

Chapter 1
Introduction

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1.1 Background

The study area is composed of Bogotá City and eight municipalities in Cundinamarca, and formed a Bogotá Metropolitan Area. The Bogotá Metropolitan area has experienced rapid population increase since 1960s, when total population was only 1.7 million. Since then the population has increased to reach 5.3 million in 1993, more than three times comparing to 1960s. Total population reached 6.4 millions in year 2000. Based on the estimation of DAPD, Bogotá City will continue to increase population at a rate of 130,000 per year.

Rapid population increase has caused many problems, such as insufficient housing stock, infrastructure provision, transportation etc. It is pointed out that the urbanized area expanded to relatively weak soil condition areas of lake deposit as well as sandy soil area, where it is the problems of the liquefaction. Moreover, the edged of the mountain area has high risk of amplification of seismic intensity. The urbanization has brought about city's vulnerability to disasters.

The Bogotá Metropolitan Area suffered various natural disasters of earthquake, landslide, flooding and industrial hazard. As for large earthquake study by INGEOMINAS, the Study Area has experienced seven times of MSK intensity over VII since 1600. For slope disaster from 1996 to 2000 in the Bogotá Metropolitan Area, 404 events were occurred and consisting of landslides, falls and flows. The flooding damage can be observed whole study area, except Cota and Madrid municipalities. During 1979 to 1998, the industrial accidents related to spills, leaks, fires and explosions were occurred 204 events, of which 109 events were fires. The study area can be observed various disasters.

To cope with natural disaster prevention, the Bogotá City enacted natural disaster prevention and a state of emergency action laws and regulations in 1999 in accordance with the national laws of disaster management, which regulate the emergency action plan by the local governments. However, the existing disaster management system can be handled relatively small area of disaster. There is no integrated disaster management system for earthquake, which expects management system for earthquake damage of whole study area.

The Government of Colombia (hereinafter referred to as "GOC") need additional technology, knowledge and information to formulate an integrated Bogotá city disaster prevention plan. With this reason, the GOC requested the Government of Japan (hereinafter referred to as "GOJ") for the conduct of a study to formulate an optimum disaster prevention plan for the Bogotá metropolitan area. In response to the request of GOC, the GOJ has decided to conduct "The Study on Disaster Prevention in the Bogotá Metropolitan Area in the Republic of Colombia (hereinafter

referred to as “the Study”) through JICA, the official agency responsible for the technical cooperation program, in accordance with relevant laws and regulations in force in Japan.

1.2 Outline of the Study

1.2.1 Goals

The basic plan for disaster prevention aims to prevent and mitigate the effects of and safeguard Bogotá City against natural disasters. The specific goals of the basic plan are categorized as follows:

- To protect the life and asset of Bogotá City from natural disasters;
- To promote the stability of the social and economic activities after disaster; and
- To secure the administrative functions of the city of Bogotá and related organizations.

In order to achieve these goals, the Study Team prepares an optimum stage development plan of the disaster prevention measures.

1.2.2 Objectives

The objectives of the Study are:

- (1) To formulate the plan for disaster prevention; and
- (2) To carry out the technology transfer to Colombian counterpart personnel in the course of the Study.

1.3 Study Area

The Study Area is the Bogotá metropolitan area, consisting of Bogotá City and the eight municipalities of Chia, Cota, Facatativa, Funza, La Calera, Madrid, Mosquera and Soacha (Figure 1.1.1).

1.4 General

The Study conducted in the following two phases:

1) Phase 1: Basic Study and Analysis

Existing data collection, analysis and evaluation

The focus of the fieldwork during Phase 1 is collected and reviewed of the existing data and analysis. The Study Team found the previous study done by the DPAE and INGEOMINAS has no database for the analysis. In order to evaluate damage, the Study team decided to establish GIS database system for damage estimation. The Study Team collected various fields of existing data in cooperation with counterpart agencies. The list of collected data and organization that supplied the data is summarized as Table 1.1.1.

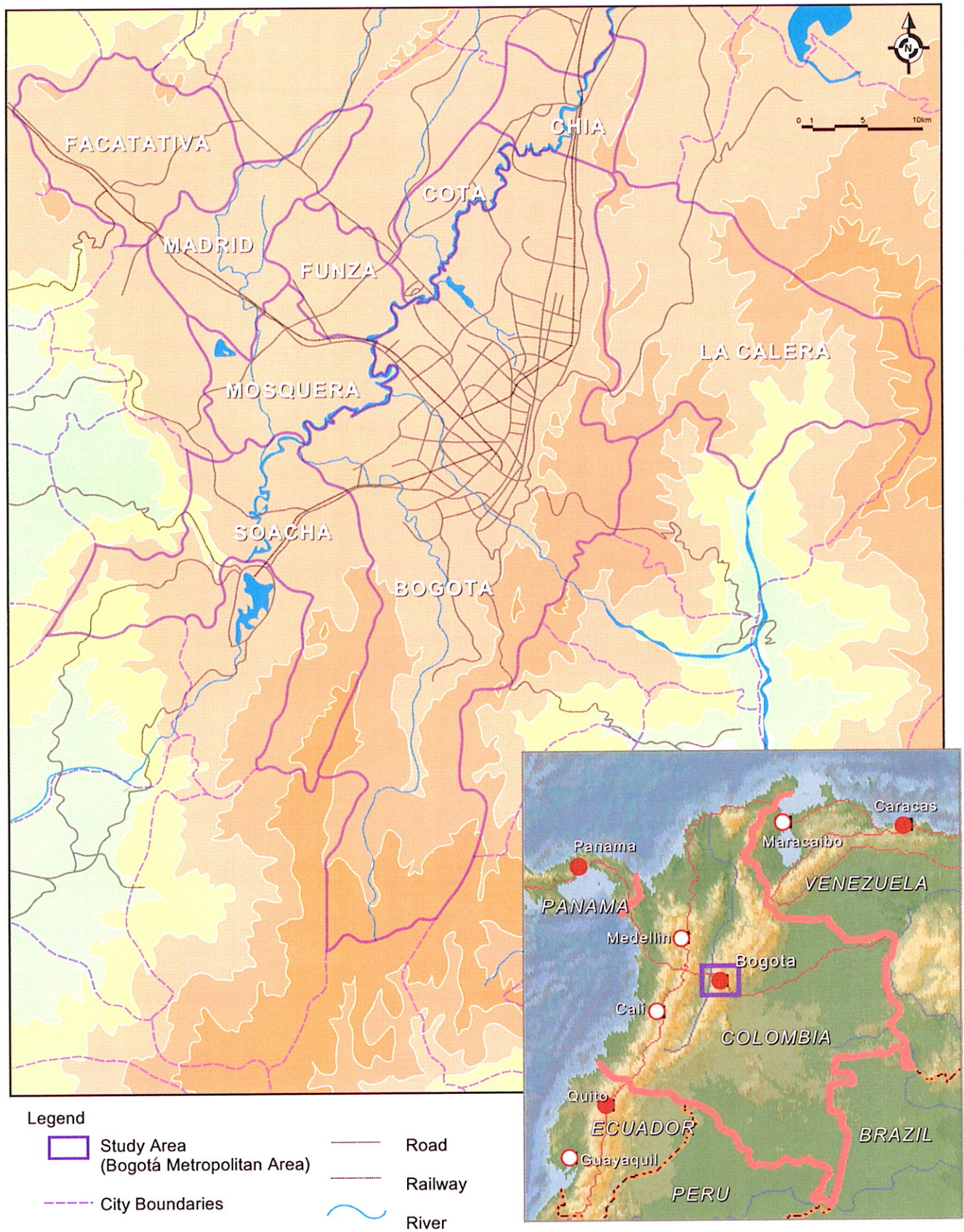


Figure 1.1.1 Study Area

Table 1.1.1 Summary of Collected Data

Items	Data Type	Organization
Earthquake	Earthquake data	INGEOMINAS
Population	Bogotá Cundinamarca	DAPD Each municipality and DANE
Building	Bogotá Cundinamarca	Bogotá City Cadastral Department IGAC
Infrastructure	Road network and bridge locations Water pipe distribution Telecommunication network Gas supply network Electronic supply network	IDU EAAB CAPTEL GAS NATURAL CODENSA
Others	Open space Public facilities (Fire fighting station, Civil defense, Red Cross, Police Station, Military station, Public and private hospital, Educational facilities)	IDRD Fire fighting Office, Civil Defense, Red Cross, Police Department, Ministry of Defense, Secretary of health, Secretary of Education, etc.

Workshop (1)

The Study Team held five Project Cycle Management: PCM and Stakeholder Workshops for the purpose of technical transfer and information spreading to people related to disaster management. Details of the workshops are summarized as follows:

Table 1.1.2 Summary of Workshop 1

Date	Participants	Activities
May 24, 2001 (Bogotá, Cundinamarca)	PCM Workshop (20 people)	
	- Government Officials - Official from Lifeline Agencies - Representatives of Districts and Cities	- Problem Analysis
	Stakeholders Workshop (30 people)	
	- Government officials - Official from Lifeline Agencies - Representatives of Districts and Cities	- Display of materials made by DPAE - Presentation of activities of DPAE/OPAD and JICA Study Team - Presentation of sufferers of disaster - Group discussions on recommendation to JICA Study Team
May 29, 2001 (Bogotá) June 8, 2001 (Cundinamarca)	PCM Workshop (40 people)	
	- Community leaders - Representatives of NGO - Representative of Hospital, Church	- Participants Analysis - Problem Analysis
	Stakeholders Workshop (60 people)	
	- Government officials - Officials from Lifeline Agencies - Representatives of Districts and Cities - Community leaders - Representatives of Mass media - Representative of NGOs	- Display of materials made by DPAE - Presentation of activities of DPAE/OPAD and JICA Study Team - Presentation of sufferers of disaster - Group discussions on recommendation and conclusion for future activities
May 30, 2001 (Bogotá) June 9, 2001 (Cundinamarca)	PCM Workshop (40 people)	
	- Community leaders - NGO - Hospital, Church	- Objective Analysis

As for stakeholder meeting, five subjects were discussed, namely, 1) infrastructure strengthening, 2) organizational and institutional strengthening, 3) people and community strengthening, 4)

mass media usage, and 5) information distribution system strengthening.

For the PCM analysis, the participants are agreed to formulate three types of project, 1) Disaster prevention and awareness improvement project, 2) Project for disaster prevention institution strengthen and 3) capacity building on disaster management. Those results are made use of formulation of the proposed projects.

Establishment of web site

The JICA study team constructed Web page in cooperation with counterpart organization. SIRE has already constructed Web page for DPAE-FOPAE. The Web page of study team was shared with counterpart's Web site and opened information on the study.

Surveys

The Study Team carried out field investigations with local consultants through hired by local consultants as well as subcontracting. Three important subjects, Socio-economic survey, Industrial survey and digital map making, are subcontracting to the local consultants. Those works are summarized as follows:

Table 1.1.3 Summary of Sub-contract

Name of Survey (Subcontracting Firm)	Outline	Results
Socio-economic survey (Urbanismo and Sistemas)	The objective of the survey is to collect data and information of buildings and population for database of the year 2000. The surveyed area covered whole study area, yet it focuses on Soacha municipality due to lack of information of building and population.	Before the field investigation, aerial photo interpretation was done by the local consultant team to determine the survey community and then field investigation was carried out for home interview of identified area. The results were used to determine population and the number of building in Soacha municipality.
Industrial facilities survey (Consejo Colombiano de Seguridad:CCS)	In order to identify industrial facilities in Cundinamarca eight municipalities, the Study Team carried out questionnaire survey of around 400 factories during Phase 1. The survey items are prepared discussion with JICA Study Team, as well as counterpart agency.	The local consultant collects total 375 questioners from eight municipalities in Cundinamarca. The collected information is combined with Bogotá's industrial facility database and constructed to integrate database for the study area.
Digital map and GIS database (Geo Spatial)	The purpose of the work is to establish digital map and GIS database covering the Bogotá City as well as adjacent eight municipalities.	The digital maps and GIS database are established within the whole study area.

The Study Team had done other field surveys through hiring local engineers. The covered areas are slope disaster identification, soil and ground data collection, building survey and infrastructure data collection. The collected data were integrated into the GIS database system and utilized for disaster damage estimation.

Public Awareness Survey

This was done by the interview survey. The targeted area for this survey was for Bogotá City and eight municipalities of Cundinamarca. Approximately 100 questionnaires were distributed, and about 50 of them were collected. This result shows that the public interest toward the disaster awareness can be improved.

2) Phase 2: Formulation of the Plan for Disaster Prevention and Mitigation

The Study Team explained the Phase 1 results to the counterpart agency as well as steering committee. Those agencies are agreed on the Phase 1 study results.

Seminar (1)

In order to introduce the results of the Phase 1, Seminar 1 was held by the study team as well as counterpart agencies. The Seminar 1 was intended to introduce disaster scenario, which was estimated within the study.

The summary of the seminar 1 is shown as follows:

Table 1.1.4 Summary of Seminar 1

Items	Descriptions
Data and Place	November 9, 2001 Cundinamarca Government
Attendants	Government officials, Professional and NGOs approximately 200 persons
Contents	Disaster scenario
Results	The study team explained the disaster scenario, which is estimated during Phase 1. The discussion with participants and the Study team concluded that the study results were important for the Bogotá Metropolitan Area to prepare disaster management system.

Workshop (2)

Workshop 2 contained two main objectives, 1) to promote the awareness to the disaster prevention education of the educational related personnel, and 2) to promote the awareness of communities to the disaster prevention by introducing participatory risk analysis and vulnerability reduction exercise.

The summary of the workshop is shown as follows:

Table 1.1.5 Summary of Workshop 2

Date	Participants	Activities
October 17, 2001	50 people (from Bogotá city and Cundinamarca) - Teachers (Elementary, Junior and High school) - Staff from the Educational Institutions	- Introduction of Japanese education on disaster prevention - Awareness promotion on the disaster prevention and the emergency response - Investigation on the potentials and issues for the disaster prevention and emergency response within the school education - Input of the educational planning on disaster prevention
October 24, 2001	50 people (25 from Bogotá city and 25 from Cundinamarca prefecture) - Members from each community	- Presentation of the results for “participatory risk analysis and vulnerability reduction exercise” which were prepared by each community previously. - Promotion of disaster prevention awareness among the community - Plan for the city strengthening

Preparation of the Basic Plan for disaster prevention

The basic plan for disaster prevention was established to formulate in the Bogotá Metropolitan Area. The plan shows the action program for next ten years and approximate costs for implementation. Since earthquake damage is far beyond the other disaster damages, the plan focused on the earthquake disaster prevention plan. The primary attention of the basic plan is to reduce earthquake damage through physical improvement, because the damage is far beyond the existing capacity of the government.

Seminar (2)

The second seminar was held on February 6, 2002 at the Cundinamarca government. The summary of the seminar 2 is shown as follows:

Table 1.1.6 Summary of Seminar 2

Items	Descriptions
Data	February 6, 2002
Attendants	Government officials, Professional and NGOs, approximately 300 people
Contents	Basic Plan for Disaster Prevention
Results	The study team explained the basic plan for disaster prevention to the Colombian attendance. During the discussion, the attendance emphasis on the importance of education and training aspect of disaster prevention. The attendance understood and agreed the contents of the basic plan.

1.5 Description of Individual Study Tasks

The work schedule of the tasks, interrelations among the tasks, and logical flow of the Study are shown in Figure 1.1.2.

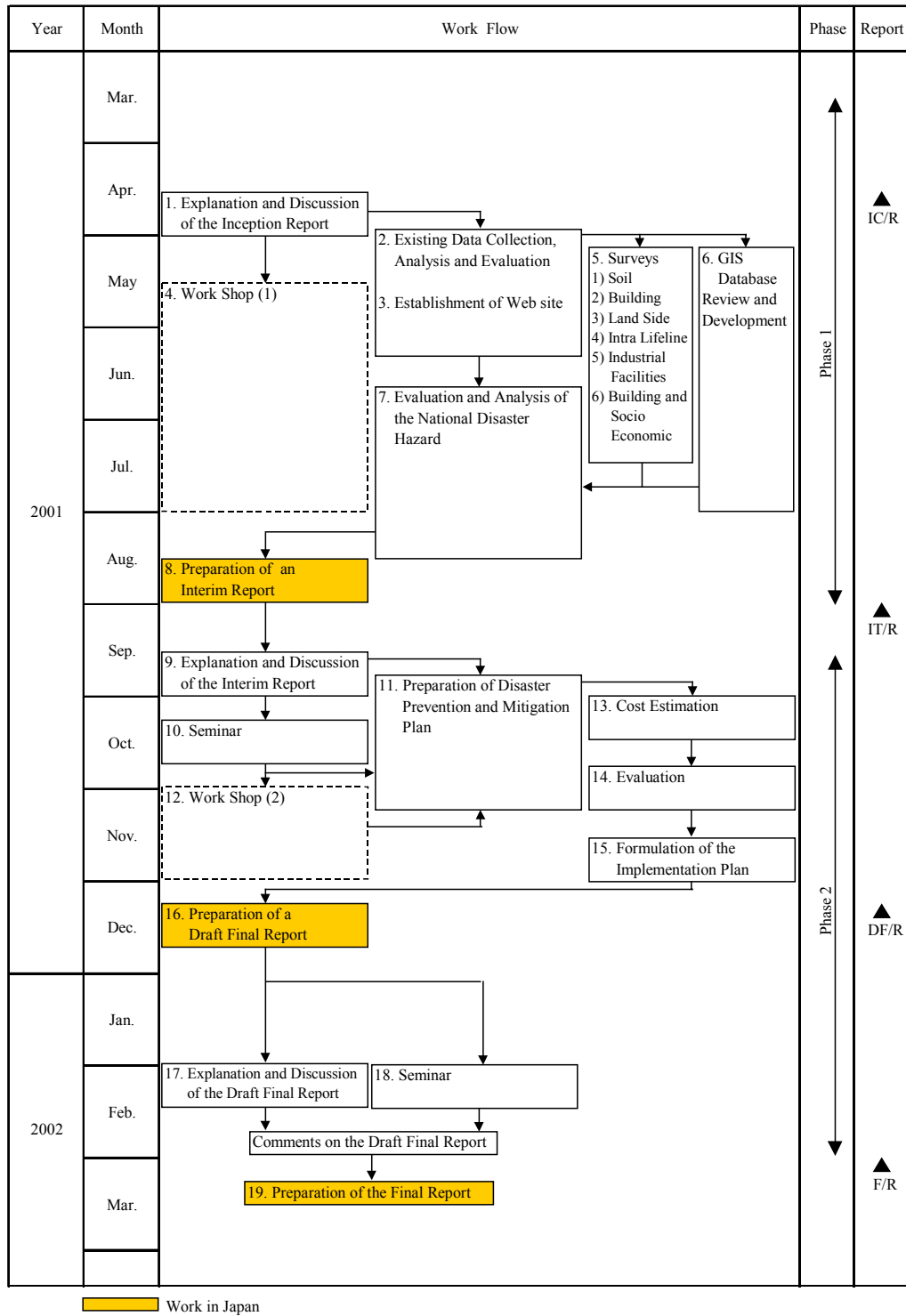


Figure 1.1.2 Work Flow of the Study

1.6 Study Organization

The Study was carried out by the joint efforts of the Study Team and Colombian counterpart personnel, which together form a study implementing body. The Study Team was composed of the members from Pacific Consultants International (PCI) and OYO Corporation. The Colombian counterparts were delegated from DPAE and Cundinamarca prefecture.

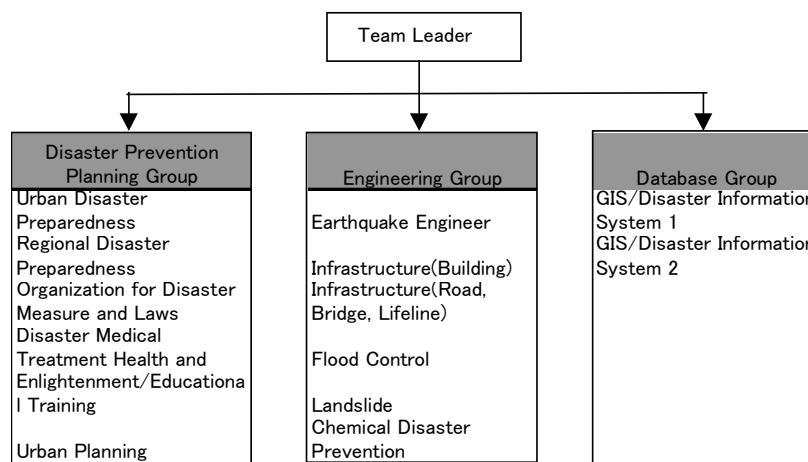


Figure 1.1.3 Study Team Organization

Members of the study team and their assignments are shown in Appendix 1.6.1. A Steering Committee was formed based on the agreement between the City of Bogotá and JICA. It was organized to guide and advise the Study Team and the counterpart team on overall study directions and policy-related matters. A list of steering committee is shown in Appendix 1.6.2 and a list of counterpart is shown in Appendix 1.6.3. Figure 1.1.4 shows the Study Organization.

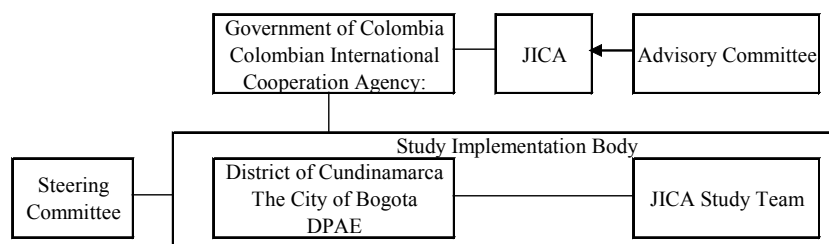


Figure 1.1.4 Study Organization

1.7 Composition of Reports

This report presents all results of the technical studies conducted during the period from April 2001 to March 2002, the Report consists of the following:

1. Summary Report
2. Main Report
3. Data Book
4. GIS Map