JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)

DEPARTMENT OF CIVIL AVIATION
MINISTRY OF TOURISM AND CIVIL AVIATION
KINGDOM OF NEPAL

THE STUDY
OF
TRIBHUVAN INTERNATIONAL AIRPORT
MODERNIZATION PLAN
IN
NEPAL

FINAL REPORT

VOLUME II : MAIN REPORT

JUNE 1994

PACIFIC CONSULTANTS INTERNATIONAL

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NOTE

The following exchange rate was adopted throughout this report :

US$ 1.00 = Rs.49.0 = Yen 109 (November, 1993)

Rs. 1.0 = Yen 2.3

PREFACE

In response to a request from the Government of the Kingdom of Nepal, the Government of Japan decided to conduct the Study on Tribhuvan International Airport Modernization Plan in Nepal and entrusted the study to the Japan International Cooperation Agency (JICA) .

JICA sent to Nepal a study team headed by Mr. Shota Morita, Pacific Consultants International, four times between July, 1993 and March, 1994.

The team held discussions with the officials concerned of the Government of Nepal, and conducted field surveys at 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 the Kingdom of Nepal for their close cooperation extended to the team.

June 1994

Kensuke Yanagiya

Kensuke Yanagiya

President
Japan International Cooperation Agency

June 1994

Mr. Kensuke Yanagiya
President
Japan International Cooperation Agency
Tokyo, Japan

Dear Mr. Yanagiya

Letter of Transmittal

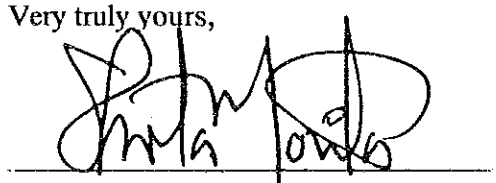
We are pleased to submit to you the final report on the Study of Tribhuvan International Airport Modernization Plan in Nepal.

This study has been conducted by Pacific Consultants International based on a contract with JICA, from July 1993 to June 1994. Throughout the study, we have taken into full consideration the present situation of Tribhuvan International Airport and have recommended that His Majesty's Government of Nepal implement this project as a top priority.

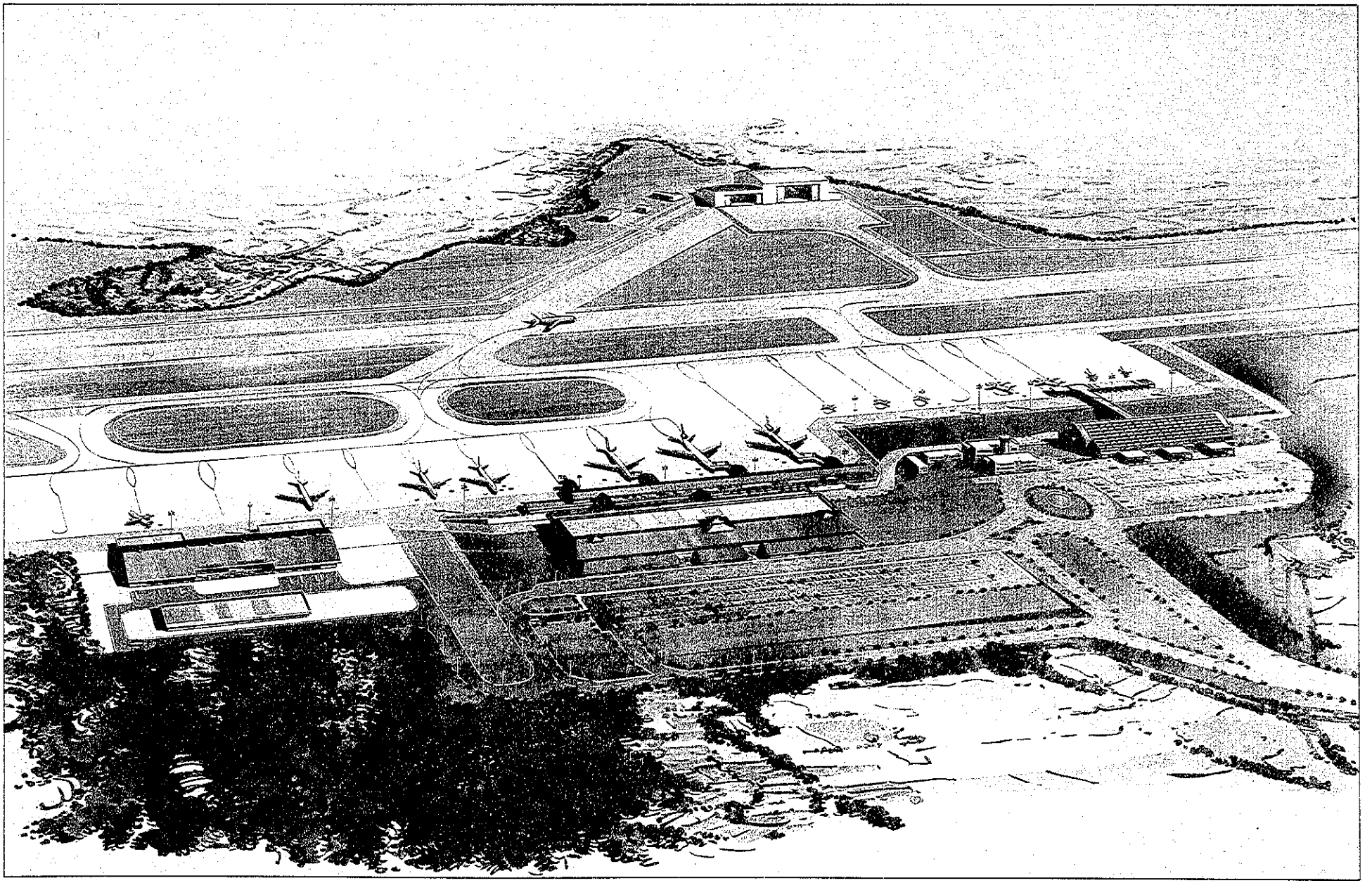
We wish to take this opportunity to express our sincere gratitude to your Agency, the Ministry of Foreign Affairs, the Ministry of Transport. We also wish to express our deep gratitude to the Ministry of Tourism and Civil Aviation and other authorities concerned of the Kingdom of Nepal for the close cooperation and assistance extended to us during our study.

Finally, we hope that this report will be effectively used for the development of Tribhuvan International Airport.

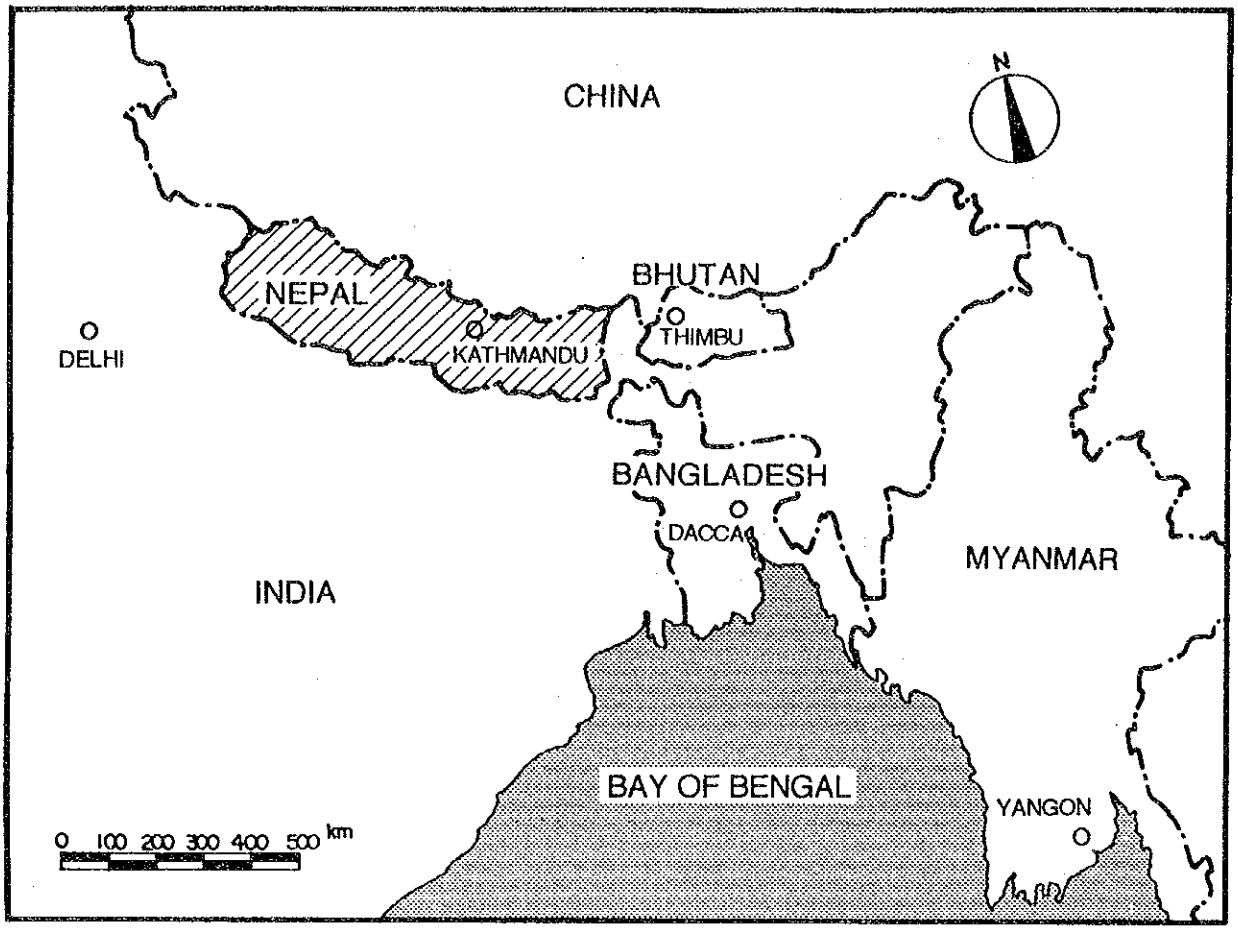
Very truly yours,

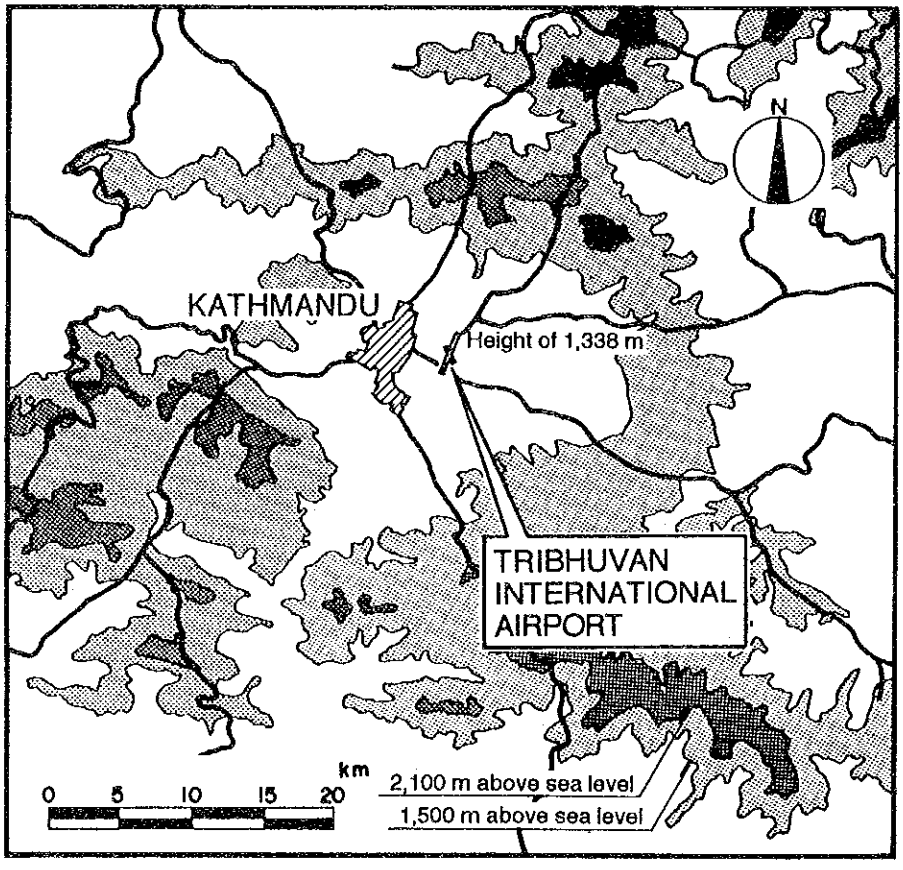


Shota Morita
Team Leader
Study for Tribhuvan International
Airport Modernization Plan
Pacific Consultants International



TRIBHUVAN INTERNATIONAL AIRPORT
SHORT-TERM MODERNIZATION PLAN





LOCATION MAP

THE STUDY
OF
TRIBHUVAN INTERNATIONAL AIRPORT
MODERNIZATION PLAN
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NEPAL

SYNOPSIS

1 Background and Objectives of the Study

a. Nepal is an inland and mountainous country which possesses the highest peaks of the world. Due to its mountainous terrain and landlocked geographical features, the road system is still underdeveloped.

Thus air transport has a vital role in the national transportation system not only for passengers, but also for freight, both internationally and domestically.

The Tribhuvan International Airport (hereinafter referred to as TIA), which is sited at Kathmandu, the capital of Nepal, is the only international gateway of Nepal and also the central hub of domestic air transport in Nepal. The airport has a 3,050 meter-long runway, and is at an altitude of 1,300 meters.

In recent years, the demand for air transport in Nepal has been increasing steadily. TIA handled 780 and 292 thousand passengers for international and domestic flights respectively in 1992. This implies the urgent necessity of improvements to the airport capacity because of the age and narrowness of the airport facilities.

As mentioned above, TIA is located in the severe Himalayan natural features. This condition gives restraints to aircraft operations and also hinders the regular performance of navigation aids.

Thus the current TIA is not fully equipped with the airport facilities which are expected to be installed in modern international airports, particularly with respect to aeronautical navigation systems.

Under this situation, two air crashes occurred on the peripheral mountains of the Kathmandu valley in 1992.

b. The objectives of the Study are summarized as follows:

- formulation of a master plan for the modernization of air safety improvement and ground facilities improvement of TIA for the target year 2010
- conduct of a feasibility study for the short-term modernization plan of ground facilities improvement for the year 2003
- conduct of a technical study for an urgent project of air safety improvement

2 Airport Modernization Plan

The Airport Modernization Plan, which is the airport master plan of TIA for the target year 2010, consists of the Ground Facilities Improvement Plan and the Air Safety Improvement Plan.

2.1 Ground Facilities Improvement Plan

(1) Short-term Modernization Plan

- Construction of a new apron for B747 class aircraft
- Construction of a maintenance hangar with a maintenance apron
- Construction of an isolated aircraft parking position
- Construction of a perimeter road, security fence, terminal road and carpark
- Construction of a new international terminal building
- Construction of a new cargo terminal building
- Renovation of the existing international terminal building for domestic use

(2) Long-term Modernization Plan

- Expansion of the passenger terminal apron
- Expansion of the international terminal building
- Expansion of the cargo terminal building
- Expansion of the maintenance hangars

(3) Ultimate Modernization Plan

- Expansion of the runway strip width
- Construction of a parallel taxiway with a minimum separation distance with the runway
- Expansion of the apron and the terminal buildings

2.2 Air Safety Improvement Plan

(1) Urgent Plan

- Installation of ASR/SSR at TIA
- Installation of an additional SSR to complement the coverage of ASR/SSR
- Improvement of the communication system for radar operations
- Installation of Localizer type Directional Aids (LDA) with DME
- Improvement of CATC
- Establishment of skill evaluation, rating and a licensing institution for air traffic controllers
- Establishment of technical skill evaluation for maintenance staff

(2) Short-term Modernization Plan

- Installation of Circling guidance lights (CGL)
- Extension of ATIS coverage
- Replacement and rearrangement of the current meteorological observation equipment with an automatic system
- Replacement of the current Semi-automatic Message Switching System (MSS) with an Automatic Message Switching System
- Others

(3) Long-term Modernization Plan

- Runway lead-in lighting system
- Replacement of the existing system, such as HF, VHF transmitter/receivers, ATS console and VOR/DME due to their age
- Provision for en-route air traffic control due to air route re-structuring at the time of increased traffic volume

- Provision for a Microwave Landing System (MLS)
- Provision for an Aeronautical Mobile Satellite Service (AMSS), Automatic Dependent Surveillance (ADS) and Global Positioning System (GPS)

(4) Human Resources Development Plan

In order to cope with operation and maintenance of modern airport facilities and systems, the human resources should be developed well.

The human resources development plan for newly introduced equipment (Radar and LLZ/DME) consists of four phases to meet the sequence from preparation till operation.

2.3 Overall Airport Modernization Plan

The Overall Airport Modernization Plan was established based on the Ground Facilities Improvement Plan and the Air Safety Improvement Plan.

2.3.1 Overall Airport Modernization Plan

The airport modernization plan was established as a master plan for current improvements and future development so as to satisfy traffic demands and technical requirements and to be compatible with the environmental condition for the year 2010 and beyond.

The outline of the plan is as follows;

a. annual passengers	2.49 million	(1.94 (Int'l) 0.55 (Dom))
b. annual cargo	54,000 ton	(52,000 (Int'l) 2,000 (Dom))
c. annual aircraft movement	29,000	(12,000 (Int'l) 17,000 (Dom))
d. target aircraft operated	B747 class	
e. major works		
taxiway	construction of exit taxiways	
apron	construction of 11 stands for international aircraft with: 2 for B747 classes 6 stands for domestic aircraft 3 stands for helicopters 6 parking stands for HS748 class	
passenger terminal building	construction (floor area: 33,000 sq.m for international passengers)	
	renovation (floor area: 10,750 sq.m for domestic passengers, converted from the current Int'l PTB)	
cargo terminal building	construction (floor area: 10,700 sq.m)	
air navigation systems	installation of ASR/SSR, additional SSR, LDA/DME, CGL, etc.	

As for the ultimate airport modernization plan beyond the year 2010, widening of the runway strip from 150 m to 300 m and shifting of the parallel taxiway are planned to meet with technical requirements.

2.3.2 Short-term Modernization Plan

The short-term plan consists of the higher necessity and urgent programs. The scope of the short-term modernization plan for the target year 2003 is summarized as shown below;

a.	annual passengers	1.85 million	(1.43 (Int'l) 0.42 (Dom))
b.	annual cargo	38,000 ton	(36,000 (Int'l) 2,000 (Dom))
c.	annual aircraft movement	28,000	(11,000 (Int'l) 17,000 (Dom))
d.	target aircraft operated	MD11 class	
e.	major works		

international terminal building	new construction with 25,000 sq.m floor area
domestic terminal building	renovation of the current international PTB with 10,750 sq.m floor area
cargo terminal building	new construction with 7,500 sq.m floor area
taxiway	construction of exit taxiways
aprons	expansion of international and domestic aprons
	construction of maintenance apron and isolated parking apron
roadways and car parks	expansion and construction for 1,020 lots with a circulation road
other civil words	construction of security fence and service roads

3 Feasibility Study of the Short-term Modernization Plan

3.1 Implementation Schedule and Project Cost

a. The implementation schedule is summarized as follows;

financial arrangement	:	1995
engineering services for detailed design/tendering	:	1996 - 1997
construction	:	1998 - 2000

b. The project cost is as follows;

item	cost (million US $)		
	local portion	foreign portion	total
civil works	6.1	21.4	27.5
architectural works	10.2	80.7	90.9
airport utilities	0.6	3.8	4.4
others	0.1	1.8	1.9
physical contingency	1.7	10.8	12.5
engineering services	1.4	12.3	13.7
total	20.1	130.8	150.9

3.2 Evaluation

From the technical point of view, the short-term plan is selected and planned to meet with the required technical standards and the level of services.

The environmental considerations reveal there will not be any serious impact from the plan on the surrounding area of the airport. However attention will be paid to aircraft noise in the future so as to keep in harmony with the local communities.

The economic and financial studies show the total viability by the following indexes;

EIRR	17.1 %
NPV	Rs. 2,400 million
B/C	1.47
FIRR	- 6.2 % (base case)

The results of the economic analysis are favorable. On the other hand, the results of the financial analysis (for the base case) are not optimistic.

Although a separate study should be considered for the increase of the revenue by making changes in the airport charges, this Project (the airport facility as an important transport infrastructure) gives benefits to the national economy for the increase of foreign income and the conveniences for the air travel of the Nepalese; when evaluated from an overall viewpoint its implementation can be considered to be adequate from the economic and financial stand.

4 Technical Study of the Urgent Project

4.1 The purpose of the Urgent Improvement Plan is to establish the system to prevent the recurrence of an aircraft accident. The work items to be implemented urgently was selected as the Urgent Project due to the longer time required for manufacturing and installation than other items. As the result, the following items were selected as the Urgent Project among the Urgent Improvement Plan:

- Installation of a radar
- Construction of a radar operation building
- Construction of a training center and installation of training equipment

Basic Design was carried out for system design and facility planning prior to the detailed design of manufacturing of the equipment and construction.

4.2 The project cost is as follows;

- ASR/SSR and training facility:	26,000	thousand US dollar
- Construction of radar operation building and other buildings:	5,000	
- Others:	3,000	

4.3 The human resources development plan for the operation and maintenance of the Project was established, as the radar system will be introduced at first in Nepal, and the healthy operation will rely on the staffs in charge.

5 Conclusions and Recommendations

5.1 Conclusions

Through the Study, it is confirmed that the Short-term Modernization Plan is feasible from the technical, environmental and economic/financial viewpoints. Furthermore, it is confirmed that the Urgent Project is technically feasible through the technical evaluation.

As a whole, the Short-term Modernization Plan and the Urgent Project will also contribute to enhance and improve the following performances in the national and regional fields, even though these values are intangible in the analysis.

a. improvement of air safety
b. enhancement of comfort of airport users by solving congestion and improving services
c. promotion of exports and imports
d. enhancement of domestic air transport and improvement of domestic air transport safety
e. modernization of Nepalese air transport

5.2 Recommendations

a. For implementation of the project, the following are recommended.

   - national and regional consensus
   - preparatory and coordination works between the parties concerned
   - financial arrangements

b. The Urgent Improvement Plan of TIA aims particularly at easing the work load of a pilot who is seriously kept busy in maintaining the aircraft position during approaching, and at giving precise information of an aircraft position to an air traffic controller for more secured control. Thus the plan is very important to be achieved, because of recovering the air safety of TIA and showing the quick effect of air safety.

   Therefore it is quite necessary to achieve the plan as soon as possible.

   The Urgent Project has been implemented as the first stage of the plan, since the diplomatic note on the detailed design of the radar system and other facilities was exchanged between Nepal and Japan on January 1994.

   The Project was selected in the urgent improvement plan taking into account the rather long period of the production of radar system and the construction of the concerned buildings, which is estimated to govern the overall project period. Therefore ASR/SSR and the training facility are expected to be completed as the first stage. And the succeeding installation of the additional SSR and LDA/DME and also the improvement of CATC as the second stage of the plan will fully complete the object.

c. Human resources development

   In accordance with the airport's modernization, new and modern systems and equipment are planned to be introduced. This implies the necessity of higher handling capabilities so as to support these modernized systems in airport operations and management. Therefore human resources development is strongly requested.

   To develop the necessary human resources by themselves in Nepal is a primary policy. However it will be expected to utilize international technical assistance at the beginning of the development so as to accelerate the process.

As CATC is the core institute of human resources development, it is strongly expected that they improve and strengthen their conditions.

d. Radar approach control

As a radar system will be introduced for the first time to Nepal, the radar service is planned to start by monitoring aircraft and then to change to full scale radar control with confirmation of the requisite conditions of (a) getting fully familiar with the operations and techniques by the Nepalese staff, (b) sufficient and adequate training for the staff and (c) satisfactory radar coverage.

The transition should be affirmatively and steadily done by spending sufficient time for familiarization and by utilizing international technical assistance fully.

e. Operation and maintenance of radar

It is clearly required for the radar system to be kept in a good condition by regular maintenance. To ensure this, it is strongly recommended that to secure the number of staff required, to train them well and to provide an adequate budget to sustain these.

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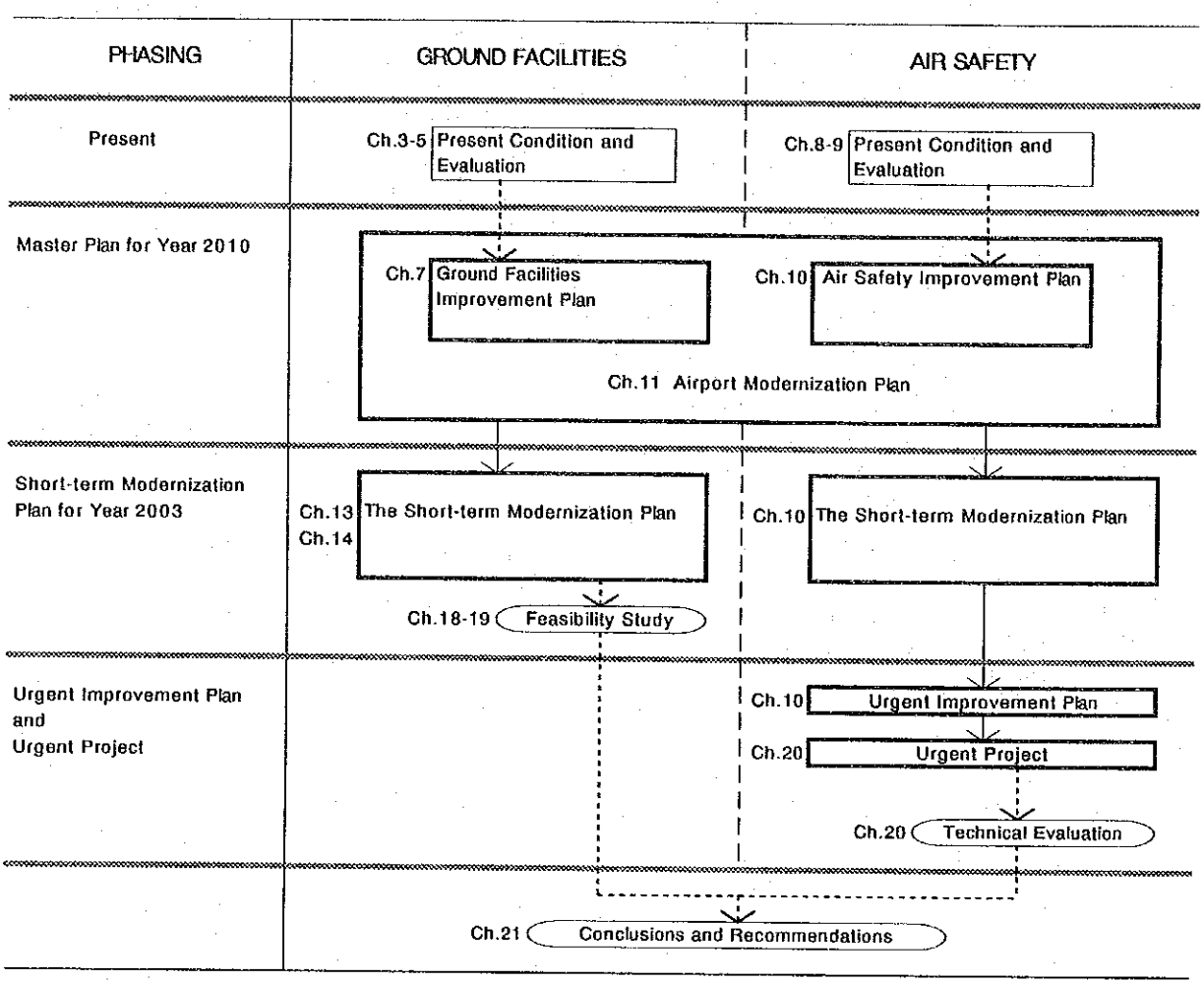


Ch. : Chapter in the Main Report

Phasing of Airport Modernization Plan and Work Flow of the Study

LIST OF ABBREVIATIONS

A300/320	:	Airbus 300/320
ACN	:	Aircraft Classification Number
AFFF	:	Aqueous Film Forming Foam
AFTN	:	Aeronautical Fixed Telecommunication Network
AGL	:	Aeronautical Ground Light
AIP	:	Aeronautical Information Publication
ALS	:	Approach Lighting System
AMSL	:	Above Mean Sea Level
ANT	:	Antenna
APPR	:	Approach
ASR	:	Airport Surveillance Radar
ATC	:	Air Traffic Control
ATS	:	Air Traffic Services
ATZ	:	Aerodrome Traffic Zone
B727/737/747/757/767	:	Boeing 727/737/747/757/767
B/C	:	Benefit Cost Ratio
CATC	:	Civil Aviation Training Center
CBR	:	California Bearing Ratio
CCR	:	Constant Current Regulator
CIP	:	Commercial Important Person
CIQS	:	Customs, Immigration, Quarantine and Security
CTR	:	Control Zone
CVOR	:	Conventional VHF Omni-Directional Radio Range
DC9/10	:	McDonnell Douglas DC-9/10
DCA	:	Department of Civil Aviation
DME	:	Distance Measuring Equipment
DVOR	:	Doppler VHF Omni-Directional Radio Range
EIRR	:	Economic Internal Rate of Return
FAA	:	Federal Aviation Administration of the United States
FIC	:	Flight Information Center
FIR	:	Flight Information Region
FIRR	:	Financial Internal Rate of Return
FIS	:	Flight Information Service
FSS	:	Flight Service Station
GDP	:	Gross Domestic Product
GP	:	Glide Path (ILS)
GRP	:	Gross Regional Product
GSE	:	Ground Support Equipment
HF	:	High Frequency
HMG/N	:	His Majesty's Government of Nepal
IATA	:	International Air Transport Association
ICAO	:	International Civil Aviation Organization
ILS	:	Instrument Landing System
IM	:	Inner Marker
IMC	:	Instrument Meteorological Condition
IWDI	:	Illuminated Wind Direction Indicator
JCAB	:	Japan Civil Aviation Bureau
JICA	:	Japan International Cooperation Agency
KHz	:	Kilo Hertz
LDA	:	Localizer Type Directional Aids
LLZ	:	Localizer (ILS)
MD-11	:	McDonnell Douglas MD-11
MHz	:	Mega Hertz
MLS	:	Microwave Landing System
MM	:	Middle Marker

NDB	:	Non Directional Radio Beacon
NM	:	Nautical Mile
NPV	:	Net Present Value
OAS	:	Obstacle Assessment Surface
OIS	:	Obstacle Identification Surface
OLS	:	Obstacle Limitation Surface
PAPI	:	Precision Approach Path Indicator
PCN	:	Pavement Classification Number
QNH	:	Altimeter sub-scale setting to obtain elevation when on the ground
RA	:	Royal Nepal Airlines Corporation
RWY 02/20	:	Runway 02/20
RX	:	Receiver
SALS	:	Simple Approach Lighting System
SID	:	Standard Instrument Departure
SSB	:	Single Side Band
SSR	:	Secondary Surveillance Radar
TIA	:	Tribhuvan International Airport
TIAO	:	Tribhuvan International Airport Office
TMA	:	Terminal Control Area
TWR	:	Aerodrome Control Tower
TX	:	Transmitter
UHF	:	Ultrahigh Frequency
USA	:	United States of America
VHF	:	Very High Frequency
VIP	:	Very Important Person
VMC	:	Visual Meteorological Condition
WECPNL	:	Weighted Equivalent Continuous Perceived Noise Level

PART A.

GENERAL

CHAPTER 1

INTRODUCTION

CHAPTER 1 INTRODUCTION

1.1 Background

(1) Nepal is an inland country bordered by China and India, and is also a mountainous country which possesses the highest peaks of the world.

The total land area is 147,000km^2 and the population of 19 million (in 1992) is widely spread over the land.

Due to its mountainous terrain and landlocked geographical features, the road system, which needs high construction costs, is still underdeveloped.

Thus air transport has a vital role in the national transportation system not only for passengers but also for freight, both domestically and internationally.

The industrial structure also indicates that the country is still in the initial stage of economic transition with agricultural shares of 60% in production and 90% in the number of workers. His Majesty's Government of Nepal recognizes that the diversification of the country's industrial structure, particularly towards an outward foreign exchange earning economy, is essential for sustainable growth, and emphasizes that tourism development is to be pursued in its Eighth Plan (1992~1997).

The tourism industry has been fast growing and has now become the highest foreign exchange earner.

Two air crashes in the peripheral mountains of the Kathmandu Valley in 1992 will likely impact tourism adversely unless immediate measures are taken to create a positive image of TIA.

(2) The Tribhuvan International Airport (hereinafter referred to as "TIA"), which is sited at Kathmandu, the capital of Nepal, is the only international gateway of Nepal and also the central hub of the air transport in Nepal.

In recent years, the demand for air transport in Nepal has been increasing steadily. TIA handled 780 and 292 thousand passengers on international and domestic flights respectively in 1992. Particularly it shows the high growth in international transport, such as 25% and 10% increases in annual number of passengers and cargo respectively between 1987 and 1992. This shows the urgent necessity of improvement of the airport capacity because of the aging and narrowness of the airport facilities.

As mentioned above, TIA is located in a severe Himalayan natural feature. This condition limits aircraft operations and also hinders regular performance of navigation aids.

Thus TIA does not have the kind of airport facilities which are expected to be installed in modern international airports, particularly in respect to aeronautical navigation aids.

(3) Because of the above reasons, the modernization of the Tribhuvan International Airport, particularly the improvement of the air navigation and air traffic control systems, is a matter of urgency and necessity.

For this purpose, a comprehensive study needs to be carried out as the accelerating step towards the project implementation.

1.2 Objectives of the Study

Based on the background, the objectives of the study are summarized as follows:

(1) Formulation of a Master Plan for the Modernization of the Tribhuvan International Airport targeting year 2010.

(2) Conduct of a feasibility study for the Short-Term Modernization Plan targeting year 2003.

(3) Formulation of an Air Safety Improvement Plan with technical study for an Urgent Project .

(4) Conduct of technology transfer in and through the course of the Study.

The Urgent Project is defined as the first stage of the Air Safety Improvement Plan to contribute to raise the level of air safety as quickly as possible at TIA.

1.3 Scope of the Study

Scope of the study was defined in the Agreement in APPENDIX- 1.3 which was agreed between the Department of Civil Aviation (DCA), His Majesty's Government of Nepal and the Japan International Cooperation Agency (JICA) on February 5, 1993.

In order to fully cover the Scope of the study, 46 major study items are identified and illustrated in Figure 1.3.1 as the work flow chart of the Study.

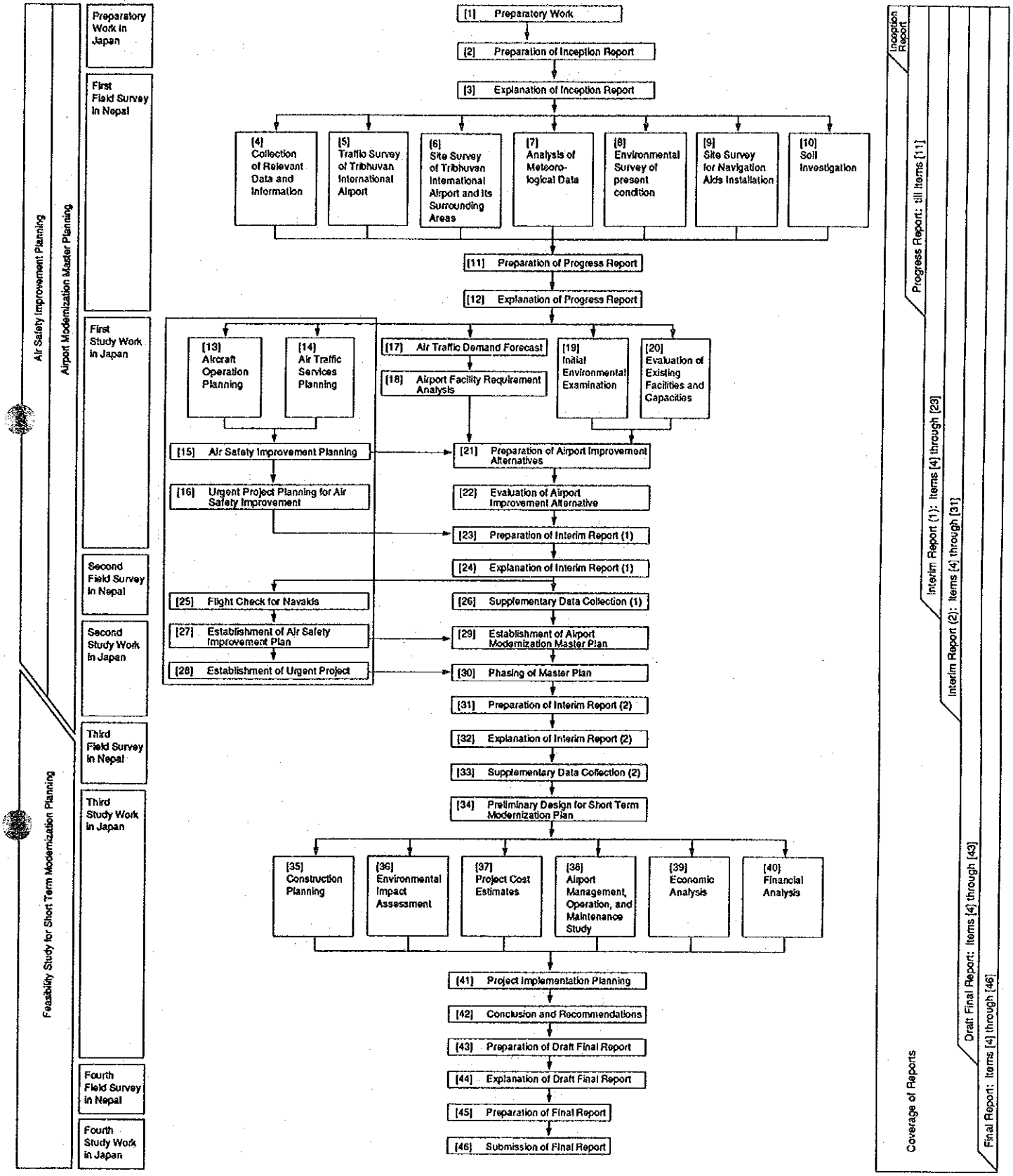


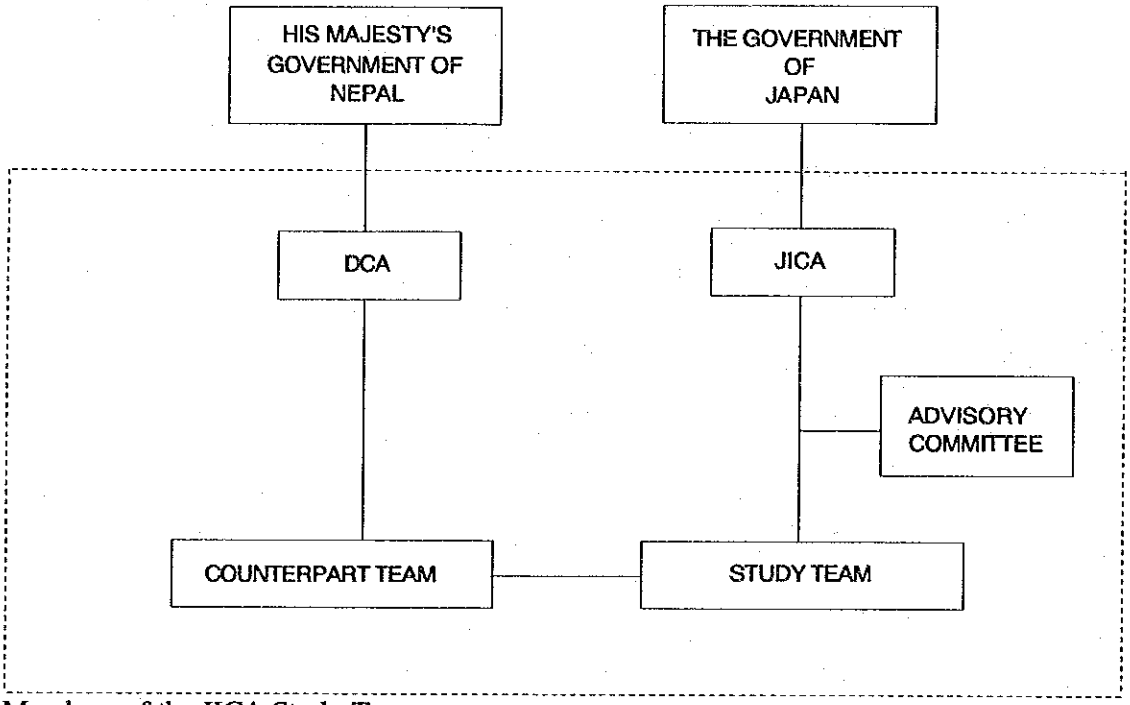
Figure 1.3.1 Work Flow Chart of the Study

1.4 Study Organization

The Study will be carried out by the JICA Study Team under the direction of the Advisory Committee which has also been organized by JICA. The Study will be conducted in close coordination with the concerned authorities of His Majesty's Government of Nepal.

1.4.1 Overall Concept of Study Organization

The overall organization framework is shown below:



1.4.2 Members of the JICA Study Team

Mr. Shota MORITA	:	Team Leader/Airport Planner
Mr. Masato TAMURA	:	Deputy Team Leader/Airport Planner
Mr. Akira KADOGUCHI	:	Air Navigation Systems Engineer
Mr. Tadamitsu ITOH	:	Air Traffic Control & Airspace Utilization Planner
Mr. Sumio HAYAKAWA	:	Airport Mechanical & Electrical Engineer
Mr. Yoshio TSUDA	:	Navaids System Engineer
Mr. Shinichi SAKABE	:	Construction & Cost Estimates Engineer
Mr. Masatoshi KANEKO	:	Economic & Financial Analyst
Mr. Tetsuya OHISHI	:	Environmental Specialist

1.4.3 Members of the Advisory Committee

Mr. Takenori MATSUMOTO (Chairman, Predecessor)	:	Director, Flight Standards Division, Engineering Department, Civil Aviation Bureau, Ministry of Transport
Mr. Takemi ISHIZUKA (Chairman, Successor)	:	Director, Flight Standards Division, Engineering Department, Civil Aviation Bureau, Ministry of Transport (since March,1994)
Mr. Souichiro TAKATORI	:	Deputy Director, Construction Division, Aerodrome Department, Civil Aviation Bureau, Ministry of Transport
Mr. Seiji TAKEMOTO	:	Chief, Radio Engineering Division, Air Traffic Services Department, Civil Aviation Bureau, Ministry of Transport
Mr. Koji WADA (Predecessor)	:	Special Assistant to Director, Flight Procedure & Airspace Program Office, Air Traffic Services Department, Civil Aviation Bureau, Ministry of Transport
Mr. Hiroei OKU (Successor)	:	Special Assistant to Director, Flight Procedure & Airspace Program Office, Air Traffic Services Department, Civil Aviation Bureau, Ministry of Transport (since December, 1993)
Mr. Takeshi IMAGOME	:	Chief, Air Traffic Control Division, Air Traffic Services Department, Civil Aviation Bureau, Ministry of Transport

1.4.4 JICA Coordinator

Mr. Yuichi SEKIGUCHI	:	Project Officer, First Development Study Division, Social Development Study Department, Japan International Cooperation Agency (JICA)

1.4.5 DCA Counterpart Team

Mr. N. P. GHIMIRE	:	Leader, Deputy Director Technical, DCA
Mr. D. N. RANA	:	Member, Chief, Civil Engineering, DCA
Mr. R. R. DALI	:	Member, Chief Operation Officer, TIAO
Mr. D. S. RANA	:	Member, Chief, Civil Maintenance Section, TIAO
Mr. C. M. SHAKYA	:	Member, Chief, ATS Section, DCA
Mr. L. M. SHAKYA	:	Member, Chief, Electro-Mechanical Engineering Section, DCA
Mr. S. B. RAUT	:	Member, Assistant Technical Officer, TIAO
Mr. K. K. VERMA	:	Member, Assistant Communication Officer, DCA
Mrs. B. K. THAPA	:	Member, Section Officer, DCA
Mr. T. R. RAUT	:	Member, Account Officer, DCA

1.5 Activities of the Study Team

1.5.1 First Field Survey in Nepal

The Study Team arrived in Kathmandu, Nepal on 7 July, 1993 to carry out the two month first field survey.

The Study Team and Advisory Committee held meetings on the Inception Report with the representatives of DCA from 8 to 13 July 1993. The Inception Report was accepted by DCA as shown in the Minutes of the Meeting in the APPENDIX. The Study Team has completed the field survey in Nepal with the close cooperation of the Counterpart Team of DCA.

1.5.2 First Study Work in Japan

The Study Team returned to Japan on 3 September 1993 from the First Field Survey in Nepal to carry out the First Study Work in Japan scheduled to take two months.

The Study Team prepared the Air Safety Improvement Plan and Airport Modernization Plan based on the result of the demand forecast and the evaluation of the existing airport.

The study items that were executed in the "First Study Work in Japan" are referred to in item numbers (13) to (23) in the following section. The study team completed them almost simultaneously due to the tight schedule. The results have been compiled into this Interim Report (1).

The Study Team and Advisory Committee held meetings on the Interim Report (1) on 27 October 1993.

1.5.3 Second Field Survey in Nepal

On October 31st, the Study Team arrived in Kathmandu to carry out the one-month Second Field Survey. The Study Team and the Advisory Committee submitted the Interim Report (1) to Counterpart Team of DCA and held the meetings for presentation of the report to DCA during the period from November 1st to 26th 1993.

The Study Team conducted a supplemental field survey from November 7th to 26th 1993.

1.5.4 Second Study Work in Japan

The Study Team returned to Japan on 28 November 1993 from the Second Field Survey in Nepal and carried out the Second Study Work in Japan.

The Study Team finalized the Air Safety Improvement Plan and Airport Modernization Plan based on comments and discussions with the Counterpart Team during the Second Field Survey.

The study items that were executed in the "Second Study Work in Japan" are referred to in item numbers (27) to (31) in the following section.

1.5.5 Third Field Survey in Nepal

The Study Team arrived in Kathmandu on January 14th 1994 for the presentation of the detailed study results on the Air Safety Improvement Plan and Airport Modernization Plan in the Interim Report (2). The additional site survey was also carried out between January 23rd to 25th 1994.

1.5.6 Third Study Work in Japan

After returning to Japan on 27th January 1994, the Study Team started the Third Study Work in Japan with the aim of the completing the Draft Final Report consisting of the preliminary design on the short-term modernization plan, environmental impact assessment, project cost estimation, project implementation planning, economic and financial analysis and conclusions and recommendations.

1.5.7 Fourth Field Survey in Nepal

The Study Team arrived in Kathmandu on 16th March 1993, and submitted to DCA the Draft Final Report including the results of the Study including the feasibility study for the short-term development plan. The meetings for the presentation and discussion of the report were held with DCA from 17th to 21st August, 1993.

Through the above meetings, the Draft Final Report was accepted in general by the Nepalese side. It was confirmed that comments on the Report would be provided within one month after submission of the Report in compliance with the agreed Scope of Work for this Study.

1.5.8 Fourth Study Work in Japan

After returning from Nepal, the Study Team proceeded with the Fourth Study Work in Japan which aimed at finalizing the Report. During the Fourth Study Work in Japan, the modifications to the Draft Final Report were made so as to reflect the DCA's comments on the Report.

This Final Report was completed and submitted to JICA in June 1994.

1.6 Organization of the Final Report

This Final Report of the Study of Tribhuvan International Airport Modernization Plan in Nepal consists of 21 chapters. Contents and coverage, in terms of the work items, of each chapter are as follows:

Part A GENERAL

Chapter 1 Introduction

The introductory chapter.

Chapter 2 Natural and Socio-economic Environment

This chapter reviews and assesses the natural and socio-economic environment of Nepal including transportation fields based on work item [4] shown in the Work Flow Chart.

Part B AIRPORT MODERNIZATION PLAN

Part B1 GROUND FACILITIES IMPROVEMENT PLAN

Chapter 3 Existing Airport and Surroundings

This chapter describes very briefly the airport's history, inventory and traffic characteristics as the result of work items [4] to [5]. Existing land use in the airport surroundings, meteorological conditions which correspond to work items [6] to [9] are also dealt with in this chapter.

Chapter 4 Air Traffic Demand Forecast

Air traffic demand forecasts, work item [17], which provide the design bases of air traffic for the airport master planning are described in this chapter.

Chapter 5 Airport Facility Requirements

In this chapter, corresponding to work item [18], the number, concept, type, size and performance necessary for each airport facility are estimated based on the air traffic demand forecasts.

Chapter 6 Evaluation of the Existing Airport

This chapter evaluates the Tribhuvan International Airport from the various aspects corresponding to work item [20]. Demand vs. capacity analyses clarify the usable life of each facility against future requirements.

Chapter 7 Ground Facilities Improvement Plan

This chapter describes the master plan of the ground facilities for the target year 2010. The alternatives for development of the terminal area and other facilities are prepared, and comparative evaluations will be made for the selection of the optimum alternative.

Part B2 AIR SAFETY IMPROVEMENT PLAN

Chapter 8 Present Condition of Air Safety

This chapter summarizes the present condition concerning air safety at TIA such as airspace use, air navigation systems, ATC, etc.

Chapter 9 Evaluation of Air Safety

In this chapter, existing air traffic control systems and air navigation systems are evaluated.

Chapter 10 Air Safety Improvement Plan

Improvement plans for aircraft operations and air traffic services by the year 2010 are established. This plan consists of three phases of long term, short term, and urgent plans.

Part B3 OVERALL AIRPORT MODERNIZATION PLAN

Chapter 11 Airport Modernization Plan

Based on the Ground Facilities Improvement Plan established in Chapter 7 and the Air Safety Improvement Plan in Chapter 10, the Airport Modernization Plan of TIA for the year 2010 is established.

Chapter 12 Initial Environmental Examination

This chapter describes the environmental impact of the Airport Modernization Plan and evaluations from the environmental aspect.

Chapter 13 The Short-term Modernization Plan

This chapter corresponding to the Airport Modernization Plan lists the construction work items of the short-term modernization plan for the year 2003.

Part C FEASIBILITY STUDY OF THE SHORT-TERM MODERNIZATION PLAN

Chapter 14 Preliminary Design

The preliminary design is carried out on the ground facilities of the short-term modernization plan. This chapter corresponds to work item [34] and designates the size, dimensions, performance and materials to be used for each facility.

Chapter 15 Airport Management Study

Based on the evaluation of present conditions of the airport management, requirements and recommendations for the operation and maintenance are described in accordance with item [38].

Chapter 16 Environmental Impact Assessment

Environmental Impact Assessment was carried out for short-term modernization plan at the existing airport corresponding to work item [36].

Chapter 17 Project Implementation Schedule and Cost Estimates

This chapter, corresponding to work item [37] , describes the cost and implementation planning of the short-term modernization plan.

Chapter 18 Economic Analysis

This chapter evaluates the economic impact of the short-term modernization plan from the nation's economic well-being viewpoint. Economic viability of the plan is also analyzed in this chapter.

Chapter 19 Financial Analysis

This chapter evaluates the financial viability of the short-term modernization plan of the implementation of the short-term modernization plan from the viewpoint of the management body of TIA.

Part D URGENT PROJECT

Chapter 20 Urgent Project

This chapter describes the technical study for the project to be implemented urgently in order to provide the services immediately for air safety. Basic design, execution program, and human resource development plans for the project are shown in this chapter.

Part E CONCLUSIONS AND RECOMMENDATIONS

Chapter 21 Conclusions and Recommendations

Corresponding to work item [42], the conclusion of the whole study and recommendations on how to implement the short-term modernization plan are described in this chapter as a final result of the Study.

CHAPTER 2

NATURAL AND SOCIO-ECONOMIC ENVIRONMENT

CHAPTER 2 NATURAL AND SOCIO-ECONOMIC ENVIRONMENT

2.1 General

Air transportation plays an important role in the public welfare and socio-economic development of a nation. This is especially true for Nepal where the topographic characteristics of the mountainous land with many steep peaks is dominant. The need for air connections between cities and regions both domestically and internationally is vital for the development of the industrial sectors and tourism sectors. As Tribhuvan International Airport (the sole international airport in Nepal) is a base for the national development of Nepal, it is necessary to take into consideration the natural and socio-economic environment of the nation in order to prepare the optimum plan for the airport.

Thus, this chapter provides a summary of the natural and socio-economic environmental factors of Nepal that might influence the Study.

2.2 Geographical Characteristics

2.2.1 Geography

Nepal is located in the northern part of the Indian subcontinent. It is a landlocked country, bounded on the north by the Tibet Autonomous Region of the People's Republic of China, and on the west, south and east by the Republic of India.

The country's total area covers 147,181 square kilometers. It lies between 26°22' and 30°27' north latitude, and 80°4' and 88°12' east longitude. The length of Nepal is 885 kilometers east-west and it varies in width from 145 to 241 kilometers north-south.

The country can be divided into three main geographical regions running from north to south, i.e. a) Himalayan (Mountain) region, b) Hill region and c) Terai region. (See Figure 2.2.1)

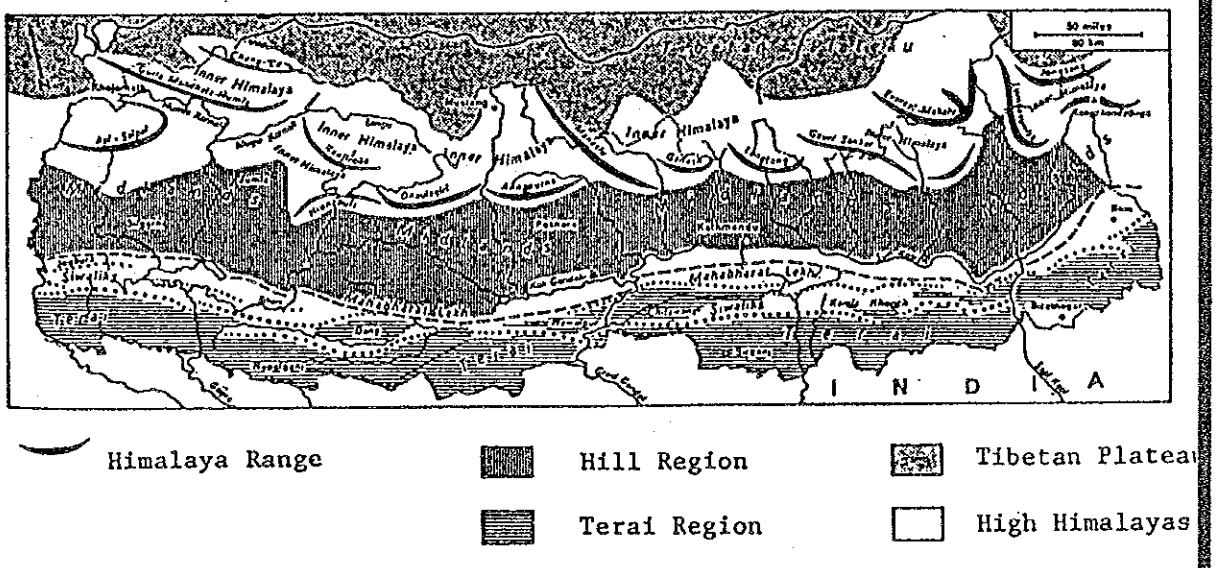


Figure 2.2.1 Geographical Features in Nepal
(Source : Nepal, Toni Hagen)

a) Himalayan (Mountain) region

The altitude of this region ranges between 4,877 meters and 8,848 meters with the snow line running around 4,877 meters above the sea level. It includes 8 of the 14 summits in the world which exceed an altitude of 8000 meters. Because of this altitude and the cold climate in the region, it is the most scarcely populated area in the country.

b) Hill region

This region lies between an altitude of 610 meters and 4,877 meters above the sea level. It comprises of several valleys and basins, such as Kathmandu, Pokhara, Hetauda and others. These areas support a relatively high percentage of the hill population.

c) Terai region

The low-land Terai region is a semi-tropical area with a width of about 20 to 32 kilometers and a minimum altitude of 70 meters above sea level.

2.2.2 Climate

Nepal's climate varies with its terrain. It ranges from tropical to arctic depending upon the altitude. The Terai region has a hot and humid climate. The mid-land region, i.e. Hill region, is temperate. The northern Mountain region has an alpine climate.

Nepal has two distinct seasons, monsoon from June to September, and a dry season from October to May.

In Kathmandu, the average annual rainfall is about 1,400 mm, 70 - 80 % of which falls between June and September. Sometimes this rainfall causes flooding in low-lying areas.

2.3 Socio-economy

2.3.1 Administrative Division

Nepal is administratively divided into five development regions and further divided into 14 zones and 75 districts as shown in Figure 2.3.1.

2.3.2 Population

In 1981, Nepal had a population of 15,023,000, which increased to 18,491,000 in 1991, with an average annual growth rate of 2.1% during 1981 - 1991 as shown in Table 2.3.1. The population density was 126 persons per square kilometer in 1991 (See Table 2.3.2). The population in 1993 was estimated to be 19,275,000.

Table 2.3.1 Trend of Population in Nepal

Year	Population (x 1,000)	Remarks	
1981	15,023		
1991	18,491	Annual Average Growth Ratio during 1981-1991	2.1 %
1992	18,879	Ratio 1992/1991	2.1 %
1993	19,275	Ratio 1993/1992	2.1 %

Note : 1981 and 1991 ..... Census figures
1992 and 1993 ..... Estimated
Source : Statistical Year Book of Nepal 1993

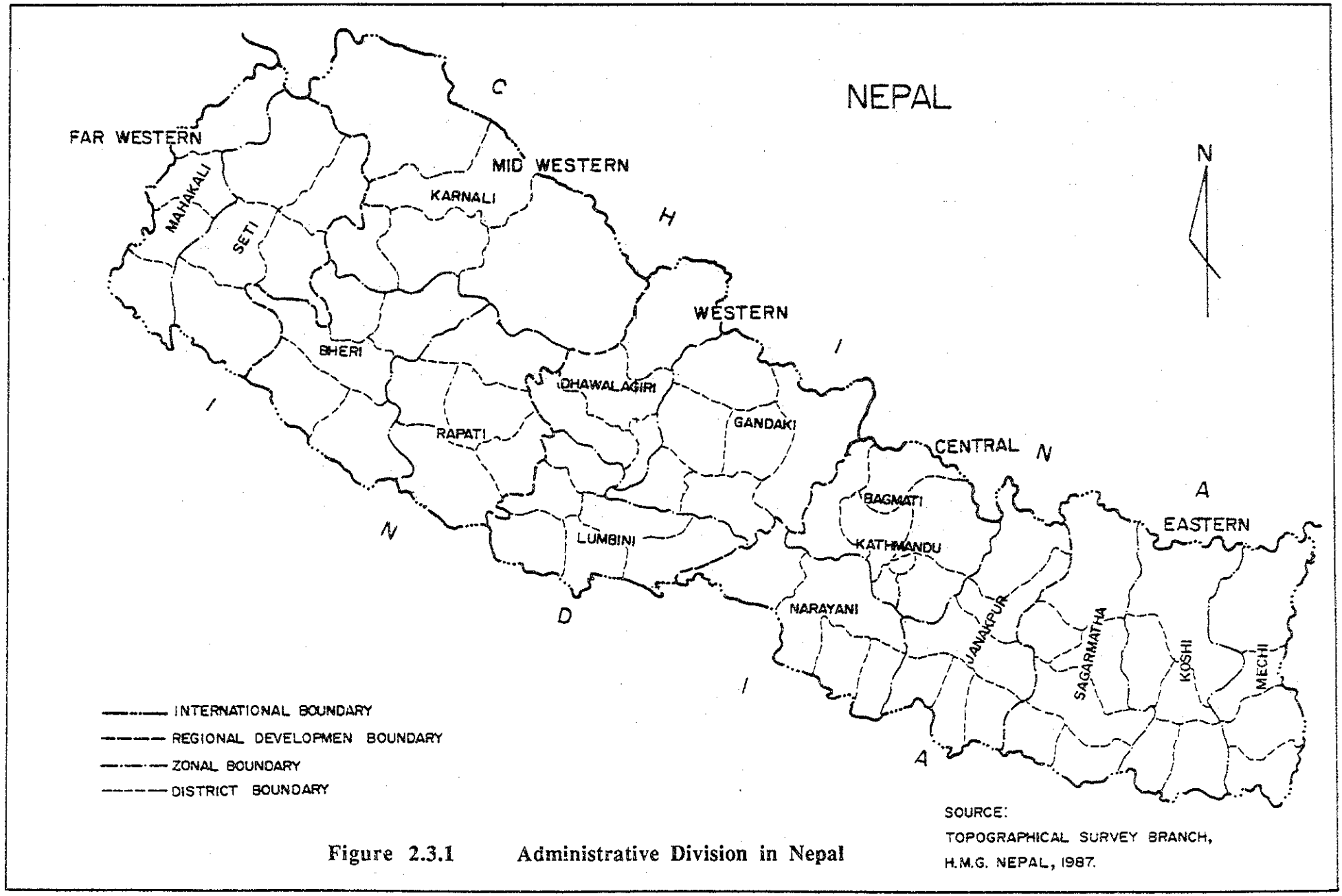


Figure 2.3.1 Administrative Division in Nepal

Ninety percent of the total inhabitants live in rural areas.

Table 2.3.2 shows the population, area and population density by development regions and zones and especially for the area of the Kathmandu Valley.

For the population size, the development region of Central shows the largest population size, followed by Eastern, Western, Mid. Western and Far Western. Similarly, the zone with the largest population is Bagmati.

For the population growth rate during 1981-1991, the development region of Far Western shows the highest rate, followed by Central, Mid. Western, Western and Eastern. Similarly, the zone with the highest population growth rate is Narayani.

As for the population density, the development region of Central is the highest, with 226 persons per square kilometer, followed by Eastern (156 persons), Western (128 persons), Far Western (86 persons) and Mid. Western (57 persons). Similarly, the zone with the highest population density is Bagmati (239 persons).

The district of Kathmandu, which is the capital of Nepal and the nation's largest city, has about 675 thousand inhabitants with a population density of 1,709 inhabitants per square kilometer in 1991.

The Kathmandu Valley Area comprises of the three districts of Kathmandu, Lalitpur and Bhaktapur, which are the part of the Bagmati zone.

The population of the Kathmandu Valley Area was 1,105,000 in 1991, which is equivalent to about 6 % of the whole Nepal population. The population density of this area shows 1,229 persons per square kilometer in 1991, with an average annual population growth rate of 3.7% during 1981 - 1991.

Table 2.3.2 Population and Area by Development Region and Zone of Nepal and Kathmandu Valley Area

Development Region / Zone	Population (x 1,000) 1981	Population (x 1,000) 1991	Annual Average Growth Ratio	Area (sq. km)	Population Density in 1991 (person/sq. km)
Eastern	3,709	4,447	1.8%	28,456	156
Mechi	932	1,118	1.8%	8,196	136
Koshi	1,424	1,728	2.0%	9,669	179
Sagarmatha	1,353	1,601	1.7%	10,591	151
Central	4,909	6,184	2.3%	27,410	226
Janakpur	1,688	2,062	2.0%	9,669	213
Bagmati	1,782	2,251	2.4%	9,428	239
Narayani	1,439	1,871	2.7%	8,313	225
Western	3,129	3,771	1.9%	29,398	128
Gandaki	1,108	1,266	1.3%	12,275	103
Dhaulagiri	453	491	0.8%	8,148	60
Lumbini	1,568	2,014	2.5%	8,975	224
Middle Western	1,956	2,410	2.1%	42,378	57
Rapti	877	1,047	1.8%	10,482	100
Bheri	836	1,103	2.8%	10,545	105
Karnali	243	260	0.7%	21,351	12
Far Western	1,320	1,679	2.4%	19,539	86
Seti	795	1,014	2.5%	12,550	81
Mahakali	525	665	2.4%	6,989	95
Nepal Total	15,023	18,491	2.1%	147,181	126
Kathmandu Valley Area	766	1,105	3.7%	899	1,229
Kathmandu District	422	675	4.8%	395	1,709
Lalitpur District	184	257	3.4%	385	668
Bhaktapur District	160	173	0.8%	119	1,454

Note : The "Kathmandu Valley Area" comprises of the three districts of Kathmandu, Lalitpur and Bhaktapur, which are the part of the zone of "Bagmati".

Source : Statistical Year Book of Nepal 1993

2.3.3 Economy

(1) Gross Domestic product (GDP)

Table 2.3.3 shows the trend of the Gross Domestic Product (GDP) of Nepal at the current price and the constant 1974/75 price. In the fiscal year 1992/93 (as a tentative estimate), the amount of GDP and per capita GDP at the current price are estimated to be Rs. 144,959 million and Rs. 7,521 respectively.

The average annual growth ratios of GDP at the current price and at the constant 1974/75 price during fiscal year 1983/84-1992/93 are estimated at 15.6% and 4.8% respectively. And the average annual growth ratios of per capita GDP at the current price and at the constant 1974/75 price are estimated at 13.2% and 2.7% respectively. (The average annual growth ratio of population of Nepal is estimated to be 2.1% for the same period.)

Table 2.3.4 shows the past trend of the structure of GDP (at current price) by industrial sector. This shows the following:

- Agriculture sector has gradually decreased its share in the total GDP. However, it is still the dominant sector in Nepal. (about a 49% share in fiscal year 1992/93.)

- On the other hand, non-agricultural sectors, especially the manufacturing sector, have increased their shares. Nevertheless, for instance, manufacturing is mostly related to agriculture and its share is still at a low level of the total GDP (about an 8% share in fiscal year 1992/93.).

The major agricultural products are rice, maize, wheat, barley, millet, sugarcane, oil seeds, tobacco, potato, jute, and tea.

The manufacturing industry produces mainly agricultural products, cement, paper, textile, leather goods, jute and handicrafts.

Table 2.3.3 Gross Domestic Product (GDP) of Nepal at Current Price and Constant Price

Year	GDP at Current Price		GDP at 1974/75 Price		Population	Per Capita			
	(Mil. Rp.)	Growth Ratio) (%)	(Mil. Rp.)	Growth Ratio) (%)	(x1,000)	GDP at Current Price (Rp.)	Growth Ratio) (%)	GDP at 1974/75 Price (Rp.)	Growth Ratio) (%)
1983/84	39,390		22,262		15,989	2,464		1,392	
1984/85	44,417	12.8%	23,630	6.1%	16,324	2,721	10.4%	1,448	4.0%
1985/86	50,428	13.5%	24,645	4.3%	16,667	3,026	11.2%	1,479	2.1%
1986/87	59,246	17.5%	25,617	3.9%	17,017	3,482	15.1%	1,505	1.8%
1987/88	68,973	16.4%	27,515	7.4%	17,374	3,970	14.0%	1,584	5.2%
1988/89	77,740	12.7%	28,749	4.5%	17,739	4,382	10.4%	1,621	2.3%
1989/90	91,008	17.1%	31,034	7.9%	18,111	5,025	14.7%	1,714	5.7%
1990/91	103,948	14.2%	32,448	4.6%	18,491	5,622	11.9%	1,755	2.4%
1991/92	126,186	21.4%	33,115	2.1%	18,879	6,684	18.9%	1,754	0.0%
1992/93	144,959	14.9%	34,076	2.9%	19,275	7,521	12.5%	1,768	0.8%
Annual Average Growth Ratio 1983/84 - 1992/93		15.6%		4.8%			13.2%		2.7%

Note: 1990/91.....Revised preliminary estimate.
1991/92.....Preliminary estimate.
1992/93.....Tentative estimate.

Source: Statistical Year Book of Nepal 1993
Per Capita GDP .....Estimated by the Study Team.

Table 2.3.4 Gross Domestic Product (GDP) of Nepal at Current Price by Industrial Sector

Unit : Million Rs.

Industrial Sector	1983/84		1986/87		1989/90		1992/93	
		Share		Share		Share		Share
1 Agriculture	22,570	61.0%	30,448	55.0%	47,251	55.7%	66,520	49.3%
2 Non-Agriculture	14,434	39.0%	24,910	45.0%	37,512	44.3%	68,303	50.7%
(1) Mining	111	0.3%	100	0.2%	116	0.1%	232	0.2%
(2) Manufacturing	1,816	4.9%	3,065	5.5%	4,775	5.6%	11,300	8.4%
(3) Electricity, Gas & Water	158	0.4%	415	0.7%	537	0.6%	1,457	1.1%
(4) Construction	2,576	7.0%	5,040	9.1%	7,042	8.3%	11,824	8.8%
(5) Trade, Restaurants & Hotels	1,520	4.1%	2,905	5.2%	4,512	5.3%	8,721	6.5%
1) Trade	1,362	3.7%	2,238	4.0%	3,525	4.2%	6,717	5.0%
2) Restaurants & Hotels	158	0.4%	667	1.2%	987	1.2%	2,004	1.5%
(6) Transport, Communications	2,468	6.7%	3,594	6.5%	4,751	5.6%	9,921	7.4%
(7) Financial & Social Services	2,937	7.9%	4,715	8.5%	8,394	9.9%	13,571	10.1%
(8) Community & Social Services	2,848	7.7%	5,076	9.2%	7,385	8.7%	11,277	8.4%
3 Indirect Taxes (Net)	2,386		3,888		6,245		10,136	
Total GDP	39,390		59,246		91,008		144,959	
Total GDP Excluding "Indirect Taxes"	37,004	100.0%	55,358	100.0%	84,763	100.0%	134,823	100.0%

Note : 1992/93 .... Tentative estimate.
Share : Based on Total GDP Excluding "Indirect Taxes"
Source : Statistical Year Book of Nepal 1995

(2) Foreign Trade and Balance of Payments

Table 2.3.5 shows the trend of the structure of the foreign trade of Nepal in value. The balance between export value and import value shows chronically a great deal of deficit. Although the degree of dependence on India for exports was considerably high in past years, it has gradually decreased. The share for India for import remains almost at the same level.

Table 2.3.5 Foreign Trade of Nepal in Value

Unit : Million Rs.

	1982/83		1985/86		1988/89		1991/92	
Export (FOB)	1,132		3,078		4,195		13,939	
India	843	(74%)	1,241	(40%)	1,035	(25%)	1,569	(11%)
Other Countries	289	(26%)	1,837	(60%)	3,160	(75%)	12,370	(89%)
Import (CIF)	6,314		9,341		16,264		32,951	
India	2,500	(40%)	3,971	(43%)	4,239	(26%)	11,816	(36%)
Other Countries	3,814	(60%)	5,370	(57%)	12,025	(74%)	21,135	(64%)
Total Balance	-5,182		-6,263		-12,069		-19,012	
India	-1,657		-2,730		-3,204		-10,247	
Other Countries	-3,525		-3,533		-8,865		-8,765	

Note : On customs based data (at basic exchange rate)
1992/1993 : Provisional

Source : Statistical Year Book of Nepal 1993.

Table 2.3.6 shows the trends in the balance of payments of Nepal in terms of national finance. This shows the characteristics of Nepal's financial condition in that the chronic deficits in foreign trade are compensated to some extent by the "services" sector and "grant" and "loans" from foreign countries.

Table 2.3.6 Balance of Payment of Nepal

Unit : Million Rs.

Item	1982/83	1985/86	1988/89	1991/92	Remarks
(a) Trade Balance	-5,197.0	-6,286.3	-12,085.7	-19,039.8	
(b) Services	1,634.9	1,574.5	2,989.5	3,893.1	Net
1) Receipts	2,521.8	3,483.3	6,189.7	11,756.7	
2) Payments	886.9	1,908.8	3,200.2	7,863.6	
(c) Unrequitted transfers	1,890.7	2,241.0	2,761.4	4,294.3	Net
1) Private	516.6	709.4	1,372.1	2,122.4	
2) Government	1,374.1	1,531.6	1,389.3	2,171.9	
Grants	1,315.0	1,355.2	1,272.7	1,689.5	
Others	59.1	176.4	116.6	482.4	
(d) Current Account Balance	-1,671.4	-2,470.8	-6,334.8	-10,852.4	(a)+(b)+(c)
(e) Official Capital	924.4	1,811.5	6,045.1	7,326.0	Net
Foreign Loans	963.9	2,005.1	6,425.2	8,710.3	
Amortization	-39.5	-193.6	-380.1	-1,384.3	
(f) Miscellaneous Capital Items	72.0	1,220.4	365.6	7,016.3	
(g) Changes in Reserves	-675.0	561.1	75.9	3,489.9	Net, (d)+(e)+(f)

Source : Quarterly Economic Bulletin, Mid-October 1992,
Main Economic Indicator, Nov./Dec./Jan. 1992/93 Nepal Rastra Bank.

(3) Governmental Budget

Table 2.3.7 shows the governmental budget of Nepal for recent years. Out of the expenditure, the item of development expenditure occupies a considerable share. This table proves that the balance between expenditure and revenue shows chronically a high deficit, with this deficit being compensated by both foreign loans and internal loans.

Table 2.3.7 Budget of the Nepalese Government, 1986/87, 1988/89 & 1990/91

Unit : Million Rs.

		1986/87	1988/89	1990/91	Remarks
Expenditure	(a)	11,513.2	18,005.0	23,549.8	
Regular		4,135.2	5,676.2	7,570.3	
Development		7,378.0	12,328.8	15,979.5	
Source of Finencing	(b)	7,260.1	9,457.5	12,894.6	
Revenue		5,975.1	7,776.9	10,729.9	
Foreign Grants		1,285.0	1,680.6	2,164.7	
Balance	(c)	-4,253.1	-8,547.5	-10,655.2	(b)-(a)
Foreign Loan	(d)	2,705.8	5,666.4	6,256.7	
Internal Loan	(e)	1,644.7	1,330.0	4,552.7	
Total Balance		97.4	-1,551.1	154.2	(c)+(d)+(a)

Source : Statistical Year Book of Nepal 1993

Table 2.3.8 shows the breakdown of development expenditure of the Nepalese governmental budget for recent years. According to this table, the considerable outlays have been made for the sectors of agriculture, water resources including electricity and road transport. The share of outlay for the sector of civil aviation ranges about from 2 - 3 %. As for the tourism sector, its share of outlay ranges about from 0.1 - 0.2%.

Table 2.3.8 Breakdown of Development Expenditure of Government Budget in Nepal 1986/87, 1988/89 & 1990/91

Unit : Million Rs.

	1986/87		1988/89		1990/91	
		Share		Share		Share
1. General Administration	18.4	0.2 %	35.0	0.3 %	11.3	0.2 %
2. Economic Adm. & Planning	4.0	0.1 %	10.1	0.1 %	83.3	0.5 %
3. Social Services	2,036.3	28.2 %	3,309.2	28.5 %	3,569.3	22.9 %
4. Economic Services	5,168.6	71.5 %	8,241.1	71.1 %	11,893.3	76.4 %
(1) Agriculture	681.7	9.4 %	1,016.2	8.8 %	1,534.6	9.9 %
(2) Water Resources	2,086.0	28.9 %	3,626.6	31.3 %	2,482.0	16.0 %
(3) Land Reform & Survey	94.2	1.3 %	110.1	0.9 %	109.3	0.7 %
(4) Foresty & Environment	388.4	5.4 %	556.7	4.8 %	460.1	3.0 %
(5) Industry	377.0	5.2 %	554.3	4.8 %	1,751.5	11.3 %
(6) Transport & Communication	1,125.8	15.6 %	2,231.9	19.2 %	2,036.2	13.1 %
1) Communication	139.8	1.9 %	374.7	3.2 %	56.7	0.4 %
2) Road Transport etc.	835.6	11.6 %	1,540.8	13.3 %	1,585.3	10.2 %
3) Civil Aviation	150.4	2.1 %	316.4	2.7 %	394.2	2.5 %
(7) Other Economic Services	415.5	5.7 %	145.3	1.3 %	3,519.6	22.4 %
1) Tourism	13.8	0.2 %	17.2	0.1 %	12.4	0.1 %
2) Others	401.7	5.6 %	128.1	1.2 %	3,507.2	22.3 %
5. Miscellaneous	150.7		732.8		422.2	
Total	7,378.0		12,328.2		15,979.4	
Total Excluding "Miscellaneous"	7,227.3	100.0 %	11,595.4	100.0 %	15,557.2	100.0 %

Note : % of share : Based on Total Excluding "Miscellaneous".

Source : Statistical Year Book of Nepal 1993.

2.4 Development Plan

2.4.1 General

The national development programme started its first plan in 1956, and the Eighth Plan (1992-1997) is currently in progress.

In 1990, Nepal's political system was transformed from the Panchayat Regime to a Multi-Party System, and the new constitution was established. In 1991, elections were conducted, resulting in a majority for the Nepali Congress, and a newly elected government was started.

The national development programme of the Eighth Plan was established under such a transition in the political environment.

As a basic planning for the Eighth Plan, concepts of "economic development through free market oriented liberal policies", "decentralization" or "privatization" in place of "excessive government controls" are emphasized.

2.4.2 Eighth Plan

(1) Objectives of Plan

The principal objectives that the Eighth Plan seeks to achieve are as follows,

a) Sustainable economic growth;
b) Alleviation of poverty; and
c) Reduction of regional imbalance

For the achievement of items of a) and b) above, an increased production in all economic areas and a reduction in the rate of population growth are stated to be essential. For the achievement of reduction of regional imbalance, the improvement of life infrastructure in rural area is mentioned to be required.

(2) Priority Programme

The following are stressed as major priority programmes:

a) Agricultural Intensification and Diversification
b) Energy Development
c) Development of Rural Infrastructure
d) Employment Generation and Human Resource Development
e) Reduction in Population Growth
f) Industry and Tourism Development

In order to achieve accelerated economic development, the development of industry is as important as that of agriculture and other primary sectors.

The tourism sector will be promoted in order to generate increasing foreign exchange, employment and income.

g) Export promotion and Diversification

(3) Development Target of Plan

Table 2.4.1 shows the major development target of the Eighth Plan. The target annual average growth rate of the gross domestic product during the period of the Plan amounts to 5.1%, out of which the agricultural and non-agricultural sectors are scheduled to attain 3.7% and 6.1% respectively. The annual average growth rate of population during planning period is expected to be 2.1%.

Table 2.4.1 Major Development Target of Eighth Plan

Unit : Million Rs. at 1991/92 Price

	1991/92		1996/97		Annual Average
		Share		Share	Growth Rate
1. GDP Growth	121,061		155,160		5.1 %
GDP Excluding Indirect Taxes	113,023	100.0 %	142,992	100.0 %	4.8 %
Agricultural Sector	62,712	55.5 %	75,364	52.7 %	3.7 %
Non-agricultural sector	50,311	44.5 %	67,628	47.3 %	6.1 %
Industry	7,283	6.4 %	12,169	8.5 %	10.8 %
Water/Electricity	1,054	0.9 %	1,617	1.1 %	8.9 %
Construction	9,408	8.3 %	11,604	8.1 %	4.3 %
Trade/Hotel/Restaurant	5,995	5.3 %	8,685	6.1 %	7.7 %
Transport/Communication	6,878	6.1 %	8,548	6.0 %	4.4 %
Finance/Real Estate	9,321	8.3 %	11,735	8.2 %	4.7 %
Social services	10,372	9.2 %	13,270	9.3 %	5.0 %
Indirect Taxes	8,038		12,168		8.6 %
2. Government Budget					
Revenue	12,995		20,685		9.7 %
Expenditure	24,385		39,405		10.1 %
3. Foreign Trade					
Import of Goods & Services	36,219		60,525		10.8 %
Export of Goods & Services	21,757		44,231		15.2 %
4. Population					
Annual Average Growth Rate					2.1 %

Source : Eighth Plan (1991/92 - 1996/97)

Table 2.4.2 shows the breakdown of part of the development expenditure of the planned government budget during the planning period. The total outlay for the sector of "civil aviation" amounts to Rs. 2,631 million. Similarly, the total outlay for the sector of "tourism" amounts to Rs. 1,088 million (equivalent to about 1% of the total amount). Compared to the previous trend (See Table 2.3.8), the outlay planned for the tourism sector is a large amount.

Table 2.4.2 Breakdown of Development Expenditure of Government Budget in the Eighth Plan
(Focused on "Civil Aviation" & "Tourism" sectors)

Unit : Million Rs. at 1991/92 Prices

	Amount	Share
1. General Administration	170	0.15%
2. Economic Administration & Planning	133	0.12%
3. Social Services	35,808	31.55%
4. Economic Services	77,368	68.18%
(1) Agriculture	10,947	9.65%
(2) Water Resources & Electricity	35,802	31.55%
(3) Land Reform & Survey	791	0.70%
(4) Foresty	5,372	4.73%
(5) Industry	2,245	1.98%
(6) Transport & Communications	20,030	17.65%
1) Communications	(3,835)	(3.38%)
2) Road Transport, etc.	(13,564)	(11.95%)
3) Civil Aviation	(2,631)	(2.32%)
(7) Other Economic Services	2,181	1.92%
1) Tourism	(1,088)	(0.96%)
2) Others	(1,093)	(0.96%)
Total	113,479	100.00%

Source : Eighth Plan (1991/92 - 1996/97)

The Eighth Plan also emphasizes the following items related to the civil aviation sector:

i) The flight handling capacity of Tribhuvan International Airport will be expanded. The airport will be equipped with extensive facilities and developed as a hub.

ii) A liberal sky policy will be adopted to encourage foreign airlines to fully utilize the Nepalese air space for international flights.

iii) The private sector will be encouraged to operate domestic air services, airport and services related to air traffic. These moves will provide better physical facilities at remote domestic airports and will create fresh competition to raise the quality of domestic air services.

iv) A feasibility study will be undertaken and implemented for the construction of a second international airport.

2.5 Tourism

2.5.1 General

Nepal has a lot of potential for tourism resources. There are splendid views of the Himalayan range, and historical sites such as shrines, temples, palaces, palace squares in the cities, especially in Kathmandu Valley Area, which attract foreign tourists.

2.5.2 Tourist Arrivals

It is to be noted that in the statistics for tourism used for this Study the number of tourist arrivals include Indian tourists coming by air and other tourists from third countries coming both by air and by land.

Table 2.5.1 shows the trend of tourist arrivals to Nepal during 1982-1992. During this period, the number of tourist arrivals has favorably increased for the long range, in spite of frequent stagnations/declines. The number of tourist arrivals in 1992 was about 344,000, which was about 1.9 times that in 1982 with an average annual growth ratio of 6.7%. As for the mode of tourist arrivals, by air has a share of about 90%, with 10% coming by land.

Table 2.5.1 Tourist Arrivals to Nepal during 1982-1992

Year	Total (By Air + By Land)			By Air		By Land	
	Number	Growth Rate	Index	Number	Share	Number	Share
1982	175,448	8.5%	100	153,509	87%	21,939	13%
1983	179,405	2.3%	102	152,470	85%	26,935	15%
1984	176,634	-1.5%	101	149,920	85%	26,714	15%
1985	180,989	2.5%	103	151,870	84%	29,119	16%
1986	223,331	23.4%	127	182,745	82%	40,586	18%
1987	248,080	11.1%	141	205,611	83%	42,469	17%
1988	265,943	7.2%	152	234,945	88%	30,998	12%
1989	239,945	-9.8%	137	207,907	87%	32,038	13%
1990	254,885	6.2%	145	226,421	89%	28,464	11%
1991	292,995	15.0%	167	267,932	91%	25,063	9%
1992	334,353	14.1%	191	300,496	90%	33,857	10%

Note : The numbers of tourists include Indian tourists coming by air and other tourists from a third country coming both by air and by land.

Source : Nepal Tourism Statistics 1991, Department of Tourism.
Information from Department of Tourism.

Table 2.5.2 shows the trend of tourist arrivals by month. It can be said that the peak month is October (about a share of 13%) followed by November (ranging about 10 - 12%). This is mainly because of the weather conditions at the beginning of the dry season and the moderate temperatures in October. On the other hand, although the period during July to September is the summer vacation season generally in the northern hemisphere, this period falls on the monsoon (rainy) season in Nepal. As a result, number of tourist arrivals for these months is not so high.

Table 2.5.2 Tourism Arrivals to Nepal by Month

Month	1982		1985		1988		1991		1992	
		Share		Share		Share		Share		Share
Jan.	10,918	6.2 %	10,478	5.8 %	17,459	6.6 %	17,917	6.1 %	17,451	5.2 %
Feb.	11,693	6.7 %	13,751	7.6 %	24,487	9.2 %	19,382	6.6 %	27,489	8.2 %
Mar.	17,099	9.7 %	17,768	9.8 %	28,225	10.6 %	25,323	8.6 %	31,505	9.4 %
Apr.	13,976	8.0 %	14,681	8.1 %	22,469	8.4 %	23,721	8.1 %	30,682	9.2 %
May	17,106	9.7 %	13,248	7.3 %	18,767	7.1 %	21,952	7.5 %	29,089	8.7 %
June	11,552	6.6 %	9,997	5.5 %	15,461	5.8 %	19,808	6.8 %	22,469	6.7 %
July	11,686	6.7 %	7,901	4.4 %	12,731	4.8 %	19,362	6.6 %	20,942	6.3 %
Aug.	13,449	7.7 %	11,588	6.4 %	20,877	7.9 %	24,429	8.3 %	27,338	8.2 %
Sep.	11,325	6.5 %	14,248	7.9 %	18,213	6.8 %	23,224	7.9 %	24,839	7.4 %
Oct.	23,067	13.1 %	24,187	13.4 %	33,377	12.6 %	39,339	13.4 %	42,647	12.8 %
Nov.	17,951	10.2 %	21,048	11.6 %	30,181	11.3 %	32,507	11.1 %	32,341	9.7 %
Dec.	15,626	8.9 %	22,094	12.2 %	23,696	8.9 %	26,031	8.9 %	27,561	8.2 %
Total	175,448	100.0 %	180,989	100.0 %	265,943	100.0 %	292,995	100.0 %	334,353	100.0 %

Note : The numbers of tourist includes Indian tourists coming by air and other tourists from a third country coming both by air and by land.

Source : Nepal Tourism Statistics 1991, Department of Tourism.
Information from Department of Tourism.

Table 2.5.3 shows the breakdown of purpose of visit of tourist arrivals. The aggregated share of purpose as "pleasure" and "trekking/mountaineering" is dominant with a percentage of about 90% in 1988 and about 75% in 1991. The total share of purpose of visit as "business" and "official" is about 8% in 1988 and about 18% in 1991.

Table 2.5.3 Tourist Arrivals of Nepal by Purpose of Visit

Purpose	1982		1985		1988		1991	
		Share		Share		Share		Share
Pleasure	136,693	77.9 %	128,217	70.8 %	200,775	75.5 %	177,370	60.5 %
Trekking & Mountaineering	23,507	13.4 %	28,707	15.9 %	36,937	13.9 %	42,308	14.4 %
Business	7,374	4.2 %	10,416	5.8 %	12,008	4.5 %	14,601	5.0 %
Officials	7,166	4.1 %	9,230	5.1 %	9,781	3.7 %	37,274	12.7 %
Pilgrimage							9,103	3.1 %
Convention							5,441	1.9 %
Other	708	0.4 %	4,419	2.4 %	6,442	2.4 %	6,898	2.4 %
Total	175,448	100.0 %	180,989	100.0 %	265,943	100.0 %	292,995	100.0 %

Note : The numbers of tourist includes Indian tourists coming by air and other tourists from a third country coming both by air and by land.

Source : Nepal Tourism Statistics 1991, Department of Tourism.
Information from Department of Tourism.

Table 2.5.4 shows the major tourist arrivals by, nationality in recent years. Out of the regional group, Asia and Western Europe have dominant shares. In terms of country-wise for the year 1992, India has the top share (31.9%), followed by United Kingdom (7.9%), Germany (7.1%), France (6.8%), U.S.A. (6.6%), Japan (5.8%) and Italy (4.0%). As a result, these top seven countries occupied a share of about 70% of the total in 1992.

Table 2.5.4 Major Tourist Arrivals to Nepal by Nationality in 1990, 1991 and 1992

Nationality	1990		1991		1992	
		Share		Share		Share
North America	26,343	10.3 %	24,027	8.2 %	27,356	8.2 %
Canada	4,917	1.9 %	4,899	1.7 %	5,167	1.5 %
U.S.A	21,426	8.4 %	19,128	6.5 %	22,189	6.6 %
South/Central America	1,872	0.7 %	2,202	0.8 %	2,727	0.8 %
Western Europe	110,750	43.5 %	110,425	37.7 %	132,555	39.6 %
France	19,909	7.8 %	18,106	6.2 %	22,669	6.8 %
Germany	18,565	7.3 %	19,897	6.8 %	23,887	7.1 %
Italy	11,952	4.7 %	11,728	4.0 %	13,427	4.0 %
Netherland	5,972	2.3 %	6,491	2.2 %	9,478	2.8 %
Spain	8,515	3.3 %	6,347	2.2 %	11,272	3.4 %
Switzerland	5,278	2.1 %	5,417	1.8 %	5,914	1.8 %
U.K.	23,877	9.4 %	24,968	8.5 %	26,492	7.9 %
Others	16,682	6.5 %	17,471	6.0 %	19,416	5.8 %
Eastern Europe	3,275	1.3 %	3,126	1.1 %	2,553	0.8 %
Asia	98,320	38.6 %	140,025	47.8 %	156,312	46.8 %
SAARC Countries	65,093	25.5 %	99,102	33.8 %	112,123	33.5 %
India	59,764	23.4 %	92,506	31.6 %	106,574	31.9 %
Others	5,329	2.1 %	6,596	2.3 %	5,549	1.7 %
Israel	3,582	1.4 %	4,514	1.5 %	4,547	1.4 %
Japan	15,021	5.9 %	17,874	6.1 %	19,533	5.8 %
Others	14,624	5.7 %	18,535	6.3 %	20,109	6.0 %
Australia/Pacific	13,108	5.1 %	10,476	3.6 %	10,893	3.3 %
Australia	10,249	4.0 %	8,289	2.8 %	8,871	2.7 %
Others	2,859	1.1 %	2,187	0.7 %	2,022	0.6 %
Africa	611	0.2 %	956	0.3 %	1,263	0.4 %
Others	606	0.2 %	1,758	0.6 %	694	0.2 %
Grand Total	254,885	100.0 %	292,995	100.0 %	334,353	100.0 %

Note : The numbers of tourist includes Indian tourists coming by air and other tourist from a third country both by air and land.
SAARC = South Asian Association for Regional Cooperation
(Bangladesh, Bhutan, India, Maldives, Nepal, Pakistan and Sri Lanka)

Source : Nepal tourism Statistics 1991, Department of Tourism

Table 2.5.5 shows the last port of call and next port of call for tourist arrivals in Nepal by air in 1991. The dominant last airport of call was Delhi (India, 49.1%), followed by Bangkok (Thailand, 13.0%), Varanasi (India, 6.4%), Hong Kong (5.7%), Calcutta (5.3%) and Frankfurt (Germany, 5.2%). Also, the dominant next airport of call for tourist departures was Delhi (44.7%), followed by Bangkok (14.6%), Hong Kong (7.7%), Calcutta (7.4%), Varanasi (5.5%) and Frankfurt (5.3%), representing a similar tendency as the last call airport.

Table 2.5.5 Last Port of Call and Next Port of Call for Tourist in Nepal by Air in 1991

Airport	Arrivals		Departures	
	Number	Share	Number	Share
Delhi	131,513	49.1 %	107,285	44.7 %
Calcutta	14,236	5.3 %	17,871	7.4 %
Patna	246	0.1 %	400	0.2 %
Varanasi	17,031	6.4 %	13,179	5.5 %
Bangkok	34,909	13.0 %	35,050	14.6 %
Rangoon	2,276	0.8 %	5,205	2.2 %
Hong Kong	15,253	5.7 %	18,398	7.7 %
Dhaka	12,174	4.5 %	9,161	3.8 %
Frankfult	13,832	5.2 %	12,618	5.3 %
Karachi	5,642	2.1 %	4,560	1.9 %
Dubai	3,167	1.2 %	1,297	0.5 %
London	380	0.1 %	2,151	0.9 %
Singapore	6,275	2.3 %	5,611	2.3 %
Paro	1,833	0.7 %	1,642	0.7 %
Lhasa	2,921	1.1 %	2,181	0.9 %
Moscow	2,244	0.8 %	2,694	1.1 %
Others	4,000	1.5 %	717	0.3 %
Total	267,932	100.0 %	240,020	100.0 %

Note : The numbers of tourist include Indian tourists coming by air and other tourists from a third country coming both by air and by land.

Source : Nepal Tourism Statistics 1991, Department of Tourism.

2.5.3 Hotel Accommodation and Tourism Revenue

Table 2.5.6 shows the present condition of hotel accommodation of Nepal in 1991. The area of Kathmandu occupies a share of about 55% for the number of hotels, about 74% for the number of rooms and about 73% for the number of beds in the country as a whole, showing that the accommodation facilities are concentrated to Kathmandu area.

Table 2.5.6 Hotel Accommodation of Nepal in 1991

Category	No. of Hotels	Share	No. of Rooms	Share	No. of Beds	Share
Kathmandu	106	55.2%	4,134	73.8%	8,162	87.9%
Five Star	4		722		1,414	
Four Star	5		468		965	
Three Star	3		206		387	
Two Star	17		658		1,289	
One Star	21		563		1,106	
Tourist Standard	9		184		370	
Others	47		1,333		2,631	
Other Than Kathmandu	86	44.8%	1,468	26.2%	1,128	12.1%
Five Star	0		0		0	
Four Star	0		0		0	
Three Star	1		69		136	
Two Star	2		80		164	
One Star	8		166		348	
Tourist Standard	5		66		348	
Others	70		1,087		132	
Total	192	100.0%	5,602	100.0%	9,290	100.0%

Source : Nepal Tourism Statistis 1991, Department of Tourism.

Table 2.5.7 shows the tourism revenue for Nepal in terms of the gross foreign exchange earnings in convertible currencies during 1982-1991. In this case the income from the Indian tourists was not included. In 1991, the total earning in terms of US$ was about US$ 59 million, and the average expenditure per visitor was estimated to be about US$ 292, resulting in the average expenditure per visitor per day at about US$ 32.

Table 2.5.7 Tourism Revenue for Nepal
Gross Foreign Exchange Earnings in Convertible Currencies 1982 - 1991

Year	Total Earnings (US$ 1,000)	Number of Tourists Other than Indian Tourists (persons)	Average Expenditure Per Visitor (US$)	Average Length of Stay (days)	Average Expenditure Per Visitor Per Day (US$)
1982	33,441	121,247	275.8	13.3	20.7
1983	35,667	129,303	275.8	11.5	23.9
1984	41,273	117,917	350.0	10.6	33.2
1985	39,185	127,109	308.3	11.3	27.3
1986	50,841	168,136	302.4	11.2	27.1
1987	60,229	189,116	318.5	12.0	26.6
1988	63,502	193,885	327.5	12.0	27.3
1989	68,343	196,661	347.5	12.0	29.0
1990	63,701	195,121	326.5	12.0	27.2
1991	58,589	200,489	292.2	9.2	31.8

Note: Income from the Indian tourists is not included.

Source: Nepal Tourism Statistics 1991

Table 2.5.8 shows the comparison of total foreign exchange earnings from tourism with other economic indicators for the fiscal year 1989/90-1991/92. In the fiscal year 1991/92, the ratios of total foreign exchange earnings from tourism to the value of exports, the value exports & service receipts, the foreign exchange earnings in convertible foreign exchange and the gross domestic product (GDP) at current prices are about 36%, 20%, 20% and 4% respectively. Similarly, the ratios of total foreign exchange earnings from tourism excluding income from Indian tourists to the value exports, the value exports & service receipts, the foreign exchange earnings in convertible foreign exchange and the gross domestic product (GDP) at current prices are about 22%, 12%, 12% and 2% respectively. These show that the degree of contribution of the tourism sector to the national economy of Nepal is considerable large.

Table 2.5.8 Comparison of Total Foreign Exchange Earnings From Tourism with Other Economic Indicators, 1989/90-1991/92

Unit : Million Rs.

	1989/90	1990/91	1991/92	Remarks
(1) Total Foreign Exchange Earnings from Tourism				
(a) Total	3,121.2	3,587.6	5,016.9	(*1)
(b) Excluding Income from Indian Tourists	1,541.7	1,993.8	3,090.7	(*2)
(2) Value of Exports				
(c)	5,169.5	7,403.3	13,958.5	(*3)
(a) / (c)	60.4%	48.5%	35.9%	
(b) / (c)	29.8%	26.9%	22.1%	
(3) Value of Exports & Service Receipts				
(d)	11,537.5	15,082.3	25,715.2	(*4)
(a) / (d)	27.1%	23.8%	19.5%	
(b) / (d)	13.4%	13.2%	12.0%	
(4) Foreign Exchange Earnings in Convertible Foreign Exchange				
(e)	13,362.7	16,465.8	25,056.0	(*5)
(a) / (e)	23.4%	21.8%	20.0%	
(b) / (e)	11.5%	12.1%	12.3%	
(5) Gross Domestic Product at Current Prices				
(f)	91,008.0	103,948.0	126,186.0	(*6)
(a) / (f)	3.4%	3.5%	4.0%	
(b) / (f)	1.7%	1.9%	2.4%	

Source: (*1) Statistical Year Book of Nepal 1993

(*2) Quarterly Economic Bulletin Mid-Oct. 1992, Nepal Rastra Bank

(*3) Statistical Year Book of Nepal 1993

(*4) Statistical Year Book of Nepal 1993

(*5) Quarterly Economic Bulletin Mid-Oct. 1992, Nepal Rastra Bank

(*6) Statistical Year Book of Nepal 1993

2.6 Air Transport

2.6.1 Role of Air Transport in Nepal

(1) Nepal is a landlocked and mountainous country. Its high mountains, rolling hills and tranquil valleys account for 83 percent of the total national land area. On account of the topographic constraints, most of the interior of the country is not easily accessible by surface transport. As road construction needs so much investment and time, the only viable alternative is air transport.

The role of aviation in Nepal is pivotal to its socio-economic development. In view of the national aspect, it has made valuable contributions to the process of national integration by providing transport and communications links to the remote and out-of-the-way areas.

In view of the international aspect, air transport is a very important means to maintain connections with foreign countries at all times in spite of the severe topographic conditions of Nepal and tense international relations around the country which may occasionally happen.

Also, air transport development has played a key role in the promotion of tourism in Nepal.

(2) His Majesty's Government of Nepal (HMG/N) has put an emphasis on the promotion of tourism and the tourism industry to extend international relations and to increase the foreign currency earnings, In line with this basic national policy, HMG/N has formulated the following policies concerning air transport.

a) Development of Tribhuvan International Airport
b) Adoption of the Liberal Sky Policy to foreign airlines
c) Opening domestic air services and airports to the private sector
d) Study on a second international airport

2.6.2 Air Network in Nepal

There is an international airport (Tribhuvan International Airport) in Kathmandu, the capital of Nepal. This is literally the national gateway of Nepal as shown in Figure 2.6.1. At the same time, it plays the pivotal role as the hub airport of the domestic air network.

There are totally 43 airports and airfields in the country, ranging from Pilatus porter strips to a modern jet airport. They vary in elevation from 236 feet to 12,000 feet.

The air network in Nepal consists of these airfields connecting with hub airports as shown in Figure 2.6.2.

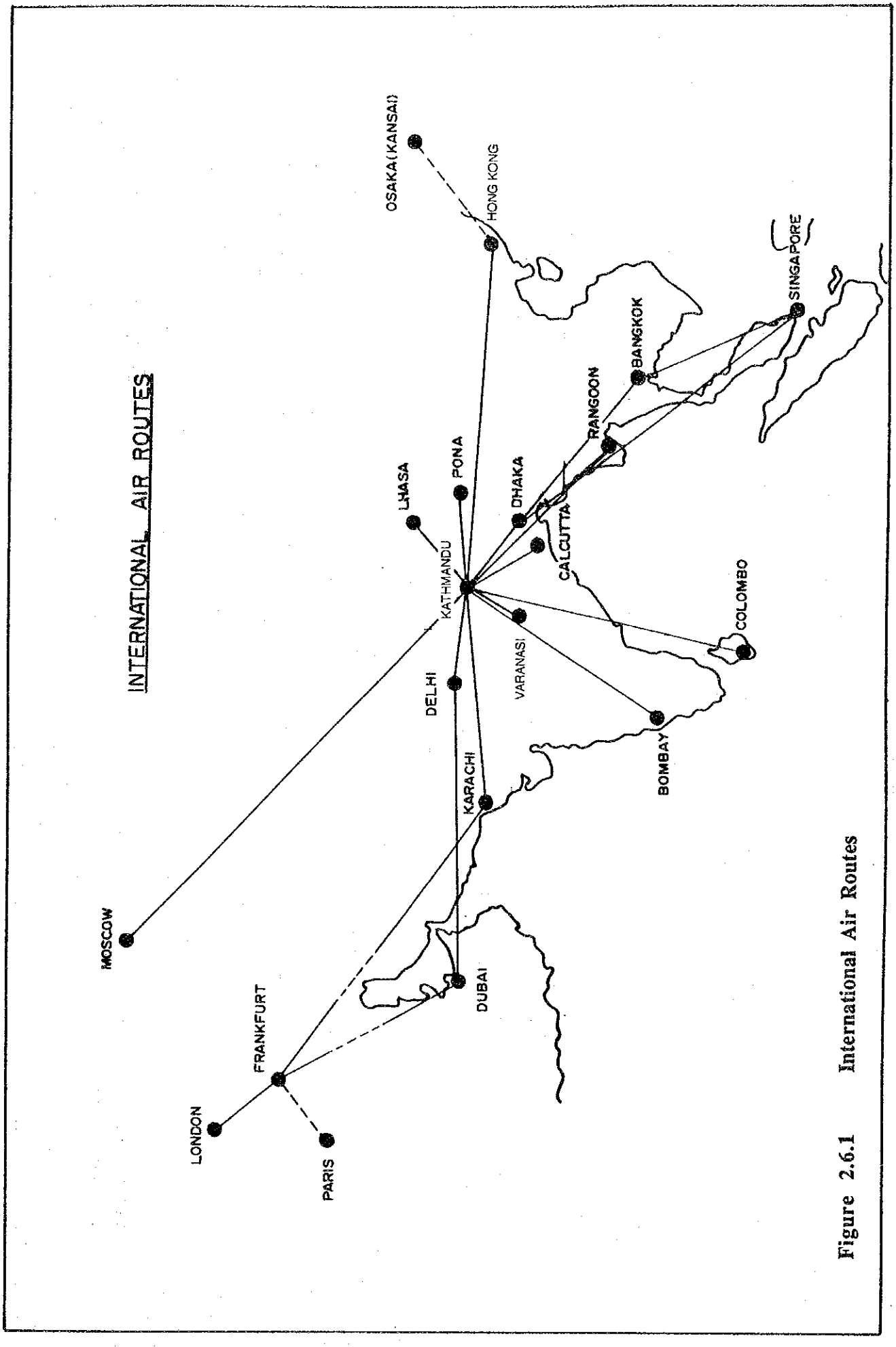


Figure 2.6.1 International Air Routes

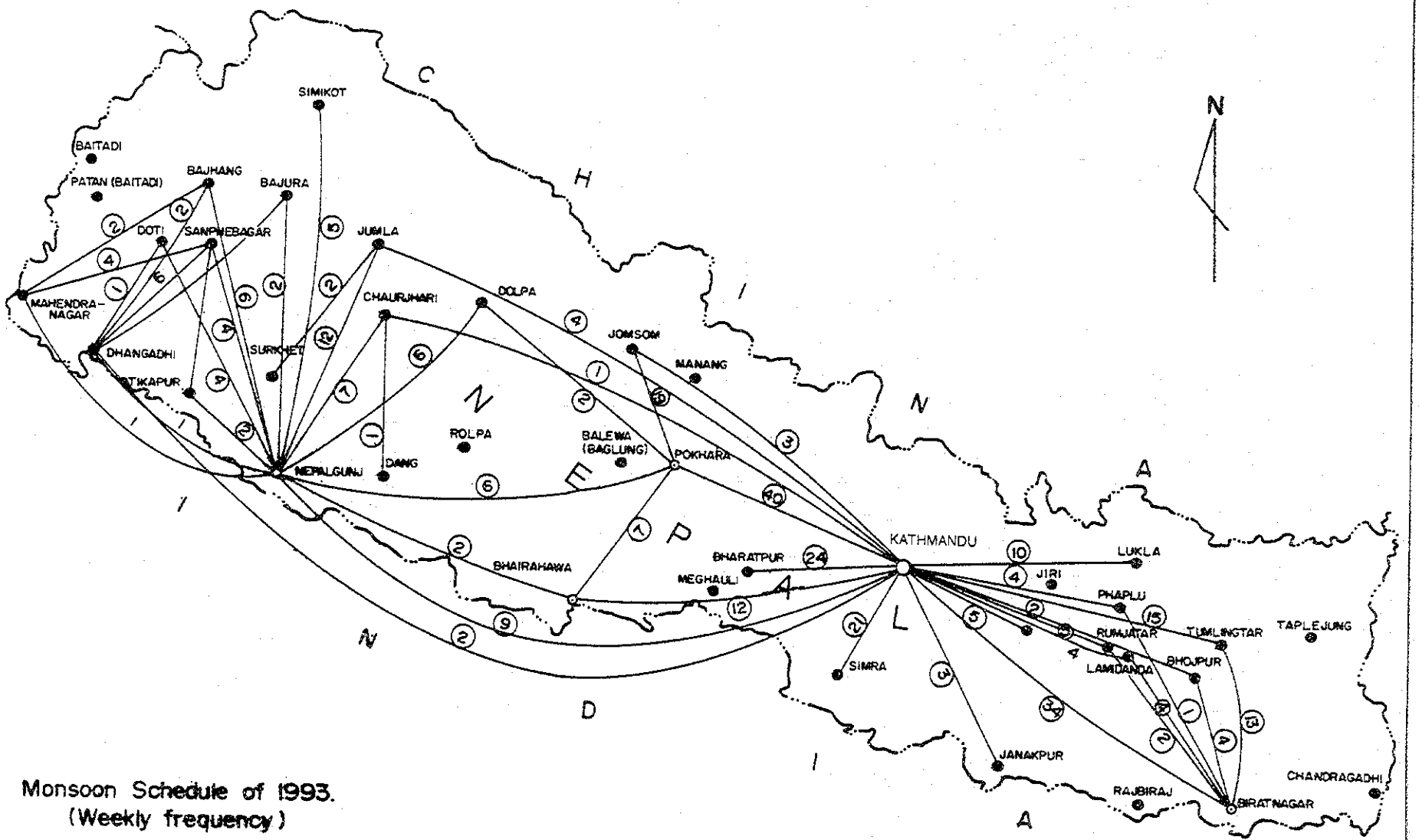


Figure 2.6.2 **Domestic Air Routes**

2.6.3 Air Transportation

(1) International passenger transport has been steadily growing with an average annual growth rate of 6 % in this area and reached 400,000 (arrivals) in 1992.

Most of the passengers (more than 70 %) are foreign tourists. It suggests that TIA has contributed well to international tourism promotion.

As a matter necessity, this resulted in facilitating larger modern airliners. Thus the Royal Nepal Airlines Corporation (RNAC) introduced A-310 aircraft in 1993, which are the biggest aircraft of RNAC's fleet, to expand the service and routes.

(2) On the other hand, domestic air transport has experienced a zigzag trend in the past but it has made progress in total. In fiscal year 1987, it marked a record 341,000 (It was 309,000 in fiscal 1991.)

Since the middle of the year 1992, three new private companies - Everest Air, Nepal Airways and Necon Air - have rushed to enter into the domestic market of the air transport industry. This caused competition with the former monopolist RNAC. The emergence of private airlines companies stimulated the market in 1992, which resulted in an uplift of passenger transport.

(3) Concerning air cargo, international exports (particularly of garments and carpets) has occupied most of the share of the total cargo. Since the beginning of 1980's, it had grown sharply and peaked in 1989. From the next year it showed an abrupt decline and but then turned into gradual growth.

The domestic freight is comparatively small but it shows the important role of transporting foods and others items to remote regions.

Statistics of Air Transport

	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
international passenger (x 1,000)	407.8	414.8	465.3	482.8	523.2	573.1	628.3	613.5	599.4	780.6	780.2
domestic passenger (x 1,000)	209.9	223.2	246.2	255.2	295.5	341.6	295.1	290.4	308.0	309.4	
international cargo (ton)	3,908	4,019	5,259	7,967	8,738	12,402	15,445	17,210	12,953	14,268	15,832
domestic cargo (ton)	760	805	783	731	721	804	791	853	739	887	

Note : The figures of domestic transport are in the fiscal year

2.7 Other Transportation

2.7.1 General

Because of constraints such as steep terrain, heavy rainfall during the monsoon season and financial conditions, the development of roads in Nepal is still not favorable in comparison with adjacent countries. However, in the recent years, investment for road development has been emphasized.

Table 2.7.1 shows the outline of transportation modes other than air transportation in Nepal in 1990/91. The total road length in 1990/91 was about 8,328 km. As for road transportation, it is described later in the section 2.7.2.

A railway service is operated near Janakpur to link Nepal with India. The service length is only about 53 km, and the actual volume transported is small.

A ropeway facility is used for transportation of goods near Kathmandu covering a length of about 43 km.

Table 2.7.1 Outline of Transportation of Nepal in 1990/1991
(Other Than Air Transportation)

1. Roadway	Road Length	8,328 km
2. Railway	(near Janakpur)	
	Service Length	53 km
	Number of Passengers	1,068,000 persons
	Goods Transported	14,554 ton
3. Ropeway	(between Kathmandu - Hetauda)	
	Service Length	43 km
	Goods Transported	10,712 ton

Source: Statistical Year Book of Nepal 1993

2.7.2 Road Transportation

The road network in Nepal is illustrated in Fig. 2.7.1.

In accordance with the recent socio-economic growth in Nepal, the development and improvement of the road infrastructure has been accelerated.

Table 2.7.2 shows the road length in Nepal by type in 1982 and 1991. The total road length in 1991 is estimated to be 1.6 times that in 1982. In 1991, the road type of "paved" occupies a share of about 37% to total road length.

The remaining (about 63%) is still gravel or unpaved.

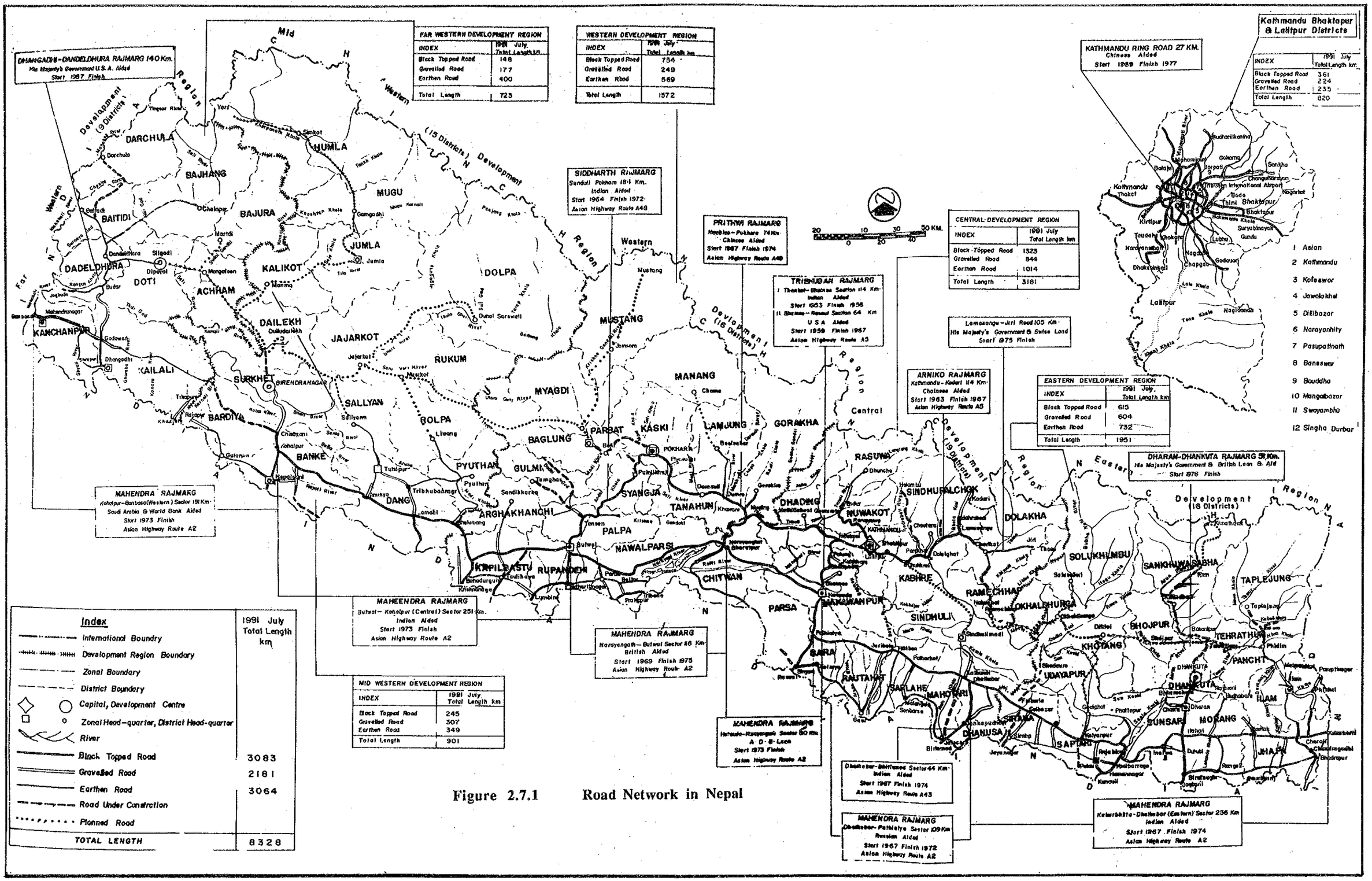
Table 2.7.2 Road Length in Nepal by Type in 1982 and 1991

Unit : Kilometer

	1982		1991		(b)/(a)
	(a)	Share	(b)	Share	
Paved (Black Top)	2,322	(44.1%)	3,083	(37.0%)	1.33
Gravel	719	(13.6%)	2,181	(26.2%)	3.03
Earthern	2,229	(42.3%)	3,064	(36.8%)	1.37
Total	5,270	(100.0%)	8,328	(100.0%)	1.58

Source : Statistics Year Book of Nepal 1993

Table 2.7.3 shows the road length in Nepal by class and by type in 1991. In 1991, the class of highway occupies a share of about 28% of the total road length.



FAR WESTERN DEVELOPMENT REGION	
INDEX	1991 July Total Length km
Black Topped Road	146
Gravelled Road	177
Earthen Road	400
Total Length	723

WESTERN DEVELOPMENT REGION	
INDEX	1991 July Total Length km
Black Topped Road	754
Gravelled Road	249
Earthen Road	569
Total Length	1572

CENTRAL-DEVELOPMENT REGION	
INDEX	1991 July Total Length km
Black-Topped Road	1323
Gravelled Road	844
Earthen Road	1014
Total Length	3181

EASTERN DEVELOPMENT REGION	
INDEX	1991 July Total Length km
Black Topped Road	615
Gravelled Road	604
Earthen Road	732
Total Length	1951

MID WESTERN DEVELOPMENT REGION	
INDEX	1991 July Total Length km
Black Topped Road	245
Gravelled Road	307
Earthen Road	349
Total Length	901

Index	1991 July Total Length km
International Boundry	
Development Region Boundary	
Zonal Boundary	
District Boundary	
Capital, Development Centre	
Zonal Head-quarter, District Head-quarter	
River	
Black Topped Road	3083
Gravelled Road	2181
Earthen Road	3064
Road Under Construction	
Planned Road	
TOTAL LENGTH	8328

KATHMANDU BHAKTAPUR & LALITPUR DISTRICTS	
INDEX	1991 July Total Length km
Black Topped Road	361
Gravelled Road	224
Earthen Road	235
Total Length	820

Figure 2.7.1 Road Network in Nepal

Source : Nepal Road statistics 1991, Department of Roads

Table 2.7.3 Road Length in Nepal by Class and by Type in 1991

Unit : Kilometer

	Paved (Black Top)	Gravel	Earthern	Total	
					Share
Highway	1,819	276	210	2,305	(27.7%)
Feeder Road	483	622	621	1,726	(20.7%)
District Road	260	959	1,920	3,139	(37.7%)
City Road	521	324	313	1,158	(13.9%)
Total	3,083	2,181	3,064	8,328	(100.0%)

Source : Statistical Year Book of Nepal 1993

The major highway link in Nepal is the Mahendra Highway (East- West Highway) which is the only national road network that links the eastern and western borders of Nepal, running through the Terai area. It was initiated in 1963, and as of now, covers a total distance of 1,015 Km. Other major highways linking from/to Kathmandu are the Tribhuvan Highway (Kathmandu - Birganj), Prithvi Highway (Kathmandu - Pokhara), and Arniko Highway (Kathmandu - Kodari).

As a major road development plan in future, the construction of the Sindhuli Road (Kathmandu - Sindhuli) is programmed in order to connect Kathmandu city with the south eastern part of the country: This will form an additional alternative route to the one through the Terai area.

2.8 Environment

2.8.1 General

In development planning, it is important to consider the environment. For the long and short term, it is necessary to give enough consideration to the environment, both from the view point of the macro and micro regions.

It is important to attain economic growth for the development in Nepal, and for this, it should be carried out considering the environment continually.

Here is information which takes into account best the environmental impact that the development plan would have, while undertaking the modernization of the Tribhuvan International Airport. Regarding these environmental assessments, consideration has been referred to the "National Environmental Assessment Guideline 1992", and the National Planning Commission.

2.8.2 Social Environment

The total population of Nepal is approximately 18.46 million (1991), with a population density of 124 persons/km^2. The population of the capital Kathmandu stands at 0.42 million, or 2.2% of the total national population.

With respect to race, Nepal is a multi-racial nation comprising of Indo Aryans, Mongolians, Tibetans; altogether there are more than 20 main types of races. Nepalese language is used as the official language. Freedom of religion has been recognized but for a long period Hinduism had been defined as the national religion (the new constitution of 1992 has deleted it). The proportion of respective religions is indicated hereunder.

Table 2.8.1 Religion in Nepal

	Number of People	Percentage
Hindu	15,996,953	86.5%
Buddist	1,439,142	7.8%
Islam	653,218	3.5%
Jain	7,561	0.0%
Christian	31,280	0.2%
Kirati	318,389	1.7%
Others	26,416	0.1%
Unknown	18,138	0.1%
Total	18,491,097	100.0%

Source : Statistical Year Book of Nepal 1993

The administrative regions have been divided into 5 regions; the eastern region, the central region, western region, the mid-western region and the far western region. Furthermore, such administrative regions have been divided into 14 zones, with the current investigation located in the Bagmati zone, which lies in the central region.

The state of land use is such that in the outer periphery of the city, rice and paddy field are prevalent, and in the plain lands of the valley excluding the city and the suburbs, land is used for agriculture which has a high agricultural productivity. The city area is an accumulation area of agricultural products.

Beside the above, the valley is mainly comprised of forest and high mountain land.

Recently, on account of population concentration in the cities, with a rapid increase in urban population, several urban problems, such as water supply, power supply, road infrastructure and garbage treatment facilities have been encountered.

Kathmandu, Patan and Bhaktapur, the three main cities, have a previous history of prosperous capital cities during the time of the Newar kings, and to this day one encounters high density streets along narrow roads centered around the palaces. The temples along the city streets form an important part of the historical heritage which is vital for tourism. Annually more than 200,000 tourists visit the regions.

Temples, museums and parks that are a source of tourism is indicated in Table 2.8.2.

The land use plan diagram of the Kathmandu district is indicated in Figure 2.8.1.

The Ring Road (peripheral length 29 km) runs through Kathmandu and Patan as the main road. Furthermore, there is the Arniko Highway running to the Chinese border through Bhaktapur - Kodari and the Tribhuvan Highway to the Indian border through Thankot - Birganj from the Kathmandu suburbs. Besides these, there are smaller roads that link with the 3 main roads.

Hospitals are mainly constructed inside the city, as are schools, and have been constructed in each and every place in Kathmandu.

Table 2.8.2 Temples in the Kathmandu Valley

TEMPLES

KATHMANDU

NO	TEMPLE	LOCATION	DESCRIPTION
1.	Swayambhunath	Western fringe of KTM	2 thousand year old Buddhist stupa on a hillock.
2.	Boudhanath	Boudha, 1 km. east of KTM	One of the world's largest stupas.
3.	Pashupatinath	6 km. from KTM and on the banks of Bagmati river.	Sacred Hindu temple dedicated to Lord Shiva.
4.	Machchendranath (White)	Machendra bahal between Asan and Indra Chowk.	Pagoda style artistically beautiful temple.
5.	Akash Bhairav	Indra Chowk	Three story temple in the main market avenue.
6.	Kumari	Near Hanuman Dhoka Palace.	Residence of the Living Goddess, Kumari. Built by King Jaya Prakash Malla.
7.	Kasthamandap	Near Hanuman Dhoka	Built by King Laxmi Narsingha Malla in the beginning of 16th century.
8.	Ashok Binayak	Behind Kasthamandap	It is a small but a very important temple and is also known as Maru Ganesh.
9.	Mahankalsthan	Western section of Tundikhel	An ancient gigantic image of Lord Mahankal, which is one of the master - pieces of ancient Nepalese sculpture
10.	Bhadrakali	Western edge of Tudikhel, near Matyr's memorial gate	One of the main Bhagawati temples of KTM
11.	Budhanilkantha	8 km. North of KTM, at the base of Shiwapuri hill	Statue of Lord Vishnu, reclining on a bed of snakes. It is a fifth century stone sculpture of Lichchavi period.
12.	Guheshwori	5 km. east of KTM	There is no image of any goddess eventhough it is the shrine of Goddess Sati (Parvati).
13.	Chabahil Stupa	8 km. east of KTM near Boudhanath	Built by Charumati, the daughter of the Indian Emperor Ashoka, in the third century B.C.
14.	Chandra Vinayak	200m. west of Chabahil stupa.	Temple of Lord Ganesh.
15.	Shekha Narayan.	Situated on a hillock, which is between Chobhar and Dakshinkali.	Temple of Lord Vishnu. There are ponds with fishes at the base.
16.	Dakshinkali	2 km. South of Shekha Narayan.	A very important Hindu temple of goddesses. Pilgrims visit here to offer their prayers and sacrifice animals. It is also a popular picnic spot.