperation effects. Furthermore, the Study also intends the formulation of the "Planning Guidelines for an Integrated Watershed Management Plan" (including plan preparation process) using the said Integrated Watershed Management Plan.

1-3 Study Area and Model Areas

1-3-1 Study Area

The Study Area of some 120,000 ha consists of the southern parts of Kaski District and Parbat District in the Western Development Region of Nepal. In addition to aerial photography, data on the natural and socioeconomic conditions of the Study Area are collected using existing documents. The guidelines for the preparation of an integrated watershed management plan for Study Area are formulated based on the above data and plan formulation process for the Model Areas described later.

1-3-2 Model Areas

In the selection of the Model Areas, emphasis was placed on the watersheds, including VDCs, which were considered as the subject areas of the two projects with which the Study is closely related. The selection criteria used were ① non-competition with other aid organizations operating in the same area, if any, ② feasible positive achievements in the 5 year project period and ③ initial good access and a reasonable living environment for JOCV members. Subsequently, 3 areas in the southern part of Kaski District and 2 areas in the Parbat District, totalling some 43,000 ha, were established as the Model Areas as shown in Fig. 1-1. (Note: For details refer to the M/M and S/W signed in December, 1994 and June, 1995 respectively). A socioeconomic baseline survey and natural conditions survey is conducted in these Model Areas and an integrated watershed management plan, incorporating an appropriate land use plan, erosion hazard prediction and rehabilitation measures, people's living environment improvement, etc. is prepared based on the findings of the above surveys. Two VDCs, Ghachok and Lahachok in Kaski North Model Area, are excluded from the subject areas because ACAP (Annapurna Conservation Area Project) has already been active in these VDCs. For this reason the total land area of the five Model Areas is some 41,000 hectares.

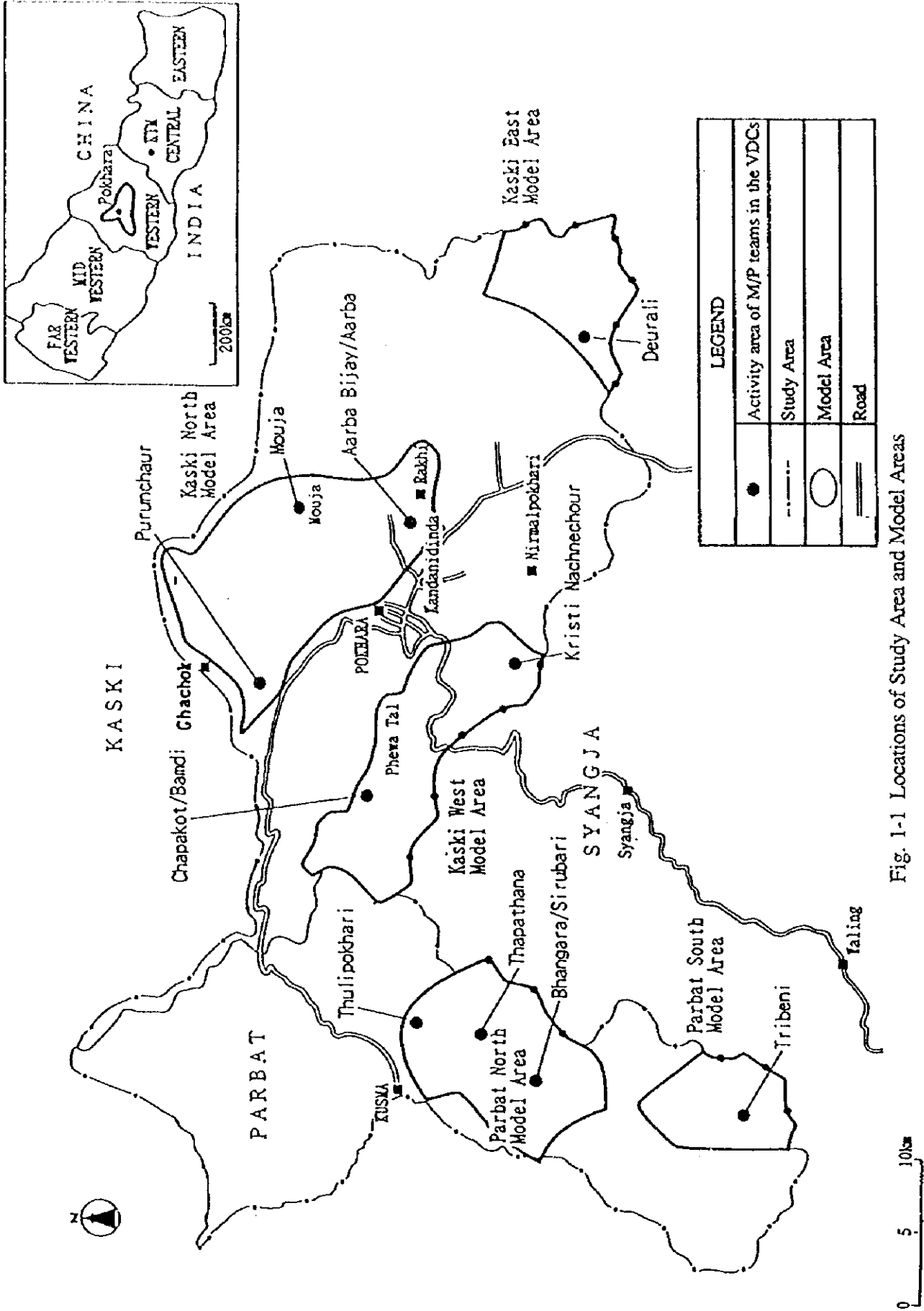


Fig. 1-1 Locations of Study Area and Model Areas

1-4 Outline of the Study

The Study is conducted in accordance with the flow shown in Fig. 1-2. (For topographic mapping and GIS operation refer to Appendixes, Volume III)

1-4-1 Phase I

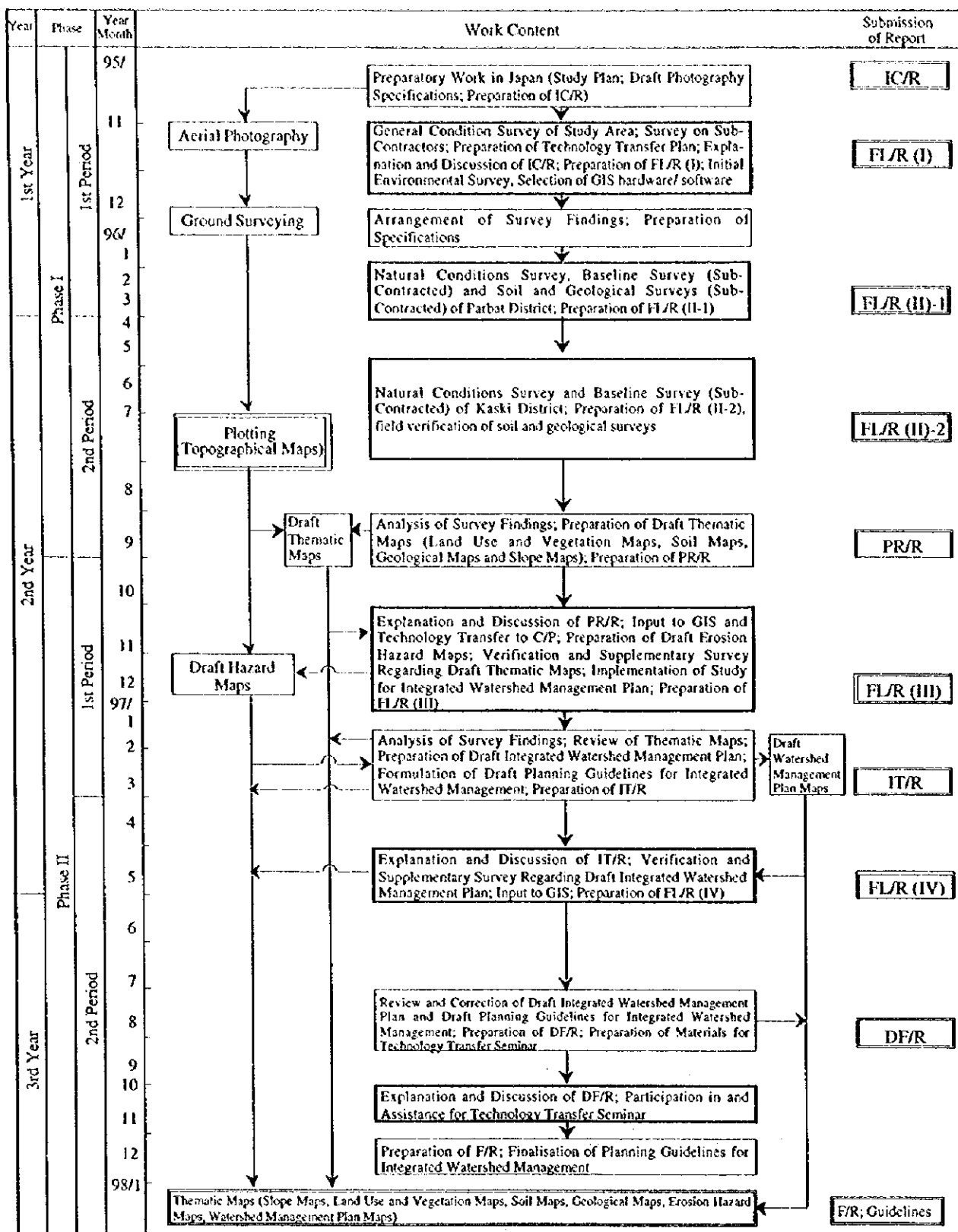
(1) Field Surveys

① Phase I, First Period from November 28th, 1995 to March, 22, 1996

- a. Attendance at Coordinating Committee meeting and explanation of the Inception Report
- b. Preliminary natural conditions and socioeconomic conditions surveys in the Study Area
- c. Survey on possible subcontractors for the socioeconomic baseline survey, geological survey and soil survey
- d. Aerial photography (Scale: 1/25,000) of the Study Area of some 120,000 ha (subcontracted)
- e. Examination of suitable GIS hardware and software
- f. Collection of data/information for the initial environmental survey
- g. Preparation and submission of the draft Technology Transfer Plan
- h. Submission of Field Report I-(1)
- i. Natural conditions survey on the Model Areas (Parbat)
- j. Following subcontracted surveys:
 - (a) Socioeconomic baseline survey (Parbat)
 - (b) Geological survey (Parbat and southern parts of Kaski)
 - (c) Soil survey (Parbat and southern parts of Kaski)
- k. Levelling and field investigation required for the preparation of topographical maps
- l. Discussions on and finalisation of the Technology Transfer Plan
- m. Submission of Field Report II-(1)

② Phase I, Second Period from May 17th, 1996 to July 25th, 1996

- a. Natural conditions survey on the Kaski Model Areas
- b. Following subcontracted surveys
 - (a) Socioeconomic baseline survey (Kaski)
- c. Field verification of soil survey and geological survey findings
- d. Submission of Field Report II-(2)



IC/R = Inception Report; FL/R = Field Report; P/R = Progress Report; IT/R = Interim Report; DF/R = Draft Final Report; F/R = Final Report

Work in Japan Work in Nepal Results

Fig. 1-2 Study Flow Chart

(2) Work in Japan

Based on the findings of the above field surveys, the following work was conducted.

- a. Preparation of topographical maps of the Model Areas
- b. Preparation of such draft thematic maps as a land use and vegetation maps, soil maps and geological maps of the Model Areas
- c. Preparation of the Progress Report

1-4-2 Phase II

(1) Field Survey

① Phase II, First Period from October 24, 1996 to December 27, 1996

- a. Explanation and discussion of Progress Report
- b. Integrated watershed management plan survey
- c. Verification and supplementary survey of draft thematic maps
- d. Preparation of draft erosion hazard maps
- e. GIS operation and technology transfer to C/P
- f. Preparation and presentation of field Report III

② Phase II, Second Period from May 14, 1997 to November 12, 1997

- a. Explanation and discussion of Interim Report
- b. Field survey relating to compilation of the integrated watershed management plan
- c. Preparation of ward planning profile
- d. Socioeconomic baseline survey and analysis and preparation of report
- e. Environmental impact survey
- f. GIS operation and technology transfer to C/P
- g. Preparation and presentation of Field Report IV
- h. Explanation and discussion of Draft Final Report
- i. Participation in and assistance for Technology Transfer Seminar

(2) Work in Japan

- a. Compilation of draft integrated watershed management plan
- b. Preparation of draft guidelines for compilation of the integrated watershed management plan
- c. Preparation of Interim Report
- d. Preparation of socioeconomic baseline survey report
- e. Preparation of Draft Final Report
- f. Preparation of Final Report
- g. Preparation of Guidelines for Integrated Watershed Management Planning

1-5 Technology Transfer

The technology transfer plan, comprising the following contents, was jointly prepared with the counterparts and was implemented.

- ① Contents, method and timing of technology transfer
- ② Persons conducting technology transfer and recipient counterparts
- ③ Others (issues, etc. regarding technology transfer)

All of the counterparts involved in the Study showed interest in the contents and method of the Study and learned various techniques and technologies in their respective specialist fields. Details of the technology transfer results as well as the summary of objectives, methodology, etc. of the surveys conducted under the Study are given in Appendixes, Volume III.

1-6 Study Results

- (1) Inception Report
- (2) Progress Report
- (3) Interim Report
- (4) Draft Final Report
- (5) Field Report I-(1)
Field Report II-(1)
Field Report II-(2)

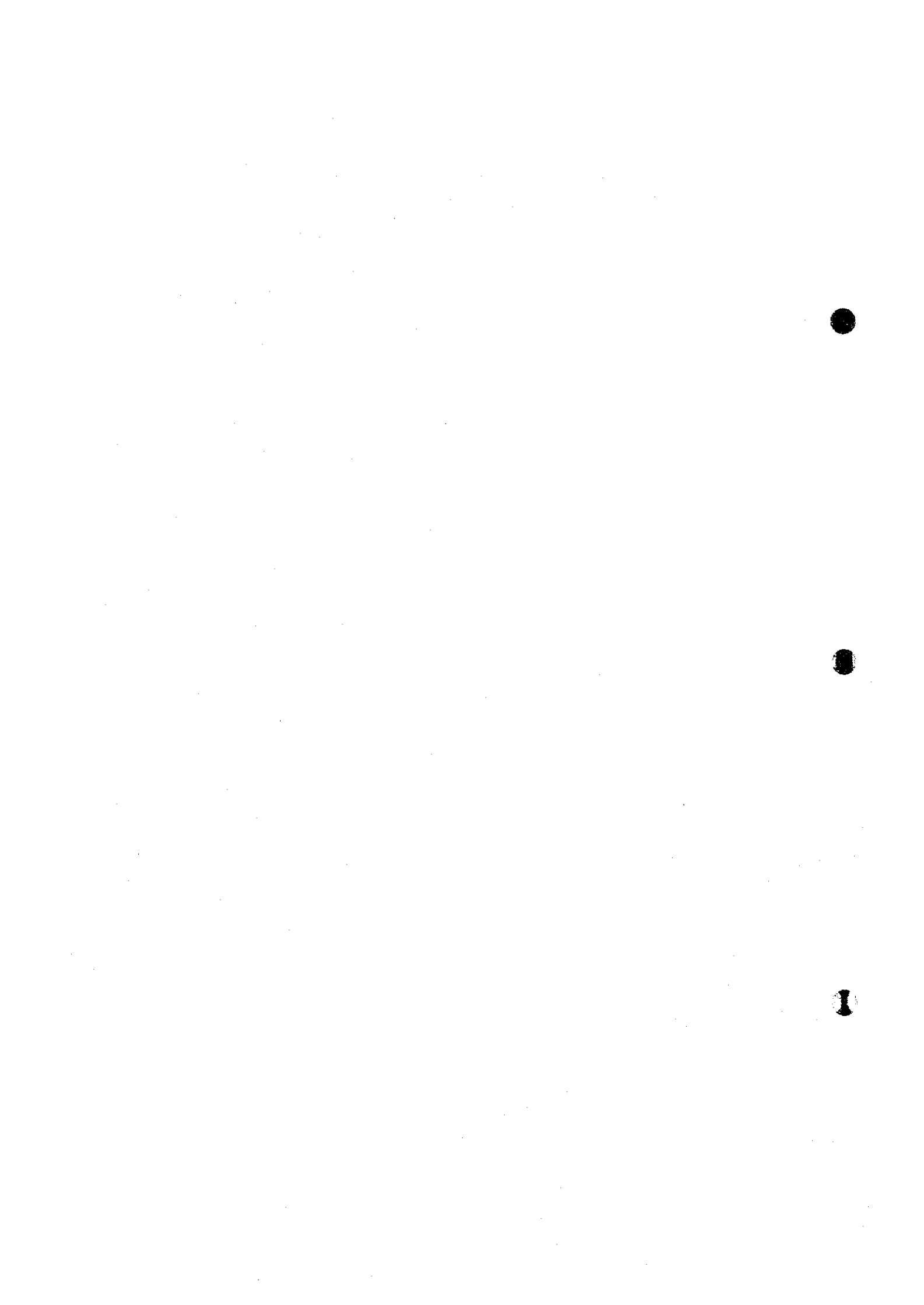
Field Report III

Field Report IV

- (6) Final Report**
- (7) Integrated Watershed Management Plan Formulation Guidelines**
- (8) Socioeconomic Baseline Survey Report**
- (9) Thematic Maps**
 - ① **Topographical Maps (Scale: 1/25,000 and 1/10,000)**
 - ② **Slope Maps (Scale: 1/25,000)**
 - ③ **Land Use and Vegetation Maps (Scale: 1/25,000 and 1/10,000)**
 - ④ **Soil Maps (Scale: 1/25,000)**
 - ⑤ **Geological Maps (Scale: 1/25,000)**
 - ⑥ **Erosion Hazard Maps (Scale: 1/25,000)**
 - ⑦ **Integrated Watershed Management Plan Maps (Scale: 1/25,000 and 1/10,000)**
- (10) GIS**
 - ① **GIS Data**
 - ② **GIS Operation Manual**
- (11) Aerial Photographs (Scale: 1/25,000)**
- (12) Technology Transfer Plan**



2. WATERSHEDS AND WATERSHED MANAGEMENT IN NEPAL



2. WATERSHEDS AND WATERSHED MANAGEMENT IN NEPAL

2-1 Current Conditions of Watersheds

2-1-1 Natural Conditions

The Ministry of Forests and Soil Conservation classifies the national land into the following four watersheds based on river systems (Fig. 2-1).

- a. Kosi Watershed
- b. Narayani Watershed
- c. Karnali Watershed
- d. Mahakali Watershed

2-1-2 Socioeconomic Conditions

(1) As of 1991, the total population of Nepal is 18.49 million and the annual population growth rate between 1981 and 1991 of 2.10% was fairly high. (Statistical Year Book of Nepal, 1995).

(2) The state of land use is as shown in Table 2-1.

Table 2-1 Land Use by Topographical Category

(Unit: 1,000 ha)

Topographical Category	Land Area	Farmland	Grazing Land	Forest	Others
High Himalayas	3,349	9	884	221	2,234
High Mountains	2,959	392	510	1,813	245
Middle Mountains	4,444	1,888	293	2,202	61
Siwalik	1,886	314	21	1,477	74
Terai	2,110	1,352	50	593	116
Total	14,748	3,955	1,757	6,306	2,730

Source: Land Resource Mapping Project, Economics Report, 1986

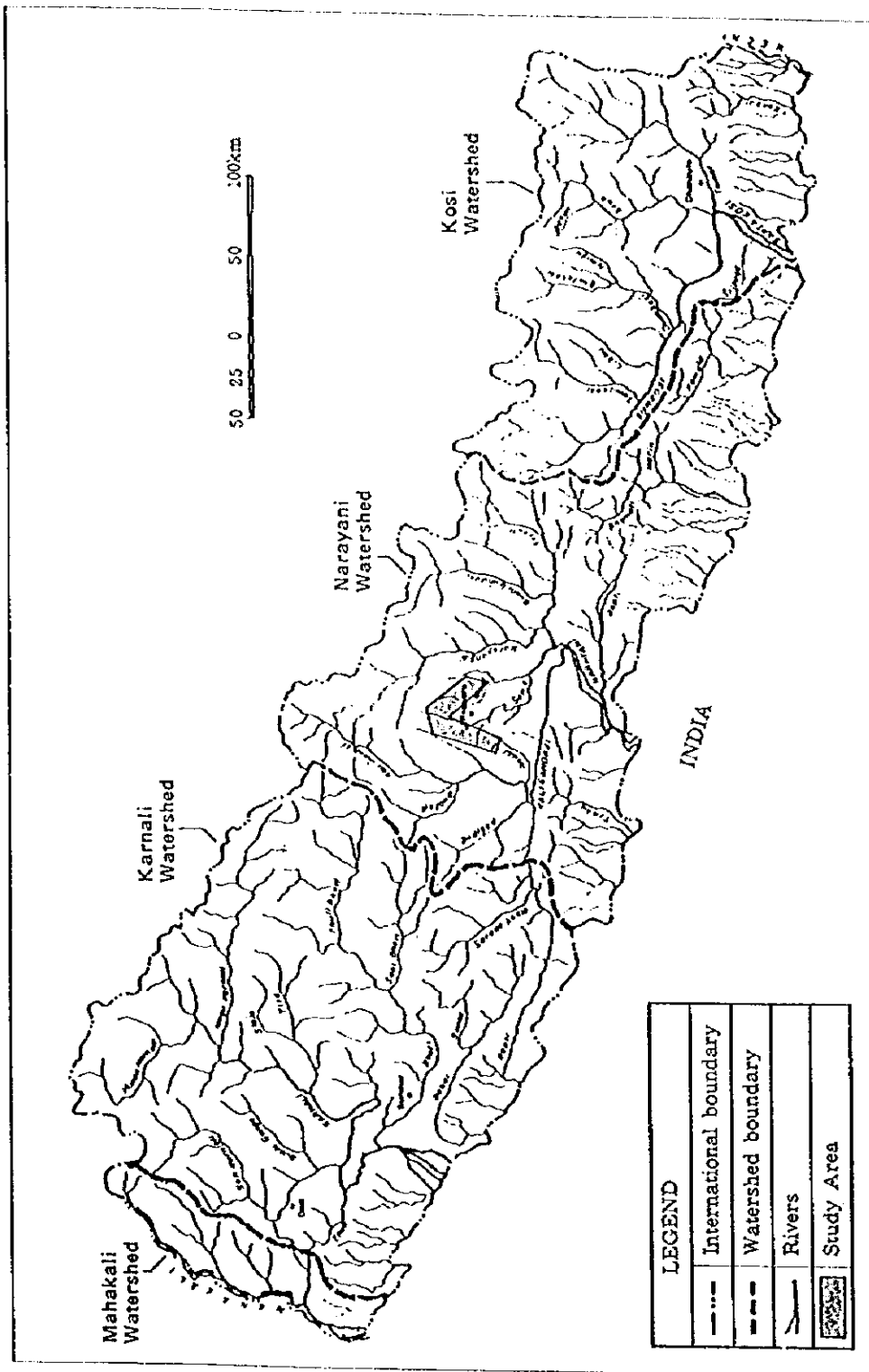


Fig. 2-1 Major Watersheds and River Systems of Nepal

2-2 Watershed Management in Development Plan

2-2-1 Ninth Five Year Plan (Fiscal 1997 - Fiscal 2002)

The soil conservation policies of the Ninth Five Year Plan are outlined below.

(1) Experience of Eighth Five Year Plan

The Eighth Five Year Plan in Nepal commenced in fiscal 1992 and ended in fiscal 1996. While encouraging achievements were made during the plan period in terms of institutional reform, technological development, linkage with NGOs and preparation of guidelines for people's participation, etc., some problems remained unsolved, including the slow progress of soil conservation projects and the insufficient training of staff members.

(2) Objectives of Ninth Five Year Plan

The Ninth Five Year Plan adopts the following objectives in the field of soil conservation.

- ① Alleviation of soil loss and improvement of land productivity
- ② Alleviation of poverty by organizing people living in remote areas through infrastructure development

(3) Main Policies

- ① To facilitate people's participation in planning, implementation and maintenance, etc. regarding soil conservation projects
- ② To make local people act as the main players in soil conservation while ensuring that the Department of Soil Conservation and other related organizations act as facilitators

(4) Main Programmes

- ① Land use development and improvement programme
- ② Conservation of land productivity
- ③ Alleviation of soil loss
- ④ Protection of infrastructure
- ⑤ Extension of soil conservation measures to local areas

2-2-2 Master Plan for the Forestry Sector (MPFS)

Global activities to conserve tropical forests since 1985 have emphasised the preparation of the Forestry Action Programme for each of 76 countries in the tropics with the assistance of international aid organizations. In Nepal, the Master Plan for the Forestry Sector (MPFS) was prepared in December, 1988 with the assistance of the FINNIDA, ADB and other aid organizations. The MPFS sets the 20 year period upto 2010 as the plan period and contains the following action programmes and supporting programmes.

(1) Action Programmes	Investment Amount Required	
	(US\$ million)	(%)
① Community and Private Forestry	811.2	46.6
② National Forests and Leashold Forestry	352.4	20.2
③ Forest Products Industry	82.8	4.7
④ Herbs and Fragrant Plants	80.1	4.6
⑤ Soil Conservation and Watershed Management	156.6	9.0
⑥ Ecosystem and Genetic Resources Conservation	116.4	6.7
(2) Supporting Programmes	Investment Amount Required	
	(US\$ million)	(%)
① Reform of Policies, Legal Framework and Organization	2.8	0.2
② Human Resources	82.7	4.7
③ Research and Extension	36.6	2.1
④ Resources Information and Programme Assistance	14.9	0.9
⑤ Monitoring and Evaluation	5.5	0.3
Total	1,742.0	100.0

The action programmes have their own implementation fields and the relevant actions are implemented throughout the country by local organizations. The assistance programmes are implemented mainly in Kathmandu, the capital, to assist the activities of various departments of the Ministry of Forests and Soil Conservation and their local offices.

The MPFS is characterised by the high priority of community and private forestry backed by a correspondingly high level of funding, accounting for almost half of the total budget. The programme approach has been adopted as the implementation policy so that each aid is specially earmarked for a specific programme or part of a specific programme. This aid specialisation is supposed to smoothly reach all relevant regions through central coordination. To ensure such central coordination, the Ministry of Forests and Soil Conservation has been given such new Divisions as the Training, Resources and Information, Evaluation and Extension and Public Relations.

Subsequent events show that neither the specialisation of each foreign aid to a single programme nor the central coordination have worked well in Nepal and most of the new departments were withdrawn during the administrative reforms some years after their establishment, forcing the HMG to seek other means to achieve the objectives of the MPFS.

(3) Soil Conservation and Watershed Management Programme

This programme, which is one of the 6 action programmes of the MPFS, is placed under the jurisdiction of the Department of Soil Conservation which is the counterpart organization for the Study. As this is an area in which a JICA technical cooperation project and a JOCV cooperation project are currently being implemented, this programme was selected as the subject for new cooperation against the background that inter-sectoral cooperation beyond the forestry sector had already been put into practice based on the idea of integrated watershed management incorporating socioeconomic development, that international aid for this particular programme was relatively weak among the action programmes of the MPFS and that staff of the Department of Soil Conservation showed a challenging spirit vis-a-vis this relatively new area.

① Objectives and Strategies

The following objectives and strategies of the Plan are identified.

a. Objectives

(a) General Objectives

- i. Contribution to meeting the basic needs of the public for forests and farming through the conservation and management of watershed resources

- ii. Conservation of the land against degradation due to soil erosion, floods, landslides, desertification and other effects of ecological imbalance

(b) Specific Objectives

- i. Establishment of a permanent organizational network related to soil conservation, watershed management and environmental protection on a countrywide scale
- ii. Establishment of a system to recruit and develop technical manpower in the sub-sectors on a continuing basis
- iii. Preparation and implementation of plans for the conservation and management of priority watersheds and areas requiring environmental protection
- iv. Building up of a strong and adequate database and applied research and monitoring and provision of evaluation support to improve field operations
- v. Establishment of a system for extension and education that will ensure the continued participation of the public in soil conservation, watershed management and environmental protection

b. Strategies

(a) Institutional

- i. Reconstruction of the existing organization in accordance with the decentralisation scheme
- ii. Development of the technical capability through intensified staff training
- iii. Coordinated and cooperative actions by all related sectors to implement a development programme

(b) Operational

- i. Up-to-date appraisal of the soil erosion and land degradation situation in various watersheds
- ii. Involvement of the public and NGOs in soil conservation programmes, etc.

- iii. Building up of strong research support
- iv. Establishment of a system for the regular monitoring and evaluation of developmental activities
- v. Assessment of the impacts of the physical development programmes of other sectors on the environment

② Development Programme

In accordance with the strategies described in b. above, the development programme to achieve the objectives of the Plan has the following 2 sets of components and their detailed items.

a. Primary Programme Components

- (a) Prevention measures
- (b) Rehabilitation measures
- (c) Education on conservation and extension

b. Supportive Programme Components

- (a) Improvement of policy and legislation
- (b) Organizational development
- (c) Training
- (d) Research and development
- (e) Watershed resources survey and management planning
- (f) Monitoring and evaluation

③ Plan Targets

The planned targets upto the year 2010 are given Table 2-2.

Table 2-2 Soil Conservation and Watershed Management Targets

Programme	Unit	7 FYP 1989/90	8 FYP 1990/95	9 FYP 1995/00	10 FYP 2000/05	11 FYP 2005/10	Total
Preventive							
Farmland							
- Terrace Improvement	ha	2,502	13,760	14,385	15,636	16,261	62,544
- Waterway Protection	no.	658	3,618	3,783	4,112	4,275	16,446
- Shelter Belt Development	km	200	1,098	1,148	1,248	1,299	4,993
- Horticultural/Fodder Plantation Establishment	ha	1,995	10,974	11,473	12,470	12,969	49,881
Degraded Land							
- Silvopasture Development	ha	266	1,461	1,527	1,660	1,725	6,639
- Reclamation	ha	363	1,995	2,086	2,267	2,358	9,069
Settlements							
- Water Source Protection	no.	321	1,764	1,844	2,005	2,085	8,018
- Conservation Pond Development	no.	147	811	848	921	958	3,685
- Greenbelt Development	km	326	1,792	1,874	2,037	2,117	8,146
Rehabilitative							
Landslide Treatment	ha	739	4,065	4,250	4,620	4,805	18,479
Roadbank Stabilisation	km	19	104	109	118	123	473
Trail Improvement	km	57	312	326	355	369	1,419
Gully Treatment	no.	52	288	302	328	341	1,311
Torrent Control	no.	20	108	113	123	126	490
Streambank Treatment	km	1	8	8	9	10	36
Irrigation Channel Improvement	km	119	656	686	746	777	2,984

Source: Master Plan for the Forestry Sector, Nepal (Revised Executive Summary, 1989)

2-2-3 Nepal Environmental Policy and Action Plan

(1) Environmental Policies in Nepal

The HMG has already prepared the Nepal Environmental Policy and Action Plan (1993) which specifies the following environmental policies.

- ① To efficiently and sustainably manage natural resources
- ② To balance development efforts and environmental conservation for the sustainable fulfilment of the basic needs of the public
- ③ To safeguard the national heritage
- ④ To mitigate the adverse environmental impacts of development projects and human actions

- ⑤ To integrate the environment and development through appropriate institutions, adequate legislation and economic incentives in addition to sufficient public resources

(2) Ministry of Environment and Population

The Ministry of Environment and Population is a new ministry which was established in October of 1995. The Environmental Protection Council established by the HMG was previously in charge of environmental issues.

(3) Ministries Related to the Study and Their Linkage to Environmental Issues

The Nepalese ministries related to the Study and their linkage to environmental issues are shown in the table below.

Ministry	Departments	Environmental Issues
Agriculture	- Agriculture - Agriculture Marketing Services - Livestock Development and Animal Health	Agrarian production, animal husbandry, soil, agro-technology and plant quarantine
Forests and Soil Conservation	- Forests - Plant Resources - National Parks and Wildlife Conservation - Soil Conservation	Forest management, herbariums, protection of ecosystem and endangered wildlife, soil and watershed conservation
Water Resources	- Irrigation and Hydrology - Electricity	Utilisation of surface and groundwater, irrigation works, electricity, flood control and meteorology

(4) Legal Framework for Environment

① Environment-Related Legislation in Nepal

The following acts are related to the environment in Nepal.

- a. Plants Protection Act, 1951
- b. Private Forest Nationalisation Act, 1956
- c. Aquatic Animals Protection Act, 1961
- d. Land (Survey and Measurement) Act, 1961
- e. Land Reform Act, 1964

- f. Canal, Electricity and Related Water Resources Act, 1967
- g. Forest Protection (Special Arrangements) Act, 1967
- h. National parks and Wildlife Conservation Act, 1973
- i. Pasture Land Nationalisation Act, 1974
- j. Public Roads Act, 1974
- k. Soil and Watershed Conservation Act, 1982
- l. King Mahendra Nature Conservation Fund Act, 1982
- m. Forest Act, 1993 and Forest Regulation, 1995
- n. Environment Act, 1996

② Guidelines for Initial Environmental Examination

Guidelines related to the initial environmental examination are as follows.

- a. A Legislative Institutional Framework, 1991
- b. National Environmental Impact Guidelines, 1993
- c. Nepal Environmental Policy and Action Plan, 1993
- d. Environmental Impact Assessment Guidelines for the Forestry Sector, 1995
- e. Environment Regulations, 1997

2-3 Forest and Soil Conservation Policies

2-3-1 Organization

(1) Forestry Policies

Introduction of the Forestry Programme in 1976, community forest Act in 1978, preparation of the Master Plan for the Forestry Sector at the end of 1988 and further revision of the Forest Act in 1992, institutionalised forest user groups. As a result of these reforms, the emphasis on forestry has shifted from government control to the participatory forest utilisation and management seen today. The main acts and regulations relating to forests and soil conservation in Nepal are listed below.

- Private Forest Nationalisation Act (1957)
- Forest Preservation Act (1967)
- Pasture Land Nationalisation Act (1974)
- Panchayat and Panchayat Forest Rules (1978)
- Soil and Watershed Conservation Act (1982)
- Soil and Watershed Conservation Regulations (1985)
- Forest Act 2049 (1993)
- Forest Regulation 2051 (1995)

(2) Forestry Administration

The administrative reform in 1993 resulted in the establishment of the Department of Forests, Department of Soil Conservation, Department of Plant Resources, Department of National Parks and Wildlife Conservation and the Forestry Research and Survey Centre under the Ministry of Forests and Soil Conservation while a Regional Forest Directorate was established in each Development Region. (Fig. 2-2).

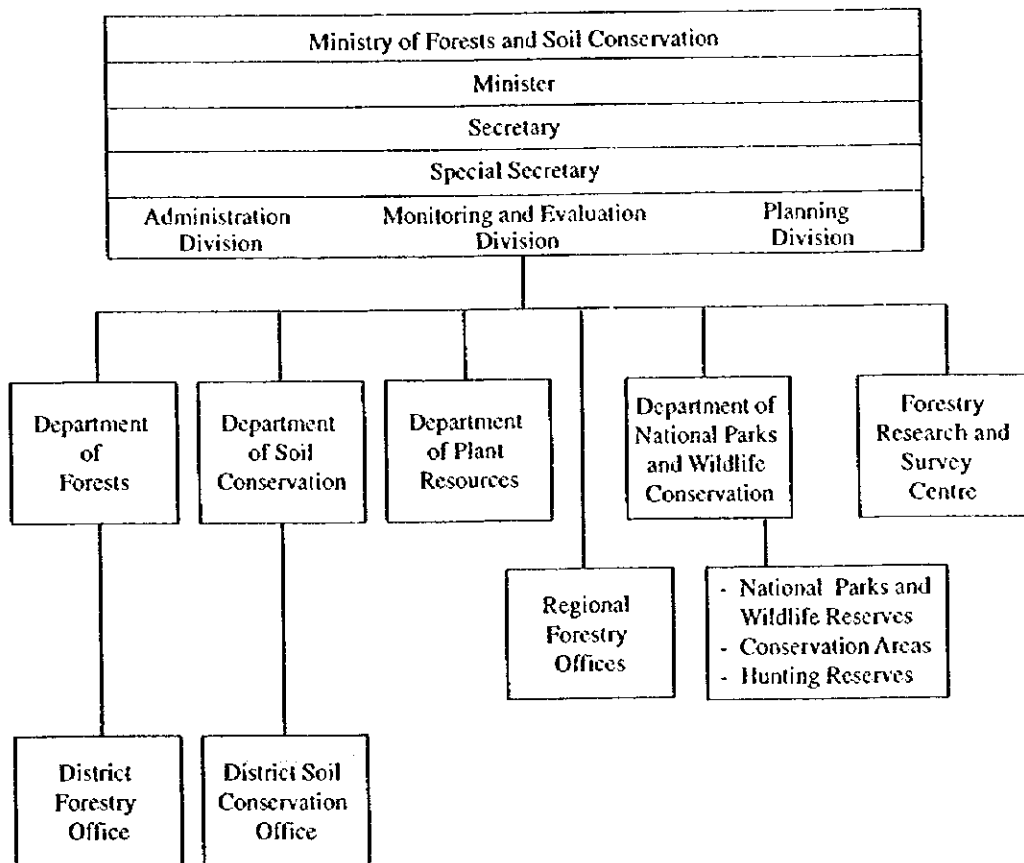


Fig. 2-2 Organizational Structure of Ministry of Forests and Soil Conservation

(3) Department of Soil Conservation

① History of Department of Soil Conservation

1974: Department of Soil and Water Conservation established at the Ministry of Forests, following the commencement of the Land Use and Torrent Control Project assisted by UNDP/FAO

1980: Department of Soil Conservation and Watershed Management established at the renamed Ministry of Forests and Soil Conservation

1993: Department of Soil Conservation and Watershed Management reorganized to become the Department of Soil Conservation; during these years, soil conservation offices, which were established to implement projects in specific watersheds, were reorganized into district-based offices in accordance with decentralisation

② Objectives

- a. To alleviate the risk of such natural disasters as floods and landslides through appropriate management of the country's important watersheds in order to maintain the balance of the ecosystem
- b. To maintain land productivity through an integrated watershed management approach involving soil conservation activities

③ Strategies

The main strategies to achieve the objectives of soil conservation are as follows.

- a. Implementation of soil conservation and watershed management projects in line with the integrated watershed management approach, by selecting priority watersheds based on general conditions and other criteria
- b. Encouragement of continual public participation through education on and the extension and demonstration of appropriate technologies while facilitating coordination with related sectors
- c. Extension of soil conservation activities which are technically, economically and environmentally appropriate at a local level
- d. Facilitation of the conservation, development and management of land and water resources using sub-watershed as a basic unit for planning and management

- e. Coordination with related sectors at a local level
- f. Efforts to minimise the negative impacts of development activities on the environment

④ Organizational Structure

The Department of Soil Conservation, which was reorganised in 1993, consists of divisions and sections, etc. as shown in Fig. 2-3. The district level organization for soil conservation is shown in Fig. 2-4 and Fig. 2-5. An A or B type district soil conservation office is established for each district. A total of 12 A type and 36 B type offices are established. In the case of the Study Area, the Kaski District has an A type office while the Parbat District has a B type office.

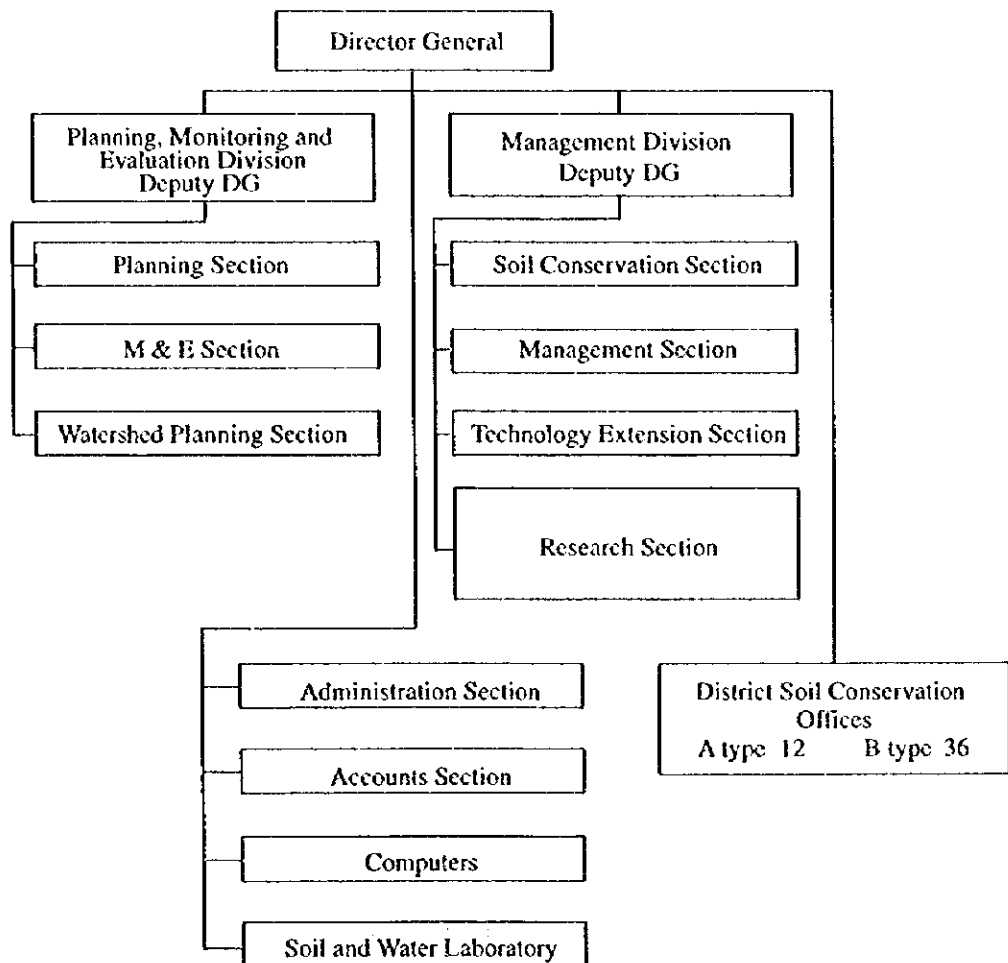


Fig. 2-3 Organizational Structure of Department of Soil Conservation

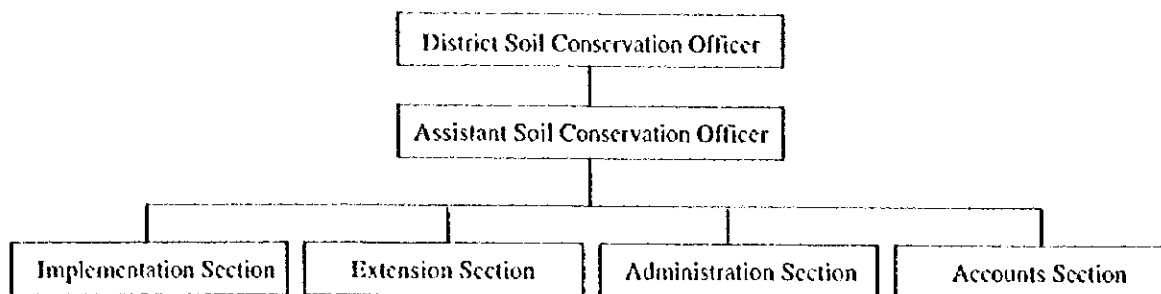


Fig. 2-4 Organizational Structure of Kaski District Soil Conservation Office (A Type)

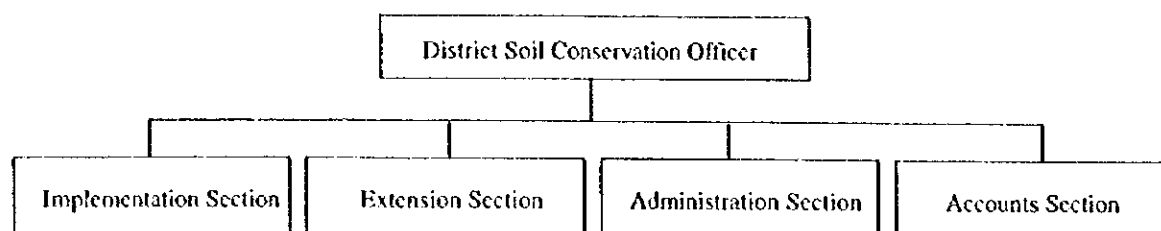


Fig. 2-5 Organizational Structure of Parbat District Soil Conservation Office (B Type)

2-3-2 Forest and Forestry

(1) Current Conditions of Forest Resources

According to the Master Plan for the Forestry Sector, Nepal, some 6.3 million ha or 43% of Nepal's total national land area is covered by forests with farmland and grazing land accounting for 3.96 million ha (27%) and 1.76 million ha (12%) respectively. Forests are mainly found at Siwalik and in mountainous areas except for the High Himalayas. Meanwhile, forest depletion is continuing at Terai which was once covered by rich forests.

① Changes of Forest Area

The general changes of the forest area are shown in Tables 2-3. The nationwide forest depletion is said to be continuing due to increases of the population and livestock. The Master Plan for Forestry Sector anticipates a large decline of the forest area if the present trend continues, indicating a strong need for active conservation and management.

Table 2-3 Historical Changes of Forest Area in Nepal

(Unit: 1,000 ha)

Year	National Total	High Himalayas	High Mountains	Middle Mountains	Siwalik	Terai	
1963/64	6,400	4,600			1,800		APIC
1964/65	6,689	4,166			1,739	784	WECS
1969--71	6,245						FAO1995
1974--76	5,870						FAO1995
1978/79	5,605	154	1,628	1,791	1,445	587	MPFSP
	6,307	4,238			1,476	593	LRMP
1979-81	5,550						FAO1995
1985/86	6,224	222	1,815	2,215	1,467	505	MPFSP (Land use)
1986	6,307	5,761				546	NPC
1987/88	6,307						CBS
1988	5,390						FAO1995
1989	5,898						World Bank Estimate
1990	5,023	4,414				609	FAO1990
	5,617	1,787		3,239		591	Nepal Agriculture Statistics
1991	5,750						FAO1995
1992	5,750						FAO1995
1993	6,307				860	546	MFSC
2000	4,678						MPFSP Estimate (continued trend)
	5,133						(Status Quo)
	5,351						(Active Management)

APIC : Association for Promotion of International Cooperation

WECS : Water and Energy Commission Secretariat

LRMS : Land Resources Mapping Project

NPC : National Planning Commission

MPFSP : Master Plan for the Forestry Sector Project

MFSC : Ministry of Forests and Soil Conservation

CBS : Central Bureau of Statistics

FAO 1995 : 1995 Country Tables (FAO)

FAO 1990 : Forest resources assessment 1990 (FAO)

According to MFSC current land area is some 6,307,000 ha

② Growing Stock

The growing stock of natural forests in Nepal is 519 million m³, of which Middle Mountains where the Study Area is located account for only 20%. The total biomass volume (trunks, branches and leaves) is some 628 million tons.

③ Production of Forest Products

Table 2-4 shows changes of the firewood and charcoal production volume in connection with demographic changes. In the 1960's, the production volume

per capita was approximately 0.75 m³ which subsequently increased to some 1 m³ in the 1990's. These figures suggest that the increased demand due to population growth has not been met by a high production increase rate. While it is necessary to verify whether or not such a production increase has exceeded the forest productivity, appropriate forest management is likely to be called for.

Table 2-4 Demographic Changes and Production Volume of Firewood and Charcoal

Year	Population (1,000 persons)	Production Volume (1,000 m ³)	Production Volume per Capita (m ³ /person)
1961	9,413	7,211	0.766
1971	11,556	10,697	0.926
1981	14,634	13,874	0.948
1991	18,491	18,513	1.001

Sources: National Census for population data and FAO statistics for production volume

④ Supply of Fodder

The feasible annual supply of fodder, including grass, is shown in Table 2-5. Much of the fodder supply comes from forests, followed by grassland and shrub land with a total annual supply capacity of some 2.8 million tons.

Table 2-5 Annual TDN Supply from Forests, Shrub Land and Grassland in Nepal (1985/86)

(Unit: '000 tons)

Zone	Forests	Shrub Land	Farmland	Total
High Himalayas	28	51	355	434
High Mountains	355	140	323	818
Middle Mountains	463	311	79	853
Siwalik	449	23	9	481
Terai	151	23	34	208
Total	1,446	548	800	2,794

Source: Master Plan for the Forestry Sector, Nepal, 1988

(2) Community Forestry

The Government of Nepal emphasises the utilisation and management of forests (national forests) led by local inhabitants and this policy is considered to be ahead of all other countries in the world. Community forestry in Nepal is forest management based on agreement between forest user groups and the government. The former are expected to manage (utilisation, development and protection) national forests in a sustainable manner. In the hills, all usable forests are supposed to serve as community forests. The progress of community forest, however, has not been entirely satisfactory, partly because of the time consuming process of confirming user groups and establishing subject forests and partly because of inadequate support by the Department of Forests due to its manpower shortage. As shown in Table 2-6, 660 Forest Operational Plans have been approved for the Western Development Region. The Kaski District has 150 approved plans to manage a total forest area of 4,116 ha. In the Parbat District, 66 plans covering 1,088 ha of forests have been approved.

Table 2-6 Number of Forest User Groups for Which Forest Operational Plan is Approved in Western Development Region (as of October, 1994)

Fiscal Year	Item	Kaski District	Parbat District	Western Develop. Region
1991	Number of Approved Plans	20	6	52
	Area (ha)	480	67	1,411
	Number of Participating Households	1,778	388	3,954
1992	Number of Approved Plans	70	13	222
	Area (ha)	1,553	126	10,318
	Number of Participating Households	5,942	1,036	31,852
1993	Number of Approved Plans	59	47	369
	Area (ha)	1,927	894	18,336
	Number of Participating Households	6,022	4,826	41,382
1994 (as of Oct.)	Number of Approved Plans	1	-	17
	Area (ha)	156	-	275
	Number of Participating Households	220	-	1,521
Total	Number of Approved Plans	150	66	660
	Area (ha)	4,116	1,088	30,341
	Number of Participating Households	13,962	6,259	78,529

Source: Ministry of Forests and Soil Conservation

(3) Extension

At present, the Planning and Training Division of the Department of Forests is in charge of forestry extension and public relations activities. When the Master Plan for Forestry Sector was prepared, it was planned that the Division of Extension and Information of the Ministry of Forests and Soil Conservation would be responsible for nationwide activities in line with various programmes. JICA's Forestry Extension Project (1991-1994) initially commenced with this Division of Extension and Information acting as the counterpart but the subsequent abolition of this Division in the administrative reform by the HMG resulted in the transfer of the public relations (information) function to the Department of Forests. The survey on the need for forestry extension conducted under the Forestry Extension Project to collect basic materials and information to formulate its policies found the following.

- ① Forestry extension, conducted at a central level, found that forestry extension should be conducted as part of each specific programme and should not rely on a specialist central government organization.
- ② The extension activity survey on forestry-related projects in the Western Development Region found that projects adopting an integrated development approach produced better extension results among local inhabitants than sector-oriented projects and that the further decentralisation of administrative power would be necessary.
- ③ In the Western Development Region, the extension and PR activities of development projects/programmes in the past only reached the top echelon of village communities and not the actual forest users (women, occupational castes) in socially weak positions.
- ④ As the need related to conservation of the natural environment and forests is ranked lower than other urgent needs, environmental and forest conservation activities which are not accompanied by measures to solve urgent needs will not obtain the sympathy and cooperation of local inhabitants.

2-3-3 Main Programmes of Department of Soil Conservation

(1) Main Activities

The main activities of the Department of Soil Conservation are as follows.

- ① Land Use Development Planning Programme
 - a. Soil conservation and watershed management plans
 - b. Operational plans and implementation plans
 - c. SCWM Services

- ② Land Productivity Conservation Programme
 - a. On-farm conservation
 - b. Conservation pond
 - c. Fruit/fodder tree planting
 - d. Grass planting

- ③ Development Infrastructure Protection Programme
 - a. Road slope stabilization
 - b. Irrigation channel protection
 - c. Foot trail improvement
 - d. Drinking water supply protection

- ④ Hazardous Area Protection Programme
 - a. Gully treatment
 - b. Landslide treatment
 - c. Torrent control
 - d. Stream bank protection

- ⑤ Community Soil Conservation Extension Programme
 - a. Demonstration
 - b. Education, extension and training

(2) Programme Achievements

According to the available data, the achievements of the soil conservation activities under the Fifth 5-Year Plan (1975/80) through the Eighth 5-Year Plan (1992/97) are shown in Table 2-7.

Table 2-7 SCWM Targets and Achievements

Activities	Unit	Target	Achievement
Fifth Plan			
- Check Dam Construction	No.	1,105	1,129
- Tree Planting, including Fruit Trees	ha	1,257	909
- Grassland Improvement	ha	218	525
- Terrace Improvement	ha	337	173
- Road Slope Stabilisation	m	5,830	12,241
- Bank Stabilisation	km	-	30
- Trail Improvement	km	-	7
Sixth Plan			
- Tree Planting	ha	1,600	1,984
- Grassland Improvement	ha	128	106
- Fruit Tree Planting	ha	16	28
- Gully Control	no.	155	175
- Terrace Improvement	ha	225	281
- Nursery Establishment	no.	41	40
- Road Slope Stabilisation	km	38	25
- Establishment of Climatological Stations	no.	23	10
Seventh Plan (5 years)			
- Conservation Planting	ha	3,933	1,753
- Grassland Improvement	ha	50	31
- Fruit Tree Planting	ha	30	15
- Terrace Improvement	ha	1,028	106
- Gully Control	no.	230	101
- Water Source Conservation	no.	118	51
Eighth Plan (5 years)			
- Sub-watershed planning	no.	80	70
- Gully control	no.	321	308
- Irrigation channel improvement	km	329	319
- On-farm conservation	ha	1,425	1,360
- Degraded land rehabilitation	ha	3,337	3,229
- Water source protection	no.	448	446
- Conservation education extension and training	person	18,323	17,995

Source: Master Plan for the Forestry Sector Project and DOSC

2-3-4 Aid Projects for Soil Conservation and Watershed Management Programmes

- (1) HMG/JICA Community Development and Forest/Watershed Conservation Project (CDFWCP) and HMG/JOCV Greenery Promotion Cooperation Project (GPCP)

These 2 Japanese assistance projects commenced in July, 1994 with the Department of Soil Conservation acting as the counterpart organization. At present, 4 experts and 10 volunteers are working in Nepal for the CDFWCP and GPCP project respectively. For the GPCP project, an expert is also acting as a leader under the title of the individual expert. These projects are being implemented in a combined manner to improve the productivity of local land and to improve the natural environment through community development projects in order to encourage the participation of local inhabitants to the conservation activities of forest as well as natural environment, thereby achieving improved living, based on the needs and initiative of the subject villages. The ultimate objective is to achieve a sustainable development process in hilly areas in Nepal.

- (2) Bagmati Watershed Management Project

The Bagmati Project commenced in 1985/86 following the agreement between the Government of Nepal and the European Union (EU) and is currently in progress with the involvement of local inhabitants. The project area is 700 km² (the Bagmati watershed has an area of 3,500 km²), covering 5 districts and 54 VDCs. The project aims at promoting diverse but sustainable production systems to meet both the conservation and utilisation needs in order to improve the production and socioeconomic conditions of the local inhabitants.

- (3) Begnas Tal and Rupa Tal Watershed Management Project (BTRT)

This project commenced in August, 1985 by the Department of Soil Conservation and CARE Nepal. Following the completion of Phase I (1985 - 1989) and Phase II (1990 - 1994), Phase III has now entered the final project year. The project area covers 173 km², involving 7 VDCs in the Kaski District. The ultimate objectives of the project are stabilisation of the environment and enhancement of the production capacity through the sustainable management of village development.

(4) Water Induced Disaster Prevention Technical Centre (DPTC)

The DPTC project commenced in October, 1991 between the Nepalese Ministry of Water Resources and the Government of Japan to facilitate the prevention and alleviation of natural disasters. The Department of Soil Conservation cooperates with DPTC. The objective of this project is to improve the technological level in Nepal to deal with water-related disasters through technological development, technical training and the establishment of a relevant database. To achieve this objective, technological development, training, information/data collection and arrangement, etc. are conducted.

2-3-5 Watershed Management with People's Participation

(1) History of Integrated Watershed Management in Nepal

Watershed management in Nepal has been led by the administration which has implemented projects ranging from the rehabilitation of landslide sites to terrace improvement and planting at degraded grassland. Because the initiative has been taken by the administration, understanding of the project objectives, etc. on the part of local people is sometimes lacking, with projects being completed without achieving project continuity or the intended effects. In some cases, the smooth implementation of watershed management projects has been hindered by the lack of understanding of local people.

The history of watershed management projects since the establishment of the DOSC in 1974 is summarised into the following four stages from the viewpoint of local people's participation.

① First Stage (1974 to 1980)

All soil conservation projects were conducted by construction companies or local labourers and the maintenance was conducted by the DOSC.

② Second Stage (1981 to 1985)

Following the decentralisation policy, the level of subsidies for local people for terrace improvement and other soil conservation projects was set at 70%. The local needs expressed by community leaders or key persons were taken into consideration in the project implementation process.

③ Third Stage (1986 to 1990)

The opinions of the VDC, DDC and DSCO on project implementation were taken into consideration in the planning process. At this stage, the level of subsidies for local people dropped to 50%. User groups were established in view of the maintenance and repair, etc. of terraces based on the principle of self-reliance.

④ Fourth Stage (1991 to 1994)

Many projects were implemented by user groups based on their own needs. Conservation projects related to extension activities drew increasing attention and the DOSC issued the Guidelines for People's Participation in Soil Conservation Projects.

Against this background of the development history of soil conservation projects, the Bagmati Watershed Management Project and the Kulekhani Watershed Management Project, etc. have been implemented with an integrated approach. In areas near the Model Areas, there are examples of successful watershed management with the participation of local people, typically the Begnas Tal Rupa Tal Watershed Management Project (BTRT). Successful examples indicate that watershed conservation as well as conservation of the natural environment are enhanced by various approaches, including the utilisation of traditional technologies, the empowerment of women and occupational castes and demonstrations for local people by exemplary farmers based on an accurate understanding of the needs of local people.

(2) People Participation Guidelines in Nepal

The Department of Soil Conservation has been implementing a number of measures to deal with landslides, floods and food shortage, all of which have resulted from the population increase. The exclusion of people from the government's soil conservation projects upto the present has, however, resulted in a high project cost and the little emphasis on people's needs has made it practically impossible to maintain or repair the facilities constructed under such projects as these projects have seldom motivated local people or engendered any sympathy for them on the part of local inhabitants.

Having reviewed the situation, the Department of Soil Conservation prepared the Guidelines for People's Participation in Soil Conservation in 1993, aimed at

assisting the Department's engineers at the project implementation stage in order to maintain a low project cost due to people's participation. The guidelines consist of the following three objectives, five strategic measures and the people's participation process.

① Objectives

- a. Clarification of the people participation concept of the Department of Soil Conservation
- b. Proposal of the process of people participation for soil conservation and watershed management via user groups
- c. Clarification of the cost items of project plans jointly formulated by the Department of Soil Conservation and user groups with a view to maintaining a healthy financial balance for soil conservation projects implemented with people's participation.

② Strategic Measures

- a. Implementation of a project with a maximum budget of one million Rp, excluding the office construction cost, etc., by a user group
- b. Assured participation of the user group in every stage of the project cycle in view of easily obtaining cooperation and consent
- c. Daily communication between the user group and VDC/DDC for appropriate fund management
- d. Maximum utilisation of the knowledge, skills and experience of people.
- e. Provision of management training and field trips for people together with technical training

③ People's Participation Process

People participation in soil conservation and watershed management takes place at four stages: (a) investigation stage, (b) negotiation stage, (c) implementation stage and (d) maintenance and benefit sharing stage. In addition, some aspects of fund control are included in the people's participation process. These stages are summarised in Table 2-8.

Table 2-8 People's Participation Process

Stage	Main Objective(s)	Contents
Investigation	Analysis of the relationship between problems faced by people and soil conservation with the participation of people; assistance for the establishment of user groups	<ul style="list-style-type: none"> - Understanding of the present state of local natural resources, etc. using maps - Explanation of the project objectives and contents to people - Participation in user group meetings and explanation of successful projects - Formulation of a task list at meetings to classify tasks to be conducted by farmers and those requiring DSCO assistance - Identification of needs and establishment of priorities - Preparation of a user group list and classification of user groups for project implementation - Formation of user group
Negotiation	Provision of assistance for and advice on implementation plans formulated by user groups and the project cost	<ul style="list-style-type: none"> - Coordination at user group meetings to create a consensus on the project and to organize an executive committee - Preparation of rules regarding women and occupational castes in the user group by the committee - Reporting of the establishment of a committee to the VDC, DDC and DSCO - Detailed study and cost estimation with DSCO assistance - Establishment of a consensus on maintenance, benefit sharing and budget distribution - Submission of an implementation plan describing the project contents and cost, etc. by the user group
Implementation	Implementation and monitoring by user groups and provision of technical advice by DSCO	<ul style="list-style-type: none"> - Preparation of a project implementation schedule by the user group - Lending of construction equipment, etc. to the user group - Technical assistance for smooth project implementation and display to facilitate understanding of the project - Sufficient meetings between the DSCO and user group - Approval of the budget and early commencement of the project - Payment of project expenses to the user group and final reporting of the project - Handing-over of the project to the user group
Maintenance and Benefit Sharing	Clarification of maintenance by the user group and expected profits	<ul style="list-style-type: none"> - Preparation of rules on maintenance by and benefits for the user group and approval of such rules by the user group members - Evaluation of the user group's ability to implement the project by the DSCO - Implementation of training to improve the management and technical capability of the user group

Source: Guidelines for People's Participation in Soil Conservation, 1993, DOSC.

(3) Examples of People's Participation in Nepal

① Bagmati Watershed Management Project

This project, as described earlier commenced in 1985 with assistance provided by the EC and is still continuing. Under the project, various activities have been conducted to promote soil conservation. Among these activities, people conduct planning, implementation, monitoring and maintenance through user groups. There are many activities to supply the project and those closely related to people participation are listed below.

- a. Training and workshops to upgrade the skills of project staff
- b. Preparation of field plan formulation manual for project staff
- c. Training of farmers showing strong interest in soil conservation and watershed management
- d. Establishment of and assistance for user groups paying particular attention to women's participation
- e. Activities to increase income from sources other than farmland
- f. Introduction of fruit trees and vegetable cultivation

Hardly any local residents participated at the beginning of the project, resulting in stagnation of the project. After four or five years, however, a new approach to encourage people participation was adopted and the project progressed smoothly thereafter, leading to maintenance work by people. An example of successful people participation under this project is given below.

Location	Bukhel VDC, Lalitpur District
Prevailing Conditions	Poor soil conditions mean poor crop production, forcing residents to live on loans
Project Implementation Results	<ul style="list-style-type: none">- Annual saving of 50 - 250 rupees- Increased volume of annual milk sales from 30 litres to 400 litres- Change of roofing material from thatch to galvanised sheet iron- Multiple use of mustard and increased fodder production- Conservation of headwater areas where landslides occur; laying of pipes; maintenance by residents

② Begnas Tal and Rupa Tal Watershed Management (BTRT)

This watershed management project has been implemented since 1985 with the people participation approach and is considered to be the most advanced project with people participation in Nepal. Under this project, Community Development Conservation Committees (CDCCs) have been established instead of user groups to promote people participation and to implement the project. One characteristic of these CDCCs is that their establishment is not restricted by the VDC or ward boundary to act as an independent project unit to conduct multiple projects. While the project formulation process is not described here, the perceived solutions to local problems are submitted to the project office. One hundred CDCCs were established by 1994. In addition to organizing people into CDCCs, the Community Development Board has been established to coordinate with the VDC. Moreover, local clubs have been formed by people as their own NGOs to assist projects and also to play a leading role in project implementation. As a result, the following positive achievements have been made.

- a. Change and improvement of land use
- b. Contribution to generating economic benefits
- c. Improved land productivity
- d. Participation by user groups in watershed management
- e. Establishment of credit facilities
- f. Positive impact on neighbourhood relationships

An example of successful people participation under the project is given below.

Location	Rakhi VDC, Kaski District
Prevailing Conditions	Gullies created by excessive grazing, resulting in soil erosion and crop damage
Project Implementation Results	<ul style="list-style-type: none"> - Construction of 16 check dams and planting in surrounding areas - The project implementation body pays 60% of the cost with the remaining 40% paid by user groups - Following completion of the project, user groups are responsible for the protection and maintenance of the check dams and the use of plants and trees - Farmland productivity has been improved and headwater areas are protected - Increased income through fodder sales

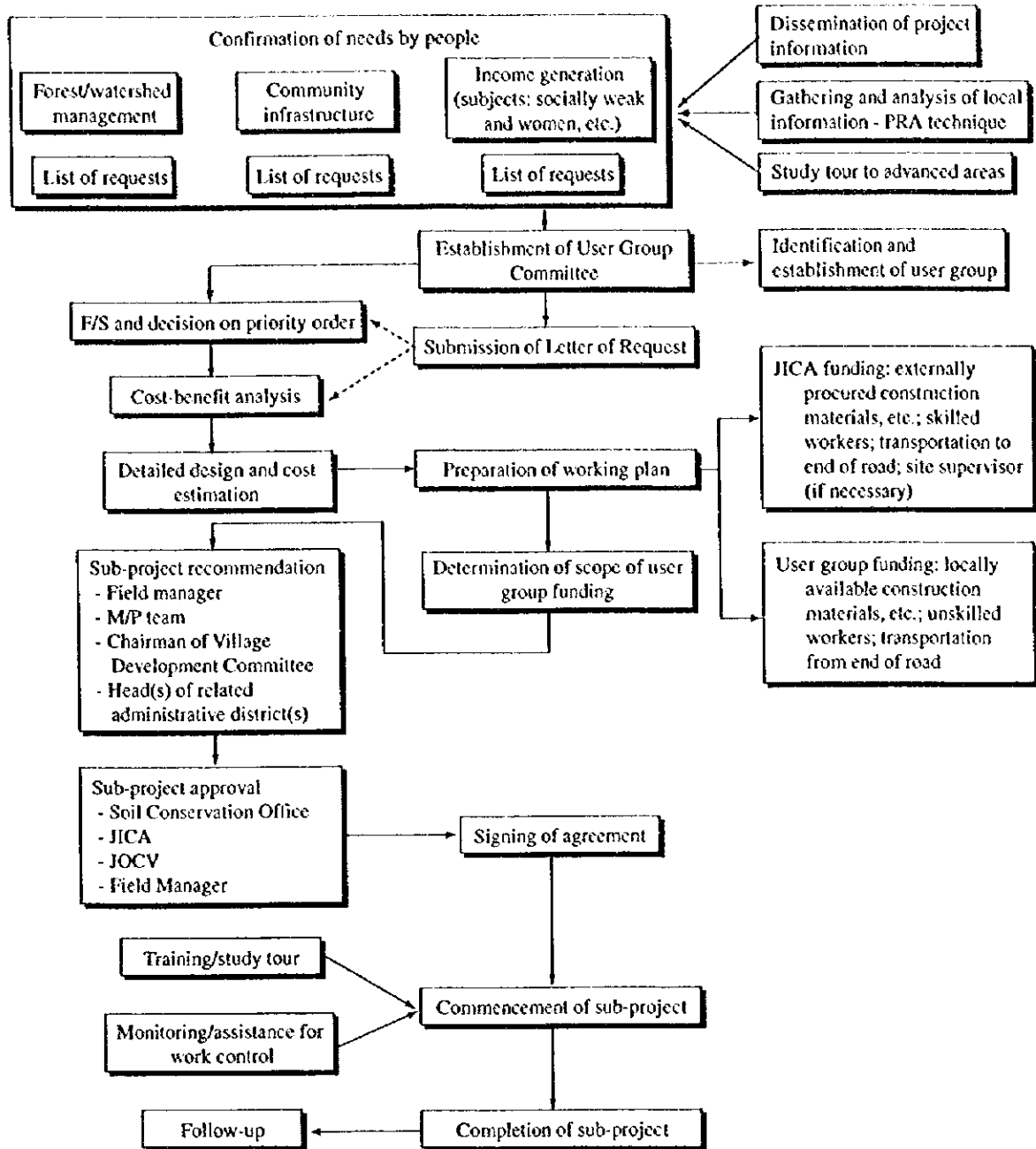
③ JICA Project

The JICA project has been implemented to contribute to improved land productivity and the natural environment in the subject areas by means of promoting model community development activities to improve the living standard on the initiative of people to meet their own needs. At present, 10 M/P teams are operating in five model areas, seeking to establish a grass-roots approach based on local needs.

There are five criteria for the selection of project areas: (i) area of conspicuous environmental deterioration, (ii) area where development of the infrastructure is much delayed, (iii) area dominated by people belonging to occupational castes, (iv) area showing enthusiasm for participatory community development and (v) area lacking assistance by other aid organizations. The minimum unit for which assistance is provided is a "ward" which is the smallest administrative unit. The details of the sub-projects under this project have already been described in 2-3-4. As an important pillar of the project is gender care, the empowerment of women is attempted through income improvement sub-projects. In addition, the rules of the steering committee of the user groups demand that half of the members should be women.

The formulation process of sub projects by JICA project is as shown in Fig. 2-6. Project management guidelines have been prepared on such matters as the understanding of people's needs, organization of people, planning and implementation to ensure the smooth progress of the project.

There is a specific project cost ceiling and the principle of "JICA assisting the cost portion which cannot be met by people through their own funding activities" applies in project implementation. Accordingly, the wages for skilled technicians and the cost of wire to construct gabions, etc. in the case of check dam construction for a forest conservation sub-project, for example, are met by the project fund. Theoretical as well as practical training, including literacy education for women, is provided to improve the capabilities of residents.



Source: General Report, 1997 by Ichiro Nagame (Ex. CDFWCP Team Leader)

Fig. 2-6 Sub Project Formulation Process

In addition to this JICA project, people participation is also encouraged by a JOCV project, the DSCO and NGOs. All of these organizations closely liaise with each other for the effective implementation of sub-projects as shown in Fig. 2-7. Moreover, as is shown in Table 2-9, coordination with related organizations is attempted for the community infrastructure development programme and income improvement programme, etc. which should contribute to the long-term continuity of the sub-projects. An example of a sub-project is given below.

Location	Puranchaur VDC Kaski District
Prevailing Conditions	<ul style="list-style-type: none"> - Poor access in the rainy season due to difficulty of using river transport - Necessity for a water supply system to alleviate the water shortage
Project Implementation Results	<ul style="list-style-type: none"> - Establishment of a user group and construction of a suspension bridge - Installation of water supply tanks by a women's group in response to a request by women of occupational castes - Encouragement of the raising of goats as part of the income generation programme

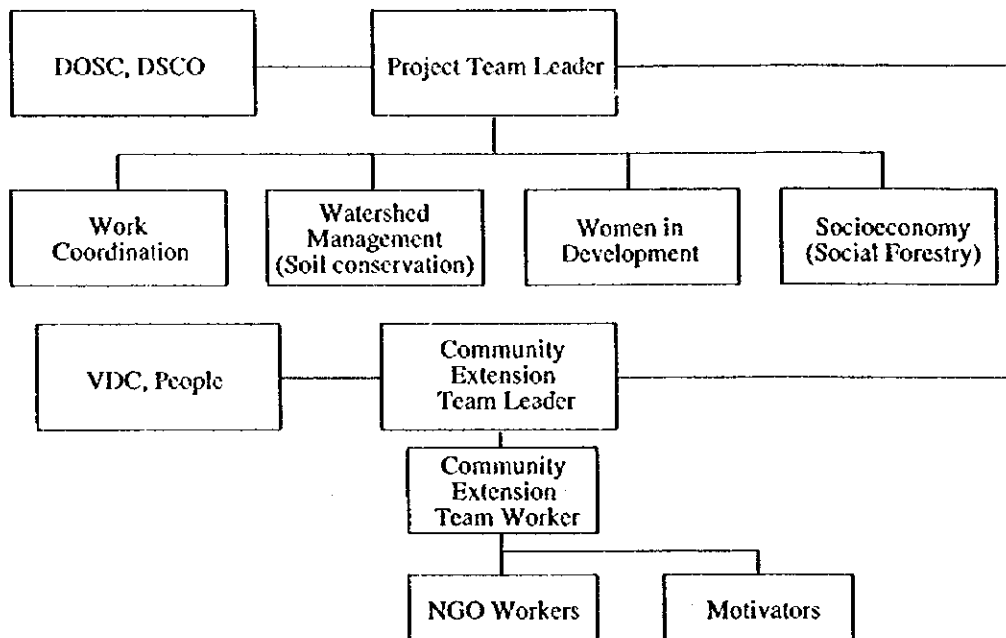


Fig. 2-7 Project Implementation System of JICA/JOVCV and Related Organizations

Table 2-9 Examples of Government Organizations Liaising in Projects

Government Organization	Example of Project	Contents
District Agricultural Office	Cultivation of citrus fruits (IG)	Training and travelling guidance
"	Production of kidney bean seeds (IG)	"
"	Cultivation of vegetables (IG)	"
"	Cultivation of ginger (IG)	"
District Livestock Office	Raising of goats (IG)	Purchase of goats, training and travelling guidance
Lumle Agricultural Experiment Station	Raising of goats (IG)	Purchase of goats
"	Cutting training for timber trees (FW)	Training and purchase of seedlings
"	Agroforestry study tour	Study tour
Mushroom Development Programme	Mushroom culture (IG)	Training and purchase of mushroom for cultivation
District Education Office	Literacy class (CB)	Literacy lessons in the project area
District Forestry Office	Community forest handing-over work (FW)	Handing-over work and workshop
VDC Health Post	Hygiene training (CB)	Training

Source: Mid-Term Evaluation Documents, 1997 by Minoru Yoshida

