



DEPARTMENT OF PUBLIC
WORKS AND HIGHWAYS
THE REPUBLIC OF THE
PHILIPPINES



Japan International
Cooperation Agency

THE STUDY ON FLOOD CONTROL PROJECT IMPLEMENTATION SYSTEM FOR PRINCIPAL RIVERS IN THE PHILIPPINES

Under

**THE PROJECT FOR ENHANCEMENT OF CAPABILITIES
IN
FLOOD CONTROL AND SABO ENGINEERING OF
THE DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS**

SUMMARY REPORT

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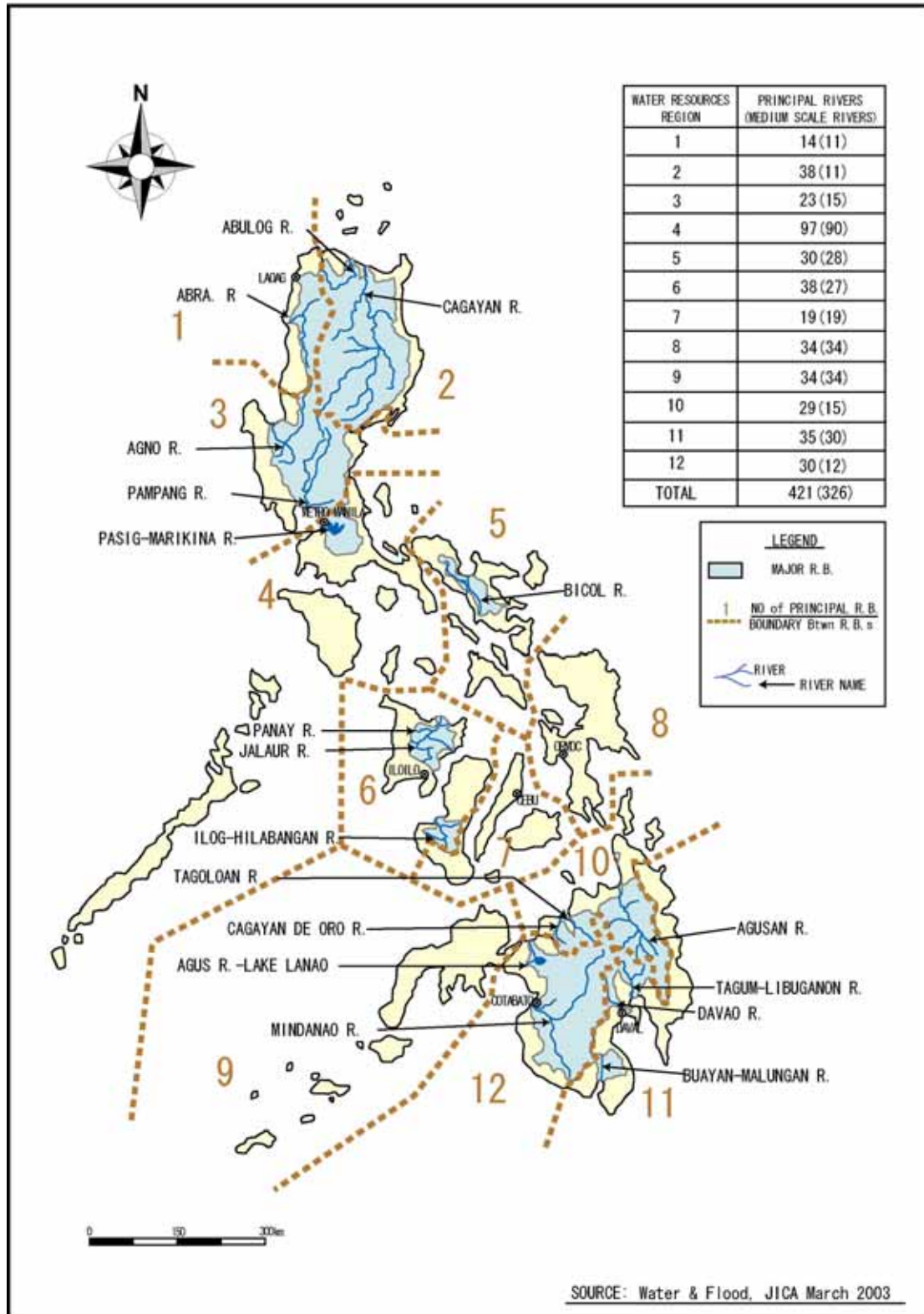
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LOCATION MAP



MAJOR RIVERS LOCATION MAP

TABLE OF CONTENTS

LOCATION MAP

TABLE OF CONTENTS	i
LIST OF TABLES	ii
LIST OF TABLES	ii
LIST OF ABBREVIATIONS	iii
CHAPTER 1. INTRODUCTION	S-1
1.1 Background	S-1
1.2 Study Objectives	S-1
1.3 Study Area	S-1
CHAPTER 2. FLOODS IN THE PHILIPPINES	S-2
2.1 Natural and Socio-economical Conditions	S-2
2.2 Flood Damages	S-5
2.3 Data and Information of Floods	S-7
CHAPTER 3. POLICY AND DIRECTION	S-10
3.1 Flood Control in the National Development Plans	S-10
3.2 Budgeting System for Flood Control Works	S-12
CHAPTER 4. ORGANIZATION, LAWS AND REGULATIONS	S-16
4.1 Organizations	S-16
4.2 Laws and Regulations	S-25
CHAPTER 5. PAST FLOOD CONTROL WORKS	S-31
5.1 Flood Control Projects	S-31
5.2 Other Related Projects	S-32
5.3 Review and Evaluation	S-33
CHAPTER 6. PROBLEMS IN IMPLEMENTATION SYSTEM	S-36
6.1 Problems/Issues through PCM Workshop	S-36
6.2 Summary of Problems in Flood Control Works for Principal Rivers	S-37
CHAPTER 7. IMPROVEMENT PLAN OF FLOOD CONTROL PROJECT IMPLEMENTATION SYSTEM	S-42
7.1 Possible Solutions	S-42
7.2 Formulation of Improvement Plan	S-44

LIST OF TABLES

Table 6.1	Summary Matrix of Problems and Issues in Flood Control Project Implementation for Principal Rivers.....	T-1
Table 7.1	Draft Project Design Matrix	T-2

LIST OF FIGURES

Figure 2.1	Topography of the Philippines	F-1
Figure 2.2	Climatological Map of the Philippines	F-2
Figure 2.3	Location of 18 Major River Basins.....	F-3
Figure 7.1	PCM Objective Tree of Flood Control Project Implementation for Principal Rivers.....	F-4
Figure 7.2	Organizational Structure of Flood Management System of DPWH with National Flood Management Committee.....	F-5
Figure 7.3	Schedule Diagram of Action Plan and Roles of FCSEC	F-6

LIST OF ABBREVIATIONS

ADB	: Asian Development Bank
AFP	: Armed Forces of Philippines
AMMS	: Administrative & Manpower Management Service, DPWH
AO	: Administrative Order
ARMM	: Autonomous Region in Muslim Mindanao
ASEAN	: Association of South East Asian Nations
ASSEC	: Assistant Secretary
AusAID	: Australian Agency for International Development
BFD	: Bureau of Forest Development, DENR
BIR	: Bureau of Internal Revenue
BOC	: Bureau of Construction, DPWH
BOD	: Bureau of Design, DPWH
BOE	: Bureau of Equipment, DPWH
BOM	: Bureau of Maintenance, DPWH
BRS	: Bureau of Research and Standards, DPWH
BSP	: Bangko Sentral ng Pilipinas (Central Bank of the Philippines)
CAR	: Cordillera Administrative Region, DPWH
CARL	: Comprehensive Agrarian Reforms Law
CARP	: Comprehensive Agrarian Reform Program
CBFM	: Community-Based Forest Management
CBM	: Community-Based Management
CBFMO	: Community-Based Forest Management Office
CBFMS	: Community-Based Forest Management Strategy
CBRMP	: Community Based Resource Management Project
CBO	: Community-Based Organization
CDA	: Co-operative Development Authority
CENRO	: Community Environment and Natural Resources Office/Officer(DENR)
CFP	: Community Forestry Program
CIDA	: Canadian International Development Agency
CALABARZON	: Region; Cavite, Laguna, Batangas, Rizal, Quezon
CO	: Community Organization (also Certificate of Origin)
COA	: Commission on Audit
CRM	: Coastal Resources Management
CY	: Calendar Year
DA	: Department of Agriculture
DANIDA	: Danish International Development Agency
DAO	: Department (DENR) Administrative Order
DAR	: Department of Agrarian Reform
DBCC	: Development Budget Coordination Committee
DBM	: Department of Budget and Management

DECS	: Department of Education Culture and Sports
DENR	: Department of Environment and Natural Resources
DEO	: District Engineering Office, DPWH
DepEd	: Department of Educations
DFA	: Department of Foreign Affairs
DILG	: Department of Interior and Local Government
DND	: Department of National Defense
DOF	: Department of Finance
DOH	: Department of Health
DOJ	: Department of Justice
DOT	: Department of Tourism
DOST	: Department of Science and Technology
DOTC	: Department of Transportation and Communications
DPWH	: Department of Public Works and Highways
DSWD	: Department of Social Welfare and Development
DTI	: Department of Trade and Industry
EC	: European Commission
ECC	: Environmental Compliance Certificate
EIA	: Environmental Impact Assessment
EMB	: Environmental Management Bureau, DENR
ENFOR	: Environment Forestry Program
ENR	: Environment and Natural Resources
ENRO	: Environment and Natural Resources Office
EO	: Executive Order
FCSEC	: Flood Control and Sabo Engineering Center
FDC	: Forest Development Center
FFWSDO	: Flood Forecasting and Warning System for Dam Operation
FINNIDA	: Finnish International Development Agency
FMB	: Forest Management Bureau, DENR
FSP	: Forestry Sector Project
GAA	: General Appropriations Act
GDP	: Gross Domestic Product
GIS	: Geographic Information System
GNP	: Gross National Product
GPS	: Global Positioning System
GWP	: Global Water Partnership
HLURB	: Housing and Land Use Regulatory Board
HUDCC	: Housing and Urban Development Coordinating Council
HQ	: Head Quarters
IEC	: Information and Education Campaign
IEE	: Initial Environmental Examination
IRR	: Implementing Rules and Regulations

ISDR	: International Strategy for Disaster Reduction
IT	: Information Technology
IWRM	: Integrated Water Resources Management
JBIC	: Japan Bank for International Cooperation
JMC	: Joint Memorandum Circular
KfW	: Kreditanstalt für Wiederaufbau (German Development Bank)
LGC	: Local Government Code (RA 7160)
LGU(s)	: Local Government Unit(s)
LLDA	: Laguna Lake Development Authority, DENR
LMB	: Land Management Bureau, DENR
LWUA	: Local Water Utilities Administration
MIS	: Monitoring and Information Services, DPWH
MMDA	: Metro Manila Development Authority
MOA	: Memorandum of Agreement
MOU	: Memorandum of Understandings
MTDIDP	: Medium-Term DPWH Infrastructure Development Plan
MTPDP	: Medium Term Philippine Development Plan
MWRMC	: Municipal Watershed Resources Management Committees
MWSS	: Manila Water and Sewerage Services
NA	: Not available
NAMRIA	: National Mapping and Resource Information Authority
NCSB	: National Statistical Coordination Board
NCR	: National Capital Region
NDCC	: National Disaster Coordinating Council
NEDA	: National Economic and Development Authority
NFPP	: National Framework for Physical Planning
NGO(s)	: Non-Governmental Organization(s)
NHA	: National Housing Authority
NHCS	: Napindan Hydraulic Control Structures
NHRC	: National Hydraulic Research Center, UPERDFI
NIA	: National Irrigation Administration
NIPAS	: National Integrated Protected Area System
NLUC	: National Land Use Code
NPC	: National Power Corporation
NSO	: National Statistics Office
NWIN	: National Water Information Network
NWRB	: National Water Resources Board
OCD	: Office of Civil Defense
ODA	: Official Development Assistance
OECD	: Overseas Economic Cooperation Fund of Japan (JBIC)
PAGASA	: Philippine Atmospheric, Geophysical, and Astronomical Services Administration

PCSD	: Philippine Council for Sustainable Development
PD	: Presidential Decree
PDCC	Provincial Disaster Coordinating Council
PDED	: Project Development and Evaluation Division, DPWH
PENRO	: Provincial Environment and Natural Resources Office/Officer
PFA	: Public Forest Administration
PHVOLCS	: Philippine Institute of Volcanology and Seismology
PIA	: Philippine Information Agency
PNCC	: Philippine National Construction Corporation
PNP	: Philippine National Police
PNRC	: Philippine National Red Cross
PO	: Peoples' Organization
PS	: Planning Service, DPWH
PWP	: Philippine Water Partnership
RA	: Republic Act
RDCC	: Regional Disaster Coordinating Council
RDP	: Regional Development Plan
RENRO	: Regional Environment and Natural Resources Office/r
RO	: Regional Office, DPWH
ROW	: Right-of-Way
TOR	: Terms of Reference
UN	: United Nations
UNDP	: United Nations Development Programme
UP	: University of the Philippines.
UPERDFI	: U.P. Engineering Research & Development Foundation Inc.
UPLB	: University of the Philippines at Los Baños.
US-AID	: United States Agency for International Development.
USDA	: United States Department of Agriculture
USEC	: Undersecretary
VAT	: Value Added Tax
WB	: World Bank
WMO	: World Meteorological Organization
WSSD	: World Summit of Sustainable Development
WTO	: World Trade Organization
WWF	: World Water Forum

CHAPTER 1. INTRODUCTION

1.1 Background

The Philippines has frequently suffered from natural disasters such as typhoons, volcanic eruptions and earthquakes while the government has continuously endeavored to mitigate the damages. Such disasters have brought heavy losses to the country's economy and claimed hundreds of lives every year. Approximately 700 lives have been lost and damages have amounted 8.1 billion pesos annually. It has affected primarily agricultural productions, transportation and communication resulting in aggravated and long time economic depression, enlargement of regional differential and influx of the poor to the urban areas. The Government of the Republic of the Philippines has hardly prevented disasters due to its limited technical background, organization structures, regulations as well as budgetary constraint.

Therefore, the Government has requested a technical cooperation project to develop the capacities of engineers by means of establishing "**Flood Control and Sabo Engineering Center**" to the Government of Japan. In response to the request, Japan International Cooperation Agency (JICA) has started "**The Project for Enhancement of Capabilities in Flood Control and Sabo Engineering of the Department of Public Works and Highways**" (herein after referred to as "the Project") on 10 January 2000.

In the course of the Project, it is recognized that the flood control project implementation system be improved to accomplish the Project Purpose: "Capability of the selected DPWH offices in planning, design, construction and maintenance of flood control structures will be enhanced, especially for the flood control projects in principal rivers". This "***Study on Flood Control Project Implementation System for Principal Rivers in the Philippines***" is decided to conduct to prepare and propose an effective flood control project implementation system.

1.2 Study Objectives

The objectives of the Study are

- (1) **To collect and review data and information of flood control projects and their relevant activities in the Philippines**
- (2) **To prepare and propose the improvement plan of implementation system for flood control projects on principal rivers* in the Philippines.**

1.3 Study Area

The study area covers the whole area of the Philippines, while the site survey is focused to the principal rivers in Luzon Region.

* Principal rivers (catchment area is bigger than 40 km²) are counted at 421 rivers nationwide, out of which major rivers (catchment area is bigger than 1,400 km²) and their tributaries are counted at 95 rivers. Therefore, Principal Rivers of which catchment area ranges 40 km² to 1,400 km² are 326 rivers.

CHAPTER 2. FLOODS IN THE PHILIPPINES

2.1 Natural and Socio-economical Conditions

(1) Natural Conditions

Most of weather-related disasters in the Philippines are directly or indirectly caused by tropical cyclones/typhoons. During the months of July to September, the presence of tropical cyclones northeast of the Philippines may intensify the southeast flow, bringing considerable rain and resulting in inland flooding and inundation of major river basins. With 421 principal rivers with drainage areas varying from 41 to 25,649 km², the hydrological profile of the Philippines makes it imperative to address the problem of flooding by prioritizing the development of water resources and river management programs for 18 major rivers and other noted key cities and urban centers nationwide.

Topography and Geology

Of volcanic origin, the Philippines is generally mountainous. Mountain ranges extend north to south, running parallel to the coasts and, in many places, bordering them. The mountains in Luzon include the Sierra Madre, Cordillera Central, the Caraballo Mountains and the Zambales Mountains. In the second largest island, Mindanao, are the Diwata Mountains and the mountain ranges in southern Mindanao including Mount Apo (a volcano), which, at 2,954 m, is the highest point in the Philippines. **(Figure 2.1)**

The archipelago consists essentially of two separable and distinct structural units, a mobile belt and a stable region. The mobile belt covers almost all the archipelago and is characterized by the concentration of earthquake epicenters, numerous active and inactive volcanoes and deeply sheared zone forming narrow canyons, intermountain basins and straits. The stable region, which embraces mainly Palawan and Sulu Sea in the southwestern part of the country, is essentially seismic and shows the virtual absence of Tertiary igneous activity.

Climate

The Philippines has a tropical climate. At sea level, temperatures rarely fall below 27°C. The country experiences an average temperature ranging from 28°C to 36°C and humidity varies from 70% to 85% depending on the time of year. Interior valleys and leeward sides of islands tend to be warmer, while mountain slopes and peaks and windward sides of islands tend to be cooler.

Rainfall averages 2,030 mm a year, with more precipitation in coastal plains than in sheltered inland valleys. In the western part of the country, the rainy season occurs during the summer monsoon, from May to November, when the wind blows from the southwest; the dry season occurs during the winter monsoon, from December to April, when the wind blows from the northeast. In contrast, the eastern side receives most of its rainfall during the winter monsoon and has no true dry season. **(Figure 2.2)**

Tropical storms are common from June to October; each year about 20 typhoons strike the Philippines, mostly on the eastern coasts of Luzon and Samar, bringing high winds and flooding that sometimes result in property damage and loss of life.

Water Resources Regions and River Basins

For purposes of comprehensive planning of water resources development, the National Water Resources Council (NWRC) divided the Philippines into 12 water resources regions (WRR), as shown in table below:

List of Water Resources Regions

Code	Name	Major River Basin	No. of Principal Rivers
WRR I	Ilocos Region	Abra River	14
WRR II	Cagayan Valley	Cagayan River	39
WRR III	Central Luzon	Pampanga and Agno Rivers	24
WRR IV	Southern Tagalog	Pasig-Laguna de Bay Rivers	97
WRR V	Bicol Region	Bicol River	30
WRR VI	Western Visayas	Panay, Jalaur and Ilog-Hilabangan Rivers	37
WRR VII	Central Visayas	-	19
WRR VIII	Eastern Visayas	-	34
WRR IX	Southwestern Mindanao	-	34
WRR X	Northern Mindanao	Agusan, Cagayan de Oro and Tagoloan Rivers	29
WRR XI	Southeastern Mindanao	Davao, Tagum-Libuganon, Buayan Rivers	35
WRR XII	Southern Mindanao	Agus and Mindanao Rivers	30

Source: "Principal River Basins of the Philippines", NWRC, October 1976

NWRC identified the principal river basins (PRBs) of the Philippines with these objectives:

- 1) To delineate and codify the PRBs for hydrologic purposes;
- 2) To determine the physical characteristics of each basin;
- 3) To generate interest on the minor river basins with potentials for development;
- 4) To define the major river basins in the country and trigger national interest in water resources development;
- 5) To prepare water resources regional maps showing the principal rivers and their respective basin boundaries to aid in the preparation of regional water resources plans and programs; and
- 6) To initiate an extensive, continuous program for collecting and organizing data on these basins for a complete characterization of each basin.

Counting the number of PRBs listed in the above-said report, 421 principal river basins were identified with drainage areas varying from 41 km² to 25,649 km². However, 77 of which are parts of larger PRBs where the rivers are tributaries of larger principal rivers. Of the 345 independent PRBs*, 18 were identified as major river basins with drainage areas of at least 1,400 km².

* Identification and delineation of principal river basins were carried out by National Water Resources Council (presently NWRB) in 1970s on the basis of 1/250,000 scale topographic map. Due to the map scale, there may be some rivers whose catchment areas are more than 40 km² unrecognized therein.

The locations of the major river basins are shown in **Figure 2.3**.

18 Major River Basins

Code No.	Rank	River Basin	Administrative Region No.	Catchment Area (km ²)
02001	1	Cagayan	Region II	25,469
12342	2	Mindanao	Region XI and XII	23,169
10315	3	Agusan	Region XIII	10,921
03059	4	Pampanga	Region III	9,759
03070	5	Agno	Region III	5,952
01036	6	Abra	Region I	5,125
04076	7	Pasig-Laguna Bay	NCR and Region IVA	4,678
05114	8	Bicol	Region V	3,771
02028	9	Abulug	Region II	3,372
11303	10	Tagum-Libuganon	Region XI	3,064
06235	11	Ilog-Hilabangan	Region VI and VII	1,945
06197	12	Panay	Region VI	1,843
10331	13	Tagoloan	Region X	1,704
12336	14	Agus	Region XII and ARMM	1,645
11307	15	Davao	Region XI	1,623
10332	16	Cagayan	Region X	1,521
06205	17	Jalaur	Region VI	1,503
11364	18	Buayan-Malungun	Region XI	1,434

Source: "Principal River Basins of the Philippines" published by NWRC in October 1976

(2) **Infrastructure Development**

The infrastructure of the Philippines is inadequate for the economic development sought by the government, international agencies and multinational corporations. Some large-scale improvements were made in the past to the country's schools, health centers, bridges, roads, flood control and irrigation works. However, the government investment in infrastructure has not kept pace with population growth and modern technologies.

The DPWH is the agency responsible for the over-all conduct, development and implementation of flood control plans and programs in the country. Out of 59 billion pesos budgeted for basic infrastructure program of DPWH in 2003, about 9.6 billion pesos or 16% is allotted to flood control including the foreign fund.

Flood Control and Drainage Sector

By end-2000, the total area provided by DPWH with river control and drainage facilities reached about 305,725 ha. This represents 62.03% of the total potential coverage area of 492,831 ha. On the other hand, the accomplishments for the Impounding/Mini Sabo Dams were not available due to the inability of the LGUs concerned to submit the information needed.

DPWH Medium-Term Infrastructure Program

Table below presents the revised and updated medium-term infrastructure program of the DPWH covering the period 1999-2004.

1999-2004 DPWH Medium-Term Infrastructure Program

(In Million Pesos, Current Prices)

Projects	1999	2000	2001**	2002	2003	2004**	Total
National Roads	24,273	22,951	28,161	29,063	39,983	41,640	186,070
Arterial Roads	16,018	14,134	17,422	17,046	27,738	28,116	120,468
Secondary Roads	4,747	6,172	7,871	8,689	8,515	9,918	45,913
Urban Roads	3,505	2,645	2,868	3,328	3,735	3,606	19,690
Flood Control	4,384	4,791	6,089	8,285	9,641	10,773	43,963
Other Projects	581	2,147	458	719	905	1,950	6,760
Various Infra. Incl. Local	606	14,999	1,720	8,430	8,430	11,864	46,050
Total	29,843	44,889	36,429	46,497	58,958	66,228	282,843

For flood control and drainage infrastructure, the medium-term targets are the following:

- The government will implement desirable flood control and drainage projects in major river systems in the country. It will pursue the provision of adequate structural schemes especially flooding for Metro Manila and other highly urbanized industrial centers. With lahar-associated problem still very much in existence due to the continuous demobilization of lahar sediments, continuing dredging and desilting activities should likewise be implemented.
- The projected total accomplishments for the plan period 2001-2004 are about 1.4 million ha. With the generation of this additional area, the total area with flood control and drainage facilities is about 1.70 million ha, or 87.57% of the total coverage in hectares for river control and drainage by 2004. The total investment requirements for the program are about 34.79 billion pesos.
- The priority flood control projects to be implemented are in the following areas: Agno River, Laoag River, Lower Cagayan River, Mt. Pinatubo Rehabilitation, Iloilo River, Lower Agusan, Lower Cotabato, West Mangahan, KAMANAVA (Kaloocan, Malabon, Navotas and Valenzuela), and Pasig River in Metro Manila.

2.2 Flood Damages

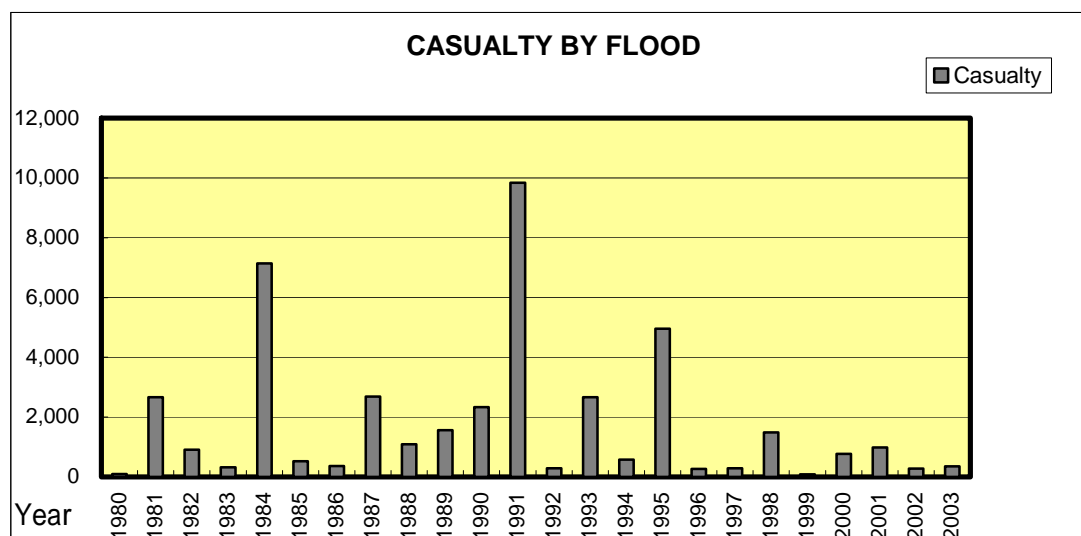
From 1990 to 2003 alone, the Philippines experienced an average of 3.5 destructive typhoons per year with damages costing up to 96.566 billion pesos mostly incurred from flood-damaged properties, infrastructures and crops. It is reported that an average of 900 persons are killed and an estimated cost of approximately 8 billion pesos are lost due to typhoons and associated flooding events. The flood damages are equivalent to 2% of the national budget and almost double the budgetary allocation of the DPWH for flood control.

Table below lists the amount of flood damages incurred for the last 24 years.

Recorded Annual Flood Damages

Year	Population Affected		Casualties			House Damaged		Damage Value (million peso)
	Families	Persons	Dead	Missing	Injured	Totally	Partially	
1980	248,164	1,666,498	36	4	55	16,510	51,101	1,472
1981	250,325	1,472,417	484	264	1,922	44,994	159,251	1,273
1982	266,476	1,569,017	337	223	347	84,027	97,485	1,754
1983	140,604	747,155	126	168	28	29,892	85,072	523
1984	741,510	4,048,805	1,979	4,426	732	310,646	313,391	416
1985	318,106	1,643,142	211	300	17	8,204	211,151	3
1986	287,240	1,524,301	171	43	155	3,162	14,595	1,838
1987	464,162	2,591,914	1,020	213	1,455	180,550	344,416	8,763
1988	1,173,994	6,081,572	429	195	468	134,344	585,732	8,675
1989	501,682	2,582,822	382	89	1,088	56,473	184,584	4,494
1990	1,265,652	6,661,474	676	262	1,392	223,535	636,742	11,713
1991	150,894	759,335	5,201	4,278	357	15,458	83,664	74
1992	418,964	2,097,693	145	95	51	3,472	8,342	7,359
1993	1,523,250	8,202,118	814	214	1,637	166,004	456,773	25,038
1994	670,078	3,306,783	266	54	260	58,869	226,291	3,401
1995	1,710,619	8,567,666	1,255	669	3,027	294,654	720,502	57,781
1996	260,581	1,254,989	124	49	97	2,690	17,557	10,109
1997	777,997	3,954,175	199	28	66	13,225	53,980	4,842
1998	1,590,905	7,197,953	498	116	873	137,020	406,438	17,823
1999	270,424	1,281,194	56	3	25	144	687	1,555
2000	1,426,965	6,852,826	338	59	370	24,573	195,536	7,217
2001	756,938	3,629,295	431	134	418	14,899	54,422	6,924
2002	538,600	3,546,469	169	33	71	2,980	15,947	829
2003	702,223	3,362,991	139	28	182	12,306	51,579	4,567
Total	16,456,353	84,602,604	15,486	11,947	15,093	1,838,631	4,975,238	188,443

Casualties have not reflected the efforts of the government in the flood control works, which have been relatively expanded in the late 1970s.



2.3 Data and Information of Floods

(1) Hydrological Data

Hydrological Observation

The agencies involved in hydrological data collection are:

- Philippine Atmospheric, Geophysical and Astronomical Services Administration (PAGASA)
- Bureau of Research and Standards (BRS)
- National Irrigation Administration (NIA)
- National Power Corporation (NPC)

Agency	Operational	Abandoned	Total	Remarks
A. RAINFALL				
PAGASA	181	165	346	Source: Station Profile, CDS-CAB, PAGASA, January 2004 (Data as of August 2002)
<i>Synoptic</i>	59	9	68	
<i>Climat/ VSS/ Cooperative/Rain</i>	96	147	243	During the field survey, 2 climat stations were found abandoned contrary to the records of PAGASA.
<i>Agromet</i>	26	9	35	During the field survey, 2 agromet stations were found abandoned contrary to the records of PAGASA.
NIA	0	157	157	Source: NIA-PDD
NPC	0	69	69	Data were already turned over to NWRB
B. STREAMFLOW				
BRS	272	479	751	Source: Integration of published streamflow records
NIA	1	178	179	Source: PDD-NIA

PAGASA has established a network of 346 hydrometeorological stations, of which 165 stations were already abandoned. Under BRS, at present, 272 out of 751 streamflow gauging stations are operational, while the rest of the stations are already closed. NIA established 157 rainfall stations, which are now all closed, and 179 streamflow gauging stations with only one (1) at present operational. All collection of rainfall data of NPC ceased completely in 1997.

Observation Condition

Gauging stations of rainfall and stream-flow shall be placed adequately for hydrological analysis in the flood control planning. For an area rainfall to be representative, it must be determined from. The World Meteorological Organization (WMO) Guide to Hydrometeorological Practices recommends an optimum number of rain gauge network as well as the minimum density of river gauging stations as follows:

For rain gauge, it shall be placed at least one station for every 600-900 km² for flat regions; and at least one station for 100-200 km² for mountainous regions. With the torrential nature of rains in the Philippines, the minimum rain gauge densities for different topographic categories are as follows:

- Extensive flat plain areas: 1 station/400 km²

- Rolling/mountainous areas: 1 station/200 km²
- Islands at least 1,000 km²: 1 station/100 km²

For stream-flow gauging station, which refers to river discharge measurement, it depends on different topographic categories are as follows:

- Flat region: 1 station/500 km²
- Mountainous region: 1 station/200 km²

For the major river basins, the densities of operational rain and stream-flow gauging stations are only one station per 2,470 km² and 913 km², respectively. Some river basins have neither rain gauge nor stream-flow gauging stations. Numbers of observation stations are quite inadequate.

Problems in Data Collection

The survey revealed some basic problems in hydrological data collection such as unavailability of reliable inventory and information of established gauging stations, lack of coordination with other agencies, and non-involvement of LGUs. The most common issues/concerns encountered are listed below:

ACTIVITY	ISSUES/CONCERNS
1. Data Observation	<ul style="list-style-type: none"> - Low compensation and delay of payment to observers - Lack of formal training to observers - Failure to observe and read data during high floods - Inaccessible to the gauges during heavy rains - Incomplete/inaccurate information filled in prescribed forms - Standard procedures in measuring not being followed - Available river cross-sections are limited - Insufficient supply of materials for observation and records
2. Operation & Maintenance	<ul style="list-style-type: none"> - Unavailability of new equipment - No funds for maintenance and instrumentation in case of breakage and lost - No regular checking and verification of established stations - Agency uninformed of unleveled instruments and change of location
3. Data Processing	<ul style="list-style-type: none"> - Delay of raw data transmission to Central Office - Delayed rectification of erroneous data - Variations in quality assurance procedures and standards between different agencies
4. Data Banking	<ul style="list-style-type: none"> - Unavailability of reliable inventory of gauging stations - Outdated system for information management - Reluctant investment in hydrological data collection - No comprehensive data submittal to NWIN - NWIN not implemented due to funding constraints

Available Records

PAGASA's data are in spreadsheets and databases. These data include daily rainfall total as well as monthly and annual summaries. For most of the stations, daily rainfall data are available for the period from 1951 to 2002.

BRS still has several years backlog in data encoding for some stations. Streamflow data are available for the period from 1945 to 2002. 112 stations have more than 30 years of record.

NIA's data are recorded in spreadsheets, which are partially stored in NWIN. Rainfall data are available for the period from 1972 to 1997. Streamflow data are available for the period from

1974 to 2004. When NPC hydrological stations stopped operations in 1997, all records available were turned over to NWRB.

New Development

NWRB has implemented the National Water Information Network (NWIN), which is being funded by the World Bank. The design and establishment of NWIN represents one of the more recent efforts to address the need to rationalize the collection of water-related data in the Philippines. NWIN is a computer-based network system that electronically links the databases of the collection agencies and providing easy access to user agencies.

NWIN now links the nine agencies tabulated below:

1.	NWRB	4.	BRS	7.	EMB
2.	MGB	5.	LWUA	8.	NIA
3.	NEDA	6.	PAGASA	9.	WSSPMO

(2) River and Flood Data

River Data: River Morphology

Other than the hydrological data, river data shall be periodically surveyed and collected to avail for river improvement planning, as follows:

River Channel	River Flow & Water Level	Geology	Catchment
1. Channel Network	1. Recorded Maximum	1. General Geology	1. Area
2. Alignment	2. Frequency of Floods	2. Geology along River Channel	2. Topography
3. Longitudinal Profile	3. Annual Mean Flow	3. Riverbed Materials	3. Vegetation Cover (Land Use)
4. Cross-section	4. Seasonal Variation	4. River Bank Materials	4. Surface Soil

However, the survey has not conducted by DPWH in the recent years due to inadequate fund and manpower, while the data has been prepared only in studies and projects for major river flood control works.

Flood Data

The principal kinds of hydrological data required for flood control projects include rainfall (depth, intensity, duration, aerial distribution, and path; maximum probable precipitation); river stage (peak stages, stage hydrograph during floods, flood-wave profiles along the stream and tributaries); discharge (peak rates, frequencies, hydrographs); and sediment (rate of suspended and bed-load transportation).

The informally recorded data may be found in newspapers. Less reliable, but vital, information may be obtained from field observations, such as flood marks on trees and buildings, and from people who have lived for a long time in the project area.

Another form of flood data is the flood inundation map, which is available only in major river basins where comprehensive planning for flood control has been undertaken.

CHAPTER 3. POLICY AND DIRECTION

3.1 Flood Control in the National Development Plans

Medium-Term Philippine Development Plan 2001-2004 (MTPDP 2001-2004) and National Framework for Physical Planning 2001-2030 have been formulated to orient the policy and direction for economic and infrastructure development including flood control in the Philippines. As well several national or international organizations have been developing guidelines to show the direction of water resources development as well as flood control; Integrated Water Resources Management (IWRM). Further, the budgeting system for policy and direction is understood.

(1) Medium-Term Philippine Development Plan 2001 – 2004

(a) Assessment of Flood Control and Drainage

While flooding has been reduced in many parts of the country, it is still a major concern together with erosion and sediment control due to the following: (a) deterioration of some rivers and streams in flood plains and delta areas due to encroachment on their natural channels, illegal mining operations and deforestation of watershed areas; (b) in urban areas, encroachment of the waterways and river channels by squatters and private landowners, indiscriminate garbage dumping and rapid urbanization which cause frequent flooding as a result of increase of runoff; and (c) deficiencies in technical standards and regulations, organization and budget for continuous O&M, rehabilitation and improvement of existing facilities and natural channels.

(b) Policy Framework

The objective under the flood control sub-sector is to promote economic development and poverty reduction through the implementation of several flood control projects.

(c) Strategies

The policies and strategies for flood control, drainage and sabo are:

- Mitigate flooding to *tolerable levels* in Metro Manila and major river basins with the additional construction/installation of flood control facilities in all flood prone areas that need protection as determined under the national land use plan. To this end, pursue the *Flood Control Act* which provides for a flood control mechanism;
- Strengthen the *Flood Control and Sabo Engineering Center* to conduct basic and applied research and development, human resource development, feasibility studies and preliminary engineering;
- Conduct comprehensive floodplain management strategy with the installation of flood forecasting and warning systems in all major river basins;
- Pursue proper O & M of flood control and drainage facilities including an effective garbage collection and disposal, *Bantay Estero/Ilog Brigades* and regulation/rules in coordination with other concerned government agencies and LGUs;
- Coordinate the development of flood control projects with the implementation of water resources development projects;
- Relocate and prevent informal settlers living along the banks of rivers/esteros/ creeks;
- Implement sabo projects for the prevention/mitigation of sediment-related disasters, debris and lahar flow/landslide;

- Study and formulate guidelines leading to sustainable development/land use in sediment-related disaster-prone areas. In relation, the *Erosion and Sediment Movement Management Act* providing for a comprehensive erosion and sediment movement management will be promoted to address the national problems on sedimentation;
- Implement comprehensive measures consisting of construction, warning/ evacuation, livelihood programs in coordination with concerned agencies and LGUs; and
- Legislate an act creating a *National Commission on Flood Control and Drainage Research and Development*.

(d) Key Measurable Targets

The priority flood control projects to be implemented are in the following areas: Agno River, Laoag River, Lower Cagayan River, Mt. Pinatubo Rehabilitation, Iloilo River, Lower Agusan, Lower Cotabato, West Mangahan, KAMANAVA (Kaloocan, Malabon, Navotas and Valenzuela), and Pasig River in Metro Manila

(2) National Framework for Physical Planning 2001 – 2030

Land Use Committee has promulgated National Framework for Physical Planning (NFPP) 2001 – 2030 to guide effective land use planning with land use planning guidelines for infrastructure development including a item as “Protection and Disaster Mitigation” that is excerpted in the followings:

(a) Protection and Disaster Mitigation

The river basin management concept shall be adopted in infrastructure planning to ensure upstream and downstream compatibility. In the implementation of environmentally-critical infrastructure projects, environmental rules and regulations shall be strictly complied to mitigate hazardous impacts of the projects.

- In solid waste disposal projects, for example, this includes adequate protection against leachate contamination of groundwater and sources of drinking water, breeding of vermin, flies and other carriers of communicable diseases; and
- Thorough environmental impact assessments of environmentally- critical projects such as fossil-fueled, nuclear-fueled, hydroelectric or geothermal power plants should also be undertaken to prevent harm to flora and fauna and other hazardous impacts neighboring communities;

(b) Incorporate Disaster Mitigation Principles in Infrastructure Development.

In addition to avoiding unnecessary encroachment into NIPAS and other protection areas, additional planning considerations are needed to incorporate disaster mitigation principles in infrastructure planning. These include:

- Designing infrastructure facilities according to specific hazard risk assessments;
- Building backup capabilities and alternative routes into infrastructure facilities, where appropriate, to ensure life support systems and services (fire-fighting services, access to medical services, power and water supply, transportation, and telecommunication) in the event of a disaster; and
- Intensifying or introducing disaster mitigation disaster mitigation measures in road projects, for instance, designing roads with slope protection, while at the same time emphasizing the need to adopt non-structural or non-engineering measures, such as warning system and controlled zoning. The use of non-structural measures also

intends to reduce the need for large infrastructure investments. The adoption of non-traditional measures such as terracing rock sheds is also encouraged.

(c) Local and Private Sector Participation

Promote local and private sector participation in infrastructure planning and implementation.

Local and private sector participation in the planning and implementation of infrastructure projects should be encouraged. Lack of such participation has led to increased project costs, wasted resources, and protracted delays in project implementation. Sufficient participation, on the other hand, can lead to better design (through primary source identification and confirmation of project objectives), facilitate construction, and improve maintenance by fostering a degree of ownership among concerned local communities.

Sharing of capital costs and maintenance responsibilities between the LGUs and the private sector should also be encouraged.

(3) **Integrated Water Resources Management**

National Water Forum 2004 was held on March 22, 2004 in Manila to present and discuss the recent water issues and to hold the signing ceremony on *Clean Water Act* in Malacañang. In the Forum, recommendations were made for water related disasters and risk management, as follows:

- Intensify reforestation, forest protection and other watershed protection activities;
- Adopt philosophy of flood management in place of flood control;
- Enhance comprehensive land use planning LGUs;
- Push for the full implementation of solid waste management plans under the Ecological Solid Waste Management Acts; and
- Conduct public awareness programs and more research on disaster preparedness and mitigation.

Global Water Partnership (GWP) Technical Committee (TEC) prepared 'Guidance in Preparing a National Integrated Water Resources Management and Efficient Plan' to provide practical advice on implementing the **WSSD** Plan of Implementation 2005 directive explaining Integrated Water Resource Management (IWRM) approaches in practical terms and outlining what needs to be done to prepare a Plan.

3.2 Budgeting System for Flood Control Works

(1) **General Appropriation of DPWH**

For the budget of 2003, a total of 42 billion pesos are allocated to the DPWH. The percentage of allocations for the respective programs and projects are shown in table below:

In the Locally Funded Projects, the biggest allocation is Various Infrastructures including Local Projects, which is a lump-sum budget to be allocated to the Representatives (Congressman and Senator) so called as "Pork Barrel" (Priority Development Assistant Fund = PDAF, previously Countrywide Development Fund = CDF) accounting for 27.1% of total budget. Flood Control and Drainage Projects shares only 1.8% of total and 3.2% of Locally Funded Projects, while National Roads and Bridges occupies 20.7% of total and 36.3% of Locally Funded Projects.

The ratio of foreign loan in the 2003 budget of the DPWH is estimated at 22.6%, out of which Flood Control Projects is 22.1% and Highways Projects is 77.9%.

Projects and Programs			Ratio
FIRST PREFERENCE			74.1%
A	PROGRAMS		
	I	General Administration and Support Services	1.3%
	II	Support to Operation	1.6%
	III	Operation	14.2%
B	PROJECTS		
	I	Locally Funded Project(s)	57.0%
	a.	National Arterial, Secondary & Local Roads and Bridges	20.7%
	b	Flood Control and Drainage Projects	1.8%
	c	Various Infrastructures including Local Projects	27.1%
	d	Preliminary/Detailed Engineering	0.6%
	e	National Buildings	0.2%
	f	Other National Public Works/Local Infrastructure Projects	6.5%
	g	Accessibility Facilities for Disabled Persons	0.1%
	h	Infrastructure Support to Gender and Development	0.0%
SECOND PREFERENCE			25.9%
A	PROGRAMS		
	I	General Administration and Support	0.1%
	II	Support to Operation	0.1%
	III	Operations	3.1%
B	PROJECTS		
	II	Foreign Assisted Project(s)	22.6%
	a	Highways (Roads and Bridges) Projects	17.6%
	b	Flood Control Projects	5.0%

(2) Budget of Local Government Units

As it is figured out in Sub-section 4.3 (1): Local Government Code in 1991, which was enacted in 1992 aiming at decentralization, devolution and development of the country. The Code increased the financial resources available to local government units by:

- (a) Broadening their taxing powers;
- (b) Providing them with a specific share from the national wealth exploited in their area; e.g. mining, fishery, and forestry charges; and
- (c) Increasing share from the national taxes, i.e. internal revenue allotments (IRA), from previously low of 11% to as much as 40%.

Although the share in national budget: IRA has increased abruptly, it is generally observed that IRA has been unable to cover the costs of devolution. Therefore, the budgeting to the flood control works by LGUs is rarely affordable, while minor drainage projects of the LGUs are undertaken using their regular budget for infrastructure.

Outside Metro Manila, flood control, urban drainage and other urban infrastructure projects of the LGUs are implemented through credit facilities provided by the Land Bank of the Philippines (LBP), Development Bank of the Philippines (DBP), and the Municipal Finance Corporation (MFC, formerly Municipal Development Fund Office of the Department of Finance) under the following WB-, ADB- and JBIC-assisted projects:

These credits are usually called as “Two-step Loan”, where the LGUs may borrow funds for infrastructure projects through the guarantee of the national governments or national funding institutions. Generally the interest rate for amortization may be added by 9% to 10% on the original rate of the foreign funding institutions so that the LGUs could not afford to repayment for the said “Two-step Loan”. On the other hand, the LGUs may request for financial assistance from the PDAF of congressmen.

(3) Foreign Assistance

Budgeting for the foreign funded projects also included in the general appropriation for the national agencies, the DPWH. The MTPIP is the primary basis for identification of country program projects to ensure that the projects supportive of the MTPDP are given due priority in funding.

(a) Funding Institutions for Flood Control Works

The flood control projects are, in the recent years, funded by mostly Japanese Government through Japan International Cooperation Agency (JICA), Japan Bank for International Cooperation (JBIC, formerly Overseas Economic Cooperation Fund = OECF) and other institutions for findings and preliminary studies. Other funding institutions such as WB and ADB usually finance to water resources developments except for flood control, transportation, urban development, environmental conservation, etc. while the US-Aid financed for rehabilitation works of Mt. Pinatubo Hazard in the recent years.

JICA is the main institution which has been conducting most of the surveys, investigations and studies for flood control nation-wide in the Philippines on the grant basis. Starting with “the Study on Pampanga Delta Development Project” in 1975, either master plan or feasibility study of flood control works were conducted by JICA for more than 1/3 of 18 major river basins. Further, the sabo (sediment control) master plans were prepared for Mayon Volcano and Mt. Pinatubo Hazard Mitigation projects.

On the other hand, JBIC has provided loans for flood control projects, usually on the basis of JICA master plans and feasibility studies. From the beginning of ODA loan operation in 1972, JBIC (OECF) has committed the first flood control project “Manila and Suburbs Flood Control and Drainage Project” in 1973. As of October 2004, the on-going flood Control projects under the JBIC loan are as follows:

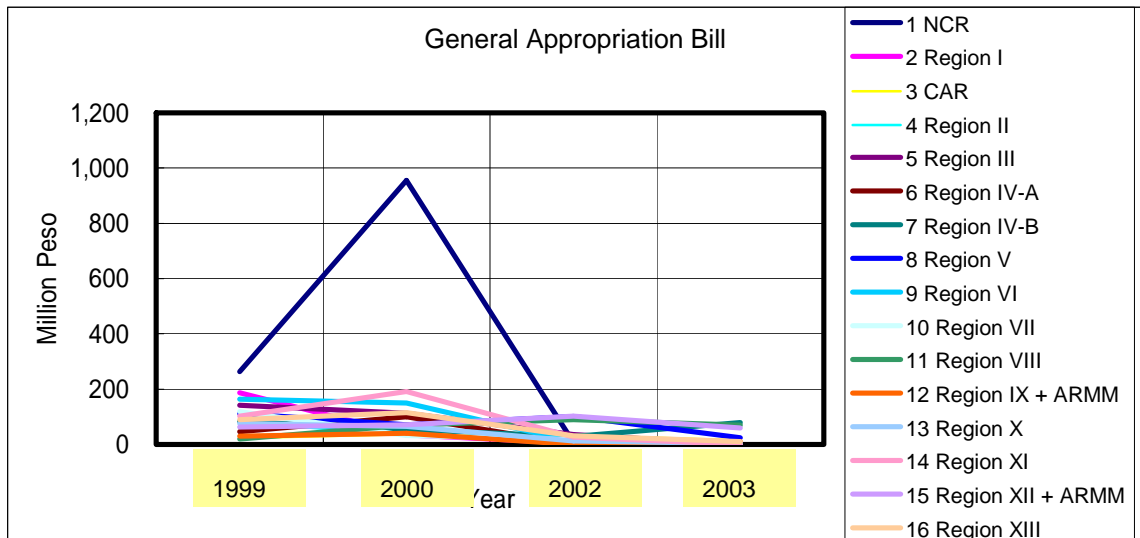
	Name of Project	Date of Loan Approved	Loan Amount (Million Yen)
1.	Lower Agusan River Development Project (Flood Control Component II)	1997.3	7,979
2.	Metro Manila Flood Control – West of Mangahan Floodway	1997.3	9,411
3.	Agno River Flood Control II	1998.9	6,734
4.	Pinatubo Hazard Mitigation Project II	1999.12	9,013
5.	Pasig-Marikina River Channel Improvement I	1999.12	1,167
6.	KAMANAVA Area Flood Control and Drainage System Improvement Project	2000.4	8,929
7.	Iloilo Flood Control Project II	2002.3	6,790
8.	Agno River Flood Control Project II-B	2001.5	2,789
9.	Laoag River Flood Control and Sabo Project	2001.5	6,309

(b) Recent Problems in Foreign Loan

In the recent years, the expanded budget deficit is a real problem. With debt service accounting for over one third revenues there is insufficient to finance necessary infrastructure to meet the needs of the growing population – estimated at over 81 million at year end 2002 and growing by 2.3% annually. Another indicator flashing warning signs is the debt service ratio where the steady growth of the external debt has this to rise from 12.8% in 1998 to 19.4% at the end of 2002. Therefore, the government has started to limit the external debt: loan for financing and spending for the infrastructure development, including flood control projects.

(4) Locally Funded Flood Control Projects

In the general appropriation, the budget for flood control projects, which were locally funded are distributed to the Regional Offices as below:



CHAPTER 4. ORGANIZATION, LAWS AND REGULATIONS

4.1 Organizations

(1) Department of Public Works and Highways

Department of Public Works and Highways (DPWH) is one of the three departments of the government undertaking major infrastructure projects. The DPWH is mandated to undertake (a) planning of infrastructure, such as roads and bridges, flood control, water resources projects and other public works, and (b) design, construction, and maintenance of national roads and bridges, and major flood control systems. These activities are undertaken in support of the national objectives of (1) alleviating rural poverty and attaining food security, and (2) expanding industries for greater productivity and global competitiveness as envisioned in the Medium-term Philippine Development Plan for 2001-2004.

The DPWH functions as the engineering and construction arm of the Government tasked to continuously develop its technology for the purpose of ensuring the safety of all infrastructure facilities and securing for all public works and highways the highest efficiency and quality in construction.

(a) Functions

The functions are presented in the order of a process for the Infrastructure Development Cycle, which the development of infrastructure projects (e.g. roads, bridges, flood control facilities and water supply) follows a cycle process consisting of four phases as follows:

(b) Organization

Organizational structure of the Department of Public Works and Highways is pursuant to Executive Order No. 124 dated 30 January 1987. The authorities and areas of responsibilities are based on the Department Orders No. 114, 127 & 149 Series of 2003.

Central Office

As of August 2004, there are 10 bureau level offices and seven project management offices (PMOs) in the Central Office of DPWH. Among seven PMOs, PMO-Major Flood Control Projects (MFCP) and Mount Pinatubo Emergency mainly undertake flood control and sabo projects, which are usually under foreign assisted.

Regional Office

There are 16 regional offices nation-wide to mainly undertake the locally funded infrastructure projects, 176 district engineering offices under the regional offices. In the Regional Office, there are usually six divisions and one regional equipment service, of which the Engineer V¹ is placed as the division chief except for Administrative and Comptrollership & Financial Management Divisions. Further, 75 to 80 engineers are assigned to conduct the service and operation for the infrastructure projects, under the engineering division.

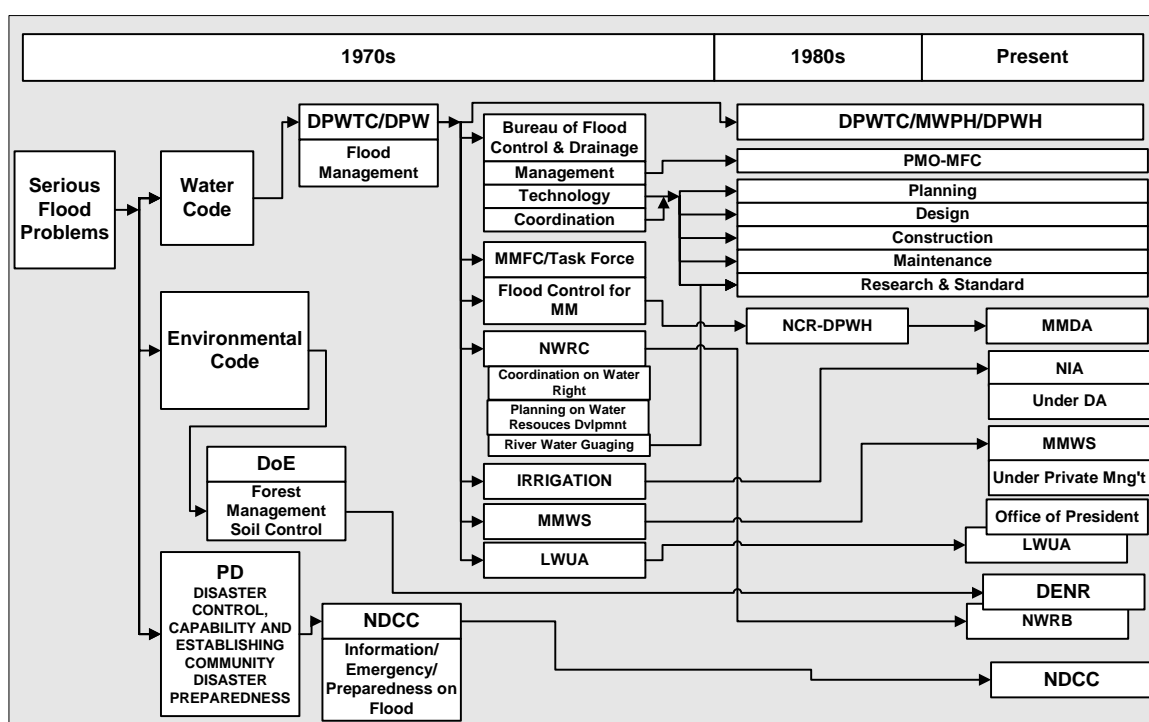
¹ One of the positions for ranking technical officials in the DPWH. Starting with Engineering Aid, Engineer I to V, and above which Project Manager I to IV.

In a region or under the Regional Offices, there are 10 to 15 District Engineering Offices. Engineer V is usually assigned as the District Engineer and Engineer IV is for Chief of engineering sections. About 10 to 25 engineers are assigned to the engineering sections and working for the implementation of locally funded projects as well as special projects under Priority Development Assistant Fund (PDAF).

As of 2002, the total number of DPWH engineers in the Regional Offices nation-wide is estimated at around 7,000 to 8,000 for permanent employees.

(c) Organizational Sequence for Flood Control Works

In the early 1970s many typhoons and floods of which the biggest was by Typhoon Dading in October 1971 attacked Central and Southern Luzon. The flood control works was started as one of the significant infrastructure by the Philippine Government delegated to DPWH, as below:



(2) Department of Environment and Natural Resources (DENR)

As provided for under Section 4 of EO 192, the DENR is mandated to be the primary government agency responsible for the conservation, management, development and proper use of the country's environment and natural resources, including those in reservations, watershed areas and lands of the public domain, as well as the licensing and regulation of all natural resources utilization as may be provided by law in order to ensure equitable sharing of the benefits derived for the welfare of the present and future generations of Filipinos.

At the operational level, DENR organization reflects a line structure under the direct supervision of the Field Operations Office. The line functions are decentralized down to three levels, namely:

- Regional level - Regional Environment and Natural Resources Offices
- Provincial level - Provincial Environment and Natural Resources Offices

- Community level - Community Environment and Natural Resources Offices

Regional Office is established in each of the fifteen (15) administrative regions.

There are also four (4) attached agencies/corporations, namely:

- National Mapping and Resource Information Authority (NAMRIA)
- Natural Resources Development Corporation (NRDC)
- Laguna Lake and Development Authority (LLDA)
- National Water Resources Board (NWRB)

(3) National Economic Development Authority (NEDA)

NEDA, as mandated by the Philippine Constitution, is the country's independent economic development and planning agency. It is headed by the President as chairman of the NEDA Board, with the Secretary of Socio-Economic Planning, concurrently NEDA Director-General, as vice-chairman. All Cabinet members, as well as the Central Bank Governor, are members of the NEDA Board.

The powers and functions of the NEDA reside in the NEDA Board. It is the country's premier social and economic development planning and policy coordinating body.

The Board is composed of the President as chairman, the Secretary of Socio-Economic Planning and NEDA Director-General as vice-chairman, and the following as members: the Executive Secretary and the Secretaries of Finance, Trade and Industry, Agriculture, Environment and Natural Resources, Public Works and Highways, Budget and Management, Labor and Employment, Health, Foreign Affairs, Agrarian Reform, Science and Technology, Transportation and Communications, Energy and Interior and Local Government as well as the Deputy Governor of the Bangko Sentral ng Pilipinas.

Assisting the NEDA Board in the performance of its functions are five cabinet-level interagency committees. These are as follows:

- (a) Development Budget Coordination Committee (DBCC)
- (b) Infrastructure Committee (InfraCom)
- (c) Investment Coordination Committee (ICC)
- (d) Social Development Committee (SDC)
- (e) Committee on Tariff and Related Matters (CTRM)

(4) National Irrigation Administration (NIA)

NIA was established in 1963 as a government agency charged with the development, operation and maintenance of irrigation systems all over the country.

NIA aims to develop water resources for irrigation and provide corollary services in line with the agricultural development program of the national government. In particular, NIA is to develop irrigation systems in support of the national food production program, whose level of service should be adequate to enhance the economic and social growth in the rural areas. Consequently, NIA is to ensure their stability through the proper maintenance and operation of these systems.

Its organizational set-up consists of a seven-man Board of Directors and a Management hierarchy headed by and an administrator. He is assisted by a deputy administrator and four assistant

administrators who are: (a) Project Development and Implementation; (b) Systems Operations and Equipment Management; (c) Finance and Management; and Administrative Services.

It has 13 regional irrigation offices (RIO) nationwide, 67 provincial irrigation offices (PIO) and 101 irrigation systems offices (ISO). In the course of implementation of irrigation systems, NIA sometimes constructs flood control facilities like dike to protect the systems, in case they are developed flood prone areas.

(5) Laguna Lake Development Authority (LLDA)

LLDA was organized in 1966 by virtue of Republic Act 4850 as a quasi-government agency with regulatory and proprietary functions. By virtue of Presidential Decree 813 in 1975 and Executive Order 927 in 1983, its powers and functions were further strengthened to include environmental protection and jurisdiction over surface waters of the lake basin. In 1993, the Administrative Supervision over LLDA was transferred to the DENR through Executive Order 149. LLDA management and operation is carried out through its Technical, Administrative and Corporate Management Divisions under the direct supervision of a General Manager and an Assistant General Manager.

In line with its thrust and priorities, the following Flagship Programs are envisioned to pave the way for the transformation of the LLDA from a dominantly regulatory to a market/client-driven developmental agency:

- *Environmental User Fee Program* as the centerpiece of LLDA's Environmental Management Program;
- *River Rehabilitation Program* with strong community organizing and information, education and communication (IEC) components to form partnerships among LLDA, LGUs, POs and NGOs to sustain the program;
- Lake Fishery Management Program with emphasis in the full implementation of the *Revised Zoning and Management Plan (ZOMAP)* for Laguna de Bay and the deconcentration of LLDA's administrative functions over the Seven Crater Lakes; and
- *Laguna de Bay Shoreland Management* to be highlighted by the demarcation of the 12.50 m elevation around the lake and intensified IEC Campaign.

(6) Philippine Climate Authority (PAGASA)

PAGASA's mandate is to provide protection against natural calamities and utilize scientific knowledge as an effective instrument to insure the safety, well being and economic security of all the people, and for promotion of national progress.

PAGASA's organization chart is presented as follows. Functions of Flood Forecasting Branch and Natural Disaster Reduction Branch are closely related with flood control works conducted by DPWH. The other branches are also important role for flood control because they provide basic information and data on meteorology.

(7) National Water Resources Board (NWRB)

NWRB is the agency under PD No. 1067, otherwise known as the Water Code with the functions of regulating the "utilization, exploitation, development, control, conservation or protection of water resources". In particular, the jurisdictional powers, functions and duties of NWRB include:

- To formulate policies and guidelines on water resources development and management;
- To effect inter-departmental coordination of water resources development activities;

- To grant issue water permits and certificates of public convenience/ and necessity;
- To advise NEDA on matters relating to water resources development plan, programs and projects, and
- To exercise jurisdiction over disputes concerning water allocation and utilization.

EO 123 stipulated for reorganization as follows;

- NWRB shall to immediately initiate a review of the Implementing Rules and Regulations (IRR) of the Water Code, and amend the same as may be necessary to effectively implement and enforce the provisions of the Code. NWRB shall likewise formulate a new/revised organization structure for its Secretariat to effectively and efficiently carry out its mandate under PD 424 and PD 1067.
- Upon approval by the President of the new/revised organization and manpower structure of the NWRB Secretariat, the NWRB shall then be transferred to DENR as a bureau for purposes of administrative control and supervision.

NWRB previously under the DPWH, has been transferred to the Office of the President. The membership of the Board is reconstituted with EO No. 123 to exclude those with direct claims on water resource. The present composition of the Board is shown as follows:

Chair	:	Secretary of Environment and Natural Resources
Vice-Chair	:	Secretary of Socio-Economic Planning
Members:		Secretary of Justice
		Secretary of Finance
		Secretary of Health
		Director, National Hydraulic Research Center
		Executive Director, NWRB Secretary

(8) National Disaster Coordination Council (NDCC)

NDCC was created under PD No. 1566 for “ Strengthening the Philippines Disaster Control, Capability and Establishing the National Program on Community Disaster Preparedness”. Its functions and role are mainly presented as follows:

- Advises the President on the status of disaster preparedness programs, disaster operations and rehabilitation efforts undertaken by the government and the private sector;
- Advises the lower-level Disaster Coordinating Councils and Disaster Control Groups through the Office of Civil Defense in accordance with the guidelines on disaster management;
- Formulates policy guidelines on emergency preparedness and disaster operations involving relief and rehabilitation;
- Formulates priorities in the allocation of funds, services, disaster equipment and relief supplies;
- Formulates a comprehensive disaster management plan based on various calamities/disaster that often hit the country (i.e. drought, flooding, typhoon, earthquake, etc.); and
- Recommends to the President the declaration of a state of calamity in areas extensively damaged; and submits proposals to restore normalcy in the affected areas, subject to the provision of RA 8185.

DPWH is one of the members of NDCC, bearing some components for disaster mitigation using its capacity and facility as describing as follows:

- Organizes reaction teams in the department proper as well as in all bureaus and offices under it;
- Prepares and identifies buildings/infrastructures and facilities for appropriate use as possible evacuation shelter in future emergencies;
- Provides warning to the public on impending releases of water from dams under its control;
- Assists in providing transportation facilities to transport relief supplies, personnel and disaster victims;
- Makes available existing communications facilities for disaster operations;
- Provides heavy and light equipment for rescue and recovery operations; and
- Restores destroyed public works such as flood control, national/secondary roads and bridges, central and regional offices of the national government agencies and their public buildings.

NDCC has published the locations of Flood Prone Areas in units of municipality through its Web site. There are 954 locations (cities/municipalities).

(9) National Hydraulic Research Center (NHRC-UPERDFI)

The NHRC is an attached research center to U.P. Engineering Research and Development Foundation, Inc. (UPERDFI), which was formally organized in 1972 as a private, non-stock, non-profit corporation based in the University of the Philippines.

The objectives of UPERDFI are to promote and support engineering research and development in the country, in furtherance and enhancement of its economic development. More detail;

- To assist the development and growth of a core of engineering educators in the country in general and at the University of the Philippines in particular;
- To support scholarships and other forms of academic endeavors and achievements in the field of engineering;
- To serve as a private institutional medium for research and innovation, technology development and utilization, strategic studies, continuing education, technological services and information dissemination in the various fields of engineering or areas where engineering knowledge is applied; and
- To engage in advocacy that would contribute towards the country's economic and technological development.

(10) Philippine Institute of Volcanology and Seismology (PHIVOLCS)

As specified in EO 128, PHIVOLCS has been mandated to perform the following functions:

- Predict the occurrence of volcanic eruptions and earthquakes and their geotectonic phenomena;
- Determine how eruptions and earthquakes shall occur and also areas likely to be affected;
- Exploit the positive aspects of volcanoes and volcanic terrain in furtherance of the socio-economic development efforts of the government;
- Generate sufficient data for forecasting volcanic eruptions and earthquakes;
- Formulate appropriate disaster-preparedness and mitigation plans; and
- Mitigate hazards of volcanic activities through appropriate detection, forecast and warning system.

(11) Metro Manila Development Authority (RA 9724)

On 24 July 1994 by virtue of RA 9724, “An Act Creating the Metropolitan Manila Development Authority, Defining its Powers and Functions, Providing Funding therefor and for Other Purposes”, the former Metro Manila Authority (MMA) was replaced by Metro Manila Development Authority (MMDA).

Scope of Services

Under the law, the MMDA shall perform planning, monitoring and coordinative functions, and in the process exercise regulatory and supervisory authority over the delivery of metro-wide services within Metro Manila without diminution of the autonomy of the local government units concerning purely local matters. Tasks to perform are as follows:

- (a) Preparation of Development Plan
- (b) Transport and Traffic Management
- (c) Solid Waste Disposal and Management
- (d) Flood Control and Sewerage Management
- (e) Urban Renewal, Zoning and Land Use Planning, and Shelter Services
- (f) Health and Sanitation, Urban and Pollution Control
- (g) Public Safety

Metro Manila Council

As the governing board and policy making body of the MMDA, Metro Manila Council is placed, composed of the mayors of thirteen (13) cities and four (4) municipalities as of 2004, and representatives from DOTC, DPWH, DOT, DBM, HUDCC and PNP as non-voting members. The functions of the Council are:

- It shall approve metro-wide plans, programs and projects and issue rules and regulations and resolutions deemed necessary by the MMDA to carry out the purposes of this Act.
- It may increase the rate of allowances and per diems of the members of the Council to take effect during the term of the succeeding Council; it shall fix the compensation of the officers and personnel of the MMDA, and approve the annual budget thereof for submission to the DBM.
- It shall promulgate rules and regulations and set policies and standards for metro-wide application governing the delivery of basic services, prescribe and collect service and regulatory fees, and impose and collect fines and penalties.

Actual Activities

Due to insufficiency of manpower and experiences, the flood control tasks of MMDA was not realized by 2002. A strong direction to undertake the flood control works in Metro Manila was given by the third Chairman: Mr. Bayani Fernando. In 2002 to 2003, most of flood control facilities and equipment were transferred to MMDA from DPWH-NCR together with engineers and technicians, most of them were assigned to the operation and maintenance of the facilities.

(12) Consulting Firms

(a) Consultant's Organization: COFILCO

The Confederation of Filipino Consulting Organizations (COFILCO) was organized in 1988 in response to Executive Order 164, signed in 1986, which was to guide all government Departments, Government Corporations, Agencies, and Bureaus and attached agencies in the purchase of services for government projects. The Implementing Rules and Regulations of the Republic Act No. 9184 recognize COFILCO as the Umbrella of Consulting Organizations.

The Confederation of Filipino Consulting Organizations (COFILCO) is presently composed of ten member-organizations (MEM'O) of Consultants. Three of which are mainly engaged in civil engineering:

- **Council of Engineering Consultants, Inc. (CECOPHIL)** – composed of corporations, which include Domestic and Foreign Consultants.
- **Council of Filipino Consultants, Inc. (COFIC)** – the composition is a conglomeration of corporation, partnership and sole proprietorship of various professional fields.
- **Association of Consultants Civil Engineers of the Philippines Inc. (ACCEP)** – the association is composed of consulting firms principally engaged in the various branches of Civil Engineering like Roads, Bridges, Ports, Water Supply, Irrigation, Drainage, Flood Control, Geotechnical, Structural Engineering and the like.

(b) Capacity for Flood Control

19 members of CECOPHIL and COFIC were surveyed to evaluate their qualifications as consultants for flood control project implementation. Those firms not surveyed mostly specialize in only one discipline, like topographic surveying, geotechnical investigation, structural design or construction management. The 19 surveyed firms offer consulting services in feasibility study, design, construction supervision, topographic survey and geotechnical investigation, and their number of employees as well as annual revenue as below:

Name of Consultants		Total No. of Employees		Annual Revenue
		F	P	Peso
COFIC	1. Cest, Inc.			
	2. Development of Environmental System, Inc. (DOES)			500,000
	3. MCSI Konsult, Inc.	34	8	
	4. Trans-Asia Consultants Group, Inc.	68	30	
	5. Urban Integrated Consultants, Inc.*	117	16	
	6. Woodfields Consultants, Inc.	105	100	50,000,000
CECOPHIL	7. Basic Technology and Management Corporation	86		11,200,000
	8. Certeza Development Corporation	77		17,910,871
	9. DCCD EGINEERING CORPORATION	239		164,640,000
	10. Engineering and Development Corporation of the Philippines	50	69	57,929,190
	11. Filipinas Dravo Corporation	75	15	42,040,000
	12. Philkoei International, Inc.	134	39	
	13. Proconsult, Inc.	110	15	18,000,000
	14. Schema Konsult, Inc.	150	15	10,000,000
	15. TCGI Engineers	300	50	133,781,110
	16. Test Consultants	30	56	7,940,906
	17. MADECOR Environmental Management Systems, Inc.	304		10,800,000
	18. MGG Consultants	89		38,900,000
	19. Science and Vision	12	8	3,043,621

F:full time; P:part time

Only two surveyed firms have more than 100 million pesos average annual revenue and more than 200 full time employees. The 19 firms indicated that they are stronger in flood control, urban drainage and irrigation than in sabo engineering and watershed management. This is understandable since the number of sabo engineering and watershed management projects has been very few.

Summarizing the capability of the local consultants in flood control works, major points are enumerated as follows:

- Local consultants are well experienced and capable in detailed design for flood control structures and construction supervision since they had worked as partners of joint-venture in the consulting services for foreign assisted flood control projects;
- Local consultants have been still developing their capabilities in preparation of master plans and their structure plans of large-scale flood control projects;
- Engineers of local consultants are less experienced with studies for formulation of flood control plans, particularly knowledge of hydrologic/hydraulic engineering since there have been very few colleges/universities holding hydrologic/hydraulic subjects in their civil engineering course; and
- Local consultants maintain some high-grade specialists for economy and sociology rather than engineers, as most of them had trainings in the abroad.

(13) Construction Companies

(a) Organizations of Construction Company

There are more than 3,000 construction companies in the country. The Philippine Constructors Association (PCA), at 53 years, is the oldest trade organization in the country. The PCA has been at the forefront for the continued development of the construction industry, domestic and overseas. Aside, there are two organizations of constructors such as the National Constructors Associations of the Philippines (NCAP) and National Confederation of Constructors Association in the Philippines (NCCAP).

In order to overview about the capacity of Filipino Construction Company, the PCA is analyzed in the following:

Number of the member construction companies of PCA is summarized as follows: in terms of membership, classification and category:

Membership

Membership	Number of Company
Regular	166
Associate	92
Chapter	16
Total	374

Classification of Lines of Business

Classification	Number of Company*
Road, Highway, Pavement & Bridge	130
Irrigation and Flood Control	75
Dam, Reservoir and Tunneling	52
Port, Harbor and Offshore Engineering	55

*: There are many construction companies covering multiple lines of business.

Among the regular member of PCA, their categories are,

Category	Track Record*	Number of Company
AAA	Above ₱25.0M	69
AA	Above ₱15.0M to ₱25.0M	11
A	Above ₱7.5M to ₱15.0M	52
B	Above ₱1.5M to ₱7.5M	19
C	Less than or equal to ₱1.5M	4
D	Less than or equal to ₱1.5M	3
Trade	Less than or equal to ₱0.5M	2
Others		8
Total		166

*: Present value of single largest relevant project completed

(b) Construction Capacity for Flood Control Works

The capacity of Filipino construction company is evaluated as follows referring to the data and information obtained through the survey.

- So-called “General Contractor” (large construction company) has enough capability to undertake infrastructure projects including flood control works in the aspects of financing, manpower and management;
- Machineries and equipment for construction works may adequately available in Metro Manila but some modern equipment in the provinces;
- Some construction methods such as tunneling, long-spanned bridge, etc. may also undertaken by the Contractor with proper guidance and advises by the experienced engineer;
- Particularly, river diversion works or dewatering works shall require an instruction and guidance by the experienced engineers; and
- Further, management skills for construction shall be graded up for effective construction and time savings.

4.2 Laws and Regulations

(1) Water Code

The Water Code of the Philippines (Presidential Decree No. 1067, issued on December 31, 1976) is the basic water law of the Philippines.

The underlying principles of the Code are in Article 3 as follows:

- All waters belong to the States.
- All waters that belong to the state cannot be subject to acquisitive prescription.
- The state may allow the use or development of waters by administration concession.
- The utilization, exploitation, development, conservation and protection of water resources shall be subject to the control and regulation of the government through the National Water Resources Council, hereinafter referred to as the Council.
- Preference in the use and development of waters shall consider current usages and be responsive to the changing needs of the country.

As an ownership of waters, the Code stipulates ‘Rivers and Their National Beds’ belongs to the State in Article 5.

Flood Control Aspect is stipulated in Chapter V, 'Control of Waters' as follows:

- Art. 53. To promote the best interest and the coordinated protection of flood plain lands, the Secretary of Public Works, Transportation and Communications² may declare flood control areas and promulgate guidelines for governing flood plain management plans in these areas.
- Art. 55. The government may construction necessary flood control structures in declared flood control areas, and for this purpose it shall have a legal easement as wide as may be needed along and adjacent to the river bank and outside the bed or channel of the river.

Regarding cost sharing, Article 45 stipulates as follows:

When a drainage channel is constructed by a number of persons for their common benefit, cost of construction and maintenance of the channel be borne by each in proportion to the benefits derived.

It is significant that the Water Code has presented the idea of flood plain management in such an early stage that such idea has come up to the international flood control field only recently. Up to present, DPWH has conducted several mater plan studies including flood plain management but not exercised authority stipulated in the Article 53 to implement the flood plain management plan and to promulgate such guidelines yet.

(2) Local Governmental Code in 1991

The Local Government Code of 1991 has effected as RA 7160 declaring the policy as follows:

- (a) It is hereby declared the policy of the State that the territorial and political subdivisions of the State shall enjoy genuine and meaningful local autonomy to enable them to attain their fullest development as self-reliant communities and make them more effective partners in the attainment of national goals. Toward this end, the State shall provide for a more responsive and accountable local government structure instituted through a system of decentralization whereby local government units shall be given more powers, authority, responsibilities, and resources. The process of decentralization shall proceed from the national government to the local government units.
- (b) It is also the policy of the State to ensure the accountability of local government units through the institution of effective mechanisms of recall, initiative and referendum.
- (c) It is likewise the policy of the State to require all national agencies and offices to conduct periodic consultations with appropriate local government units, non-governmental and people's organizations, and other concerned sectors of the community before any project or program is implemented in their respective jurisdictions.

Implementation of Flood Control Works

Flood control and drainage are included in *SEC. 17. Basic Services and Facilities*, while, the public works and infrastructure projects and other facilities, programs and services funded by the national government or those wholly or partially funded from foreign sources are not covered under this Section, except in those cases where the local government unit concerned is duly designated as the implementing agency for such projects, facilities, programs, and services.

² Department of Public Works, Transportation and Communications (DPWTC) is now DPWH.

Operation and Maintenance of Flood Control Works

Councils of LGUs shall enact ordinances, approve resolutions and appropriate funds for the general welfare of the LGUs and its inhabitants and to ensure the efficient and effective delivery of the basic services and facilities as provided above item (a).

LGUs has a responsibility to deliver basic services including flood control facilities, which are intended primarily to service the needs of residents of the municipality or province and funded out of municipality or province.

In case of national fund given to LGUs for infrastructure projects, which of National Government or LGUs shall render such services is not specified in the Code or in any other laws or regulations. DPWH has a rule as an interim measure for such projects to be handed over to LGUs with acceptance agreement when the project was completed. Some of LGUs, however, declined to accept. Such cases cause problems of operation and maintenance of the facilities.

Technical Assistance

As Operative Principles of Decentralization in Section 3, it is stipulated that the realization of local autonomy shall be facilitated through improved coordination of national government policies and programs and extension of adequate technical and material assistance to less developed and deserving local government units.

(3) Presidential Decree for NDCC

NDCC was created under PD No. 1566 in 1978 for “Strengthening the Philippines Disaster Control, Capability and Establishing the National Program on Community Disaster Preparedness”, creating NDCC, enhancing the survival capability and economic stability against all types of disasters whether natural or man-made, and responding to a cogent requirement for pre-disaster planning, community disaster preparedness and positive, precise disaster control action for rescue evacuation, relief and rehabilitation to insure the survival of the country.

- Self-reliance shall be developed by promoting and encouraging the spirit of self-help and mutual assistance among the local officials and their constituents;
- Each political and administrative subdivision of the country shall utilize all available resources in the area before asking for assistance from neighboring entities or higher authority;
- The primary responsibility rests on the government agencies in the affected areas in coordination with the people themselves;
- It shall be the responsibility of all government departments, bureaus, agencies and instrumentalities to have documented plans of their emergency functions and activities;
- Planning and operation shall also be done on the barangay level in an inter-agency, multi-sectoral basis to optimize the utilization of resources;
- On the absence of a duly constituted regional government, national government offices at the regional level shall be led and operationally controlled by the Regional Commissioner or by the official so designated by the President;
- Responsibility for leadership rests on the Provincial Governor, City Mayors, and Municipal Mayors, (and Barangay Chairman), each according to his area of responsibility;
- When an emergency affects an area covering several towns and cities, the city mayors and their personnel and facilities shall be placed under the operational control of the Provincial Governor for the duration of the emergency;
- The national government exists to support the local government. In time of emergencies

and according to their level of assignment, all national government offices in the field shall support the operations of the local government; and

- To ensure that operational activities become automatic and second nature to all concerned, exercises and periodic drills shall be conducted at all levels, principally at the Barangays.

(4) Agriculture and Fisheries Modernization Act of 1997

The State shall promote industrialization and full employment based on sound agricultural development and agrarian reform, through industries that make full and efficient use of human and natural resources, and which are competitive in both domestic and foreign markets. In pursuit of these goals, all sectors of the economy and all regions of the country shall be given optimum opportunity to develop. Private enterprises, including corporations, cooperatives, and similar collective organizations, shall be encouraged to broaden the base of their ownership.

Thus, it is hereby declared the policy of the State to enable those who belong to the agriculture and fisheries sectors to participate and share in the fruits of development and growth in a manner that utilizes the nations resources in the most efficient and sustainable way possible by establishing a more equitable access to assets, income, basic and support services and infrastructure.

All units and agencies of the government shall support the Department in the implementation of the Agriculture and Fisheries Modernization Project (AFMP).

In particular, the Department of Public Works and Highways shall coordinate with the Department with respect to the infrastructure support aspect of the plan order to accomplish networking of related infrastructure facilities.

The DPWH, DOTC, DTI and the LGUs shall coordinate with the Department to address the infrastructure requirements in accordance with this Act provided, that the Department and the LGU shall also strengthen its agricultural engineering support in carrying out the smooth and expeditious implementation of agricultural infrastructure projects.

The DPWH shall coordinate with the Department for the purpose of determining the order of priorities for public works funded under the Public Works Act directly or indirectly affect agriculture and fisheries.

(5) Environmental Code

The Environmental Code of the Philippines was issued as Presidential Decree No. 1152 on June 6, 1977. The Code is composed of five (5) titles such as:

- Air Quality Management;
- Water Quality Management;
- Land Use Management;
- Natural Resources Management; and
- Conservation, Waste Management.

Flood Control aspect is stipulated in Section 34 Measures in Flood Control Program of Chapter IV, Flood Control and Natural Calamities, as follows:

In addition to the pertinent provisions of existing laws, the following shall be included in soil erosion, sediment and flood control program:

- The control of soil erosion on the banks of rivers, the shores or lakes and the sea-shores;

- The control of flow and flooding in and from rivers and lakes;
- The conservation of water which, for purposes of this Section shall mean forms of water, but shall not include captive water;
- The needs of fisheries and wildlife and all other recreational uses of natural water;
- Measures to control the damming, diversion, taking, and use of natural water, so far as any such act may affect the quality and availability of natural water for other purposes; and
- Measures to stimulate research in matters relating to natural water and soil conservation and the application of knowledge thereby acquired.

Soil conservation is the similar concept to the Sabo Works stipulated in Section 32 Management Policy on Soil Conservation of Chapter III, Forestry and Soil Conservation, as “The National Government, through the Department of Environment and Natural Resources and the Department Agriculture, shall likewise undertake a soil conservation program including therein the identification and protection of critical watershed areas, encouragement of scientific farming techniques, physical and biological means of soil conservation, and short-term and long-term researches and technology for effective soil conservation”.

(6) Recent Proposed Bill

Water Resources Authority Bill

The bill of “An Act to Address the National Water Crises, Creating the Water Resources Authority of the Philippines, Abolishing the National Water Resources Board, Rationalizing the Organization and Functions of Government Agencies related to Water, and for Other Purposes” was read on First Reading in 12th Congress and referred to the Committees on Public Works, Local Government and Finance on July 24, 2001, status of which has been pending since then.

Sustainable management of water resources shall take into consideration the following principles:

- Water is a limited and vulnerable resource not only indispensable for the sustenance of life but also of vital importance to all socio-economic sectors. The sustainable management of water resources demands an integrated approach linking social and economic development with protection of natural water sources and ecosystems;
- Water has an economic value in all its competing uses and shall be treated as an economic good;
- Water resources management shall be decentralized, participatory and community based and conducted at the lowest appropriate level;
- Women play a central part in the provision, management and safeguarding of water resources and shall be represented in decision-making processes with regard to water resources management;
- Private sector participation shall be encouraged in all levels of water resources management, utilization and development; and
- Licensing shall be the mechanism to ensure that public interest is protected in the provision of drinking water, sanitation, irrigation or other water services by monopoly suppliers.

Metropolitan Flood Control Authority Bill

The bill of “*An Act Creating the Metropolitan Flood Control Authority and for Other Purposes*” was read on First Reading in 12th Congress and referred to the Committees, Environment and Natural Resources, Ways and Means and Finance, status of which has been pending since then.

The Policy of the act is proposed as that

- Ensure the safety of Metro Manila and other urban residents from floods and its negative effects;
- Encourage the participation of the private sector and non-governmental organizations in the promotion of the objectives of this Act;
- Encourage the adoption of a comprehensive development plan for Metro Manila and other urban centers to address the perennial flood problem.

Purpose of the Authority is also proposed in the act as that, the Authority shall be the sole agency to formulate and implement all development efforts relative to Metro Manila and other urban flood control activities with the end in view of alleviating.

River Basin Development Authority Bills

There have been several bills recently proposed to the Congress to create authority for development with river basin approach. While a number of laws for the preservation and development of rivers have been enacted, effective enforcement by local government units is weak due to the absence of a local agency with which coordination can be made. What must be created is efficient institutional machinery in each local government unit not only to implement such laws, but also to promote development of rivers, river systems, and natural waterways.

Agno River Basin Development Authority Bill

Among the several bills on river basin development authority, briefing of the bill on the Agno River Basin Development Authority is presented as follows:

The bill proposes as the policy to promote the integrated management and development of resources in the country's river basins, within the context of a river basin approach to optimize economic and social welfare without compromising the sustainability of environmental systems and to ensure a fair sharing of the national patrimony between upland and lowland peoples. Purposes and objectives of this act are proposed as follows:

- Consolidate and harmonize all development initiatives within the river-basin under the over-all framework of a unified river-basin management and development approach;
- Maximize the participation of all stakeholders in the area, establishing the most effective approach to effect and¥ active and sustainable collaboration among stakeholders from government agencies, non-government agencies/ peoples' organizations and the private sector.
- Promote equitable sharing of costs and benefits from the basin's natural resources across sectors, groups of communities, across space and time; and
- Negotiate local and external investment in the area, thereby increasing livelihood opportunities for the people within the Basin.

CHAPTER 5. PAST FLOOD CONTROL WORKS

5.1 Flood Control Projects

The 2004-2009 Medium-Term Public Investment Plan (MTPIP) of DPWH shows that the Government intends to implement a number of flood control and drainage projects placing priority on major river basins and Metro Manila. The total budget for these projects nominated in the DPWH-MTPIP is estimated to be about 41.3 billion pesos.

(1) Major Rivers

Among the 18 major rivers, either a basin-wide study or master plan study for flood control has been prepared for 11 rivers and the actual implementation has been made for five rivers. The target flood control scales are mostly proposed at 20 to 30 years occurrence probability based on the economic viability evaluation.

(2) Principal Rivers

The following ten principal rivers were surveyed for flood control project implementation conditions:

No.	River	Catchment Area (km ²)	Location/Region
1.	Amburayan River	1,386	Bangar, La Union, I
2.	Talisay River	144	Balanga City, Bataan, III
3.	Sta. Rita River	95	Olongapo City, Zambales, III
4.	Bucao River	734	Botolan, Zambales, III
5.	Angat River	781	Calumpit, Bulacan, VI-A
6.	Pansipit River	656	Lemery, Batangas, VI-A
7.	Imus River	105	Bacoor, Cavite, VI-A
8.	Camatian River	269	Lucban, Quezon, VI-A
9.	Quinali River	103	Malinao, Albay, V
10.	Yawa River	70	Legaspi City, Albay, V

The majority of the flood control plans in the 10 principal river basins are proposed or implemented by the flood protection dikes or floodwalls. Some projects consist of river dredging works (excavation works) to mitigate the flood damages in the lower reaches.

(3) Urban Drainage

Aside from Metro Manila, flood control, drainage and other urban infrastructure projects of the LGUs are implemented through credit facilities provided by the Land Bank of the Philippines (LBP), Development Bank of the Philippines (DBP), and the Municipal Finance Corporation (MFC, formerly Municipal Development Fund Office of the Department of Finance) under the following WB-, ADB- and JBIC-assisted projects:

- Philippines Regional Municipal Development Project (PRMDP)
- Subic Bay Area Municipal Development Project (SBAMDP)
- Clark Area Municipal Development Project (CAMDP)
- Mindanao Basic Urban Sector Services (MBUSS)
- Local Government Finance & Development Project (LOGOFIND)
- LGU Urban Water and Sanitation Projects 1 & 2 (LGUWSP)

- Mindanao Rural Development Project - Coastal Marine Project (MRDP-CMP)
- Water Districts Development Project (WDDP)
- Local Government Units Support Credit Program

5.2 Other Related Projects

(1) Watershed Management: Forest Sector Project

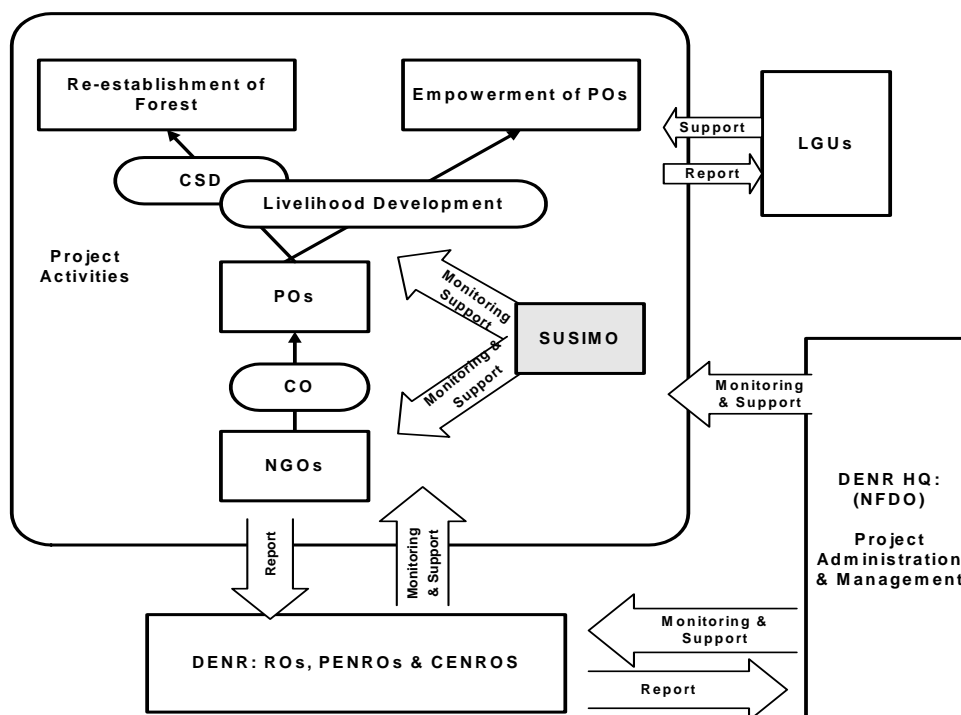
The Forest Management Bureau (FMB) of the DENR formulates and recommends policies and programs for the effective protection, development, management and conservation of forestlands and watersheds.

- Forestry Sector Project (FSP): A Community – Based Approach in Reforestation;
- Location: Various sites all over the Philippines;
- Description: The project aimed to rehabilitate a total of 68,748 ha, covering 578,573 ha of watershed area and 11,175 ha of mangrove area.

Promoting forest land use planning as an integral activity of comprehensive land use planning to determine the optimum and balanced use of natural resources to support local, regional and national growth and development, DENR and DILG concluded Joint Memorandum Circular No. 98-01 (JMC98-01) to stipulate LGU's sharing responsibility with DENR in the sustainable management and development of the forest resources within their territorial jurisdiction. Implementation of new CBFM projects shall be undertaken jointly by DENR and concerned communities/beneficiaries as provided for under DENR DAO 96-29.

The implementing system of DENR for a Community-Based Forestation Management is shown as follows:

Implementing System for CBFM



The People's Organizations (POs) are the centers of development assisted by NGOs; Assisting Organization (AO); DENR through the Subproject Site Management Office (SUSIMO), DENR Field Offices and NFDO; and LGUs for empowerment and re-establishment of forest with the objective of Sustainable Forest Resource Management of the Project area by PO.

(3) Irrigation

NIA undertakes program-oriented and comprehensive water resources projects for irrigation purposes, as well as concomitant activities such as flood control, drainage, land reclamation, hydraulic power development, watershed management, etc.

Bureau of Soils and Water Management (BSWM) undertakes assessment, development and conservation of existing and potential soil and water sources for agriculture. It also conducts cloud seeding activities. BSWM undertakes planning, design, construction, of locally-funded and foreign assisted small water impounding project, small farm reservoir, and small diversion dams for irrigation and flood control purposes. On the other hand, the total area provided with irrigation facilities by BSWM is 153,099 ha.

(4) Agrarian Reform Infrastructure Support Project (Phase II)

The Department of Agrarian Reform (DAR) has approved Agrarian Reform Communities (ARCs) in over 900 locations nationwide. Using ARCs as the basic unit of development, it has promoted integrated support for services such as the provision of basic infrastructure, organization of farmers and finance, which are required for the improvement of agricultural productivity.

The ODA loans supported agrarian reform in its 20th Loan Package of JBIC to the Philippines with projects including the Agrarian Reform Infrastructure Support Project and the Rural Farmers and Agrarian Reform Support Credit Program. This project follows the Agrarian Reform Infrastructure Support Program: Phase I (ARISP-I), which provided basic infrastructure and organizational support to ARCs in 78 locations. It will provide the basic economic infrastructure (irrigation, post-harvest processing equipment, farm roads and water supply) needed for agriculture to ARCs in about 150 locations nationwide.

In addition, it will support the organization of farmers and strengthening of local governments, and aims to contribute to improvements in agricultural productivity and increased living standards for agricultural families. Further, this project also includes some minority ethnic group and remote area ARCs.

In the implementation of the project, the Department of Agrarian Reform will be the lead executing agency with NIA-DA and DPWH as collaborating executing agencies to supervise civil works. In addition, NGOs will participate in the organization of farmers, the consolidation, organization, formation and strengthening of agricultural cooperatives and training.

5.3 Review and Evaluation

As shown by the survey conducted, major concerns in the flood control project implementation are technically the following:

- Deficiencies in technical standards and regulations,
- Organization and budget for continuous O&M, and
- Rehabilitation and improvement of existing facilities and natural channels.

The government has long recognized these concerns. The table below shows the status of the existing flood control/river structures in the ten (10) principal rivers surveyed.

Name of River	Existing Flood Control Structures/Projects/Activities	River and Flooding Conditions	Problems of the Existing Flood Control Structures
Amburayan	Dikes	Siltation; Overbanking	Deterioration of structures; scouring of foundations
Talisay	Dikes/Desilting	Encroachment; Siltation; Overbanking; Tidal flooding	Collapsed sections; piece-meal
Sta. Rita	Desilting/Flood gate/Revetments/Sabo dam	Siltation; Overbanking; Tidal flooding	Piece-meal
Bucao	Dikes/Dredging	Heavy siltation due to Lahar; Overbanking	Total collapse
Angat	Dikes/River bank protection	Bank erosion; Overbanking	Piece-meal; collapsed sections
Pansipit	River bank protection/Parapet walls/Dredging	Garbage dumping; Heavy siltation	Piece-meal
Imus	Dredging/Revetments/ River walls	Garbage dumping; Encroachment; Tidal flooding	Piece-meal
Camatian	River walls	Overbanking	Scouring of foundations; piece-meal; low and ineffective
Quinali	Dredging/Dikes	Garbage dumping; Siltation; Overbanking	Piece-meal
Yawa	Dredging/Dikes	Garbage dumping; Siltation; Overbanking	Piece-meal; low and ineffective; collapsed sections

(1) Engineering and Quality

In minor projects identified during the survey, the use of appropriate standard plans prepared by DPWH is usually the basis of construction of these projects. No surveys and investigations are done to determine whether these standard plans are really applicable for the project site. Other issues raised regarding planning and design are:

- Lack of flood control data such as discharge, catchments area and/or survey work on all flood-prone areas
- Needs further study on the river flow behavior especially on the effect of floodwater backflows and quarrying
- Design insufficient relative to physical condition of the river and flooding condition
- Lack of consultation and coordination with other related agencies during planning period
- Improper river dike alignment
- No comprehensive study

(2) Implementation

Funding constraints: perennial lack of funds discourages or hampers initiatives for undertaking big-scale projects and often resulting to piece-meal implementation. Other issues gathered during the survey regarding implementation are:

- Choice of projects and priority in implementation are dictated more by political expediency rather than by actual appropriateness and capability;
- Wrong construction method being adopted;

- Lack of continuity of the system (piece-meal implementation); and
- Lack of cooperation and coordination during construction period.

(3) Operation and Maintenance

Lack of regular maintenance is a big factor in the rapid deterioration of existing flood control structures. Other issues gathered during the survey regarding operation and maintenance are:

- No funds and no manpower at the LGU level to undertake O&M;
- Responsibility of the LGU in operation and maintenance is not clear;
- No clear agreement exist between LGU and DPWH regarding operation and maintenance; and
- No operation and maintenance budget and no O&M team that would monitor all flood control structures in the district engineering office.

CHAPTER 6. PROBLEMS IN IMPLEMENTATION SYSTEM

6.1 Problems/Issues through PCM Workshop

(1) Identification and Analysis of Problems and Issues

The main purpose of the PCM workshops was to “Identify and analyze the causes and effects of current problems in the existing flood control project implementation system”.

The identified problems/issues in the past flood control project implementation for principal rivers are categorized under five direct causes of the core problem, as follows:

- No comprehensive implementation program of flood control is prepared for principal rivers;
- Roles and functions in the implementation of flood control projects for principal rivers are not clearly delineated
- Importance of flood control projects for principal rivers is not well recognized/understood by the government as well as the people
- Coordination between related agencies of flood control projects is not made to effectively implement the projects
- Operation and maintenance for flood control facilities are not fully undertaken.

(2) Other Issues

During each PCM Workshop 2, a perception/attitude survey was conducted and the following issues were also raised.

- (a) A coordinating body (i.e. Inter-agency Technical Working Group, Technical Committee or Multi-sectoral Task Force) should be established/operationalized

As to their respective agency's roles in enhancing coordination, the participants identified the following:

- Provide relevant data/information being gathered by their respective agencies;
- Provide funds for flood control projects that are within their agencies' scope of responsibilities;
- Participate in the planning, design, implementation and monitoring of flood control projects; and
- Participate in the Information and Education Campaign.

- (b) Operation and maintenance of flood control projects

As indicated by participants from relevant agencies, their roles in the O&M of flood control projects include:

- Provision of technical assistance,
- Conduct of information and education campaign regarding the importance of flood control works;
- Training of direct beneficiaries in the O&M of flood control works; and
- Monitoring and feedback.

Close cooperation among DENR, DAR, NIA, LGUs and other stakeholders (residents in the catchment area) in the management of the watershed areas is also necessary.

- (c) Recognition of impacts of flooding and benefits of flood control projects.

The common causes of flooding in the selected study areas, based on those identified by the participants, are: (i) reduction in river carrying capacity due to siltation, (ii) erosion of river banks, (iii) insufficient internal drainage, and (iv) improper waste disposal.

The responses of the participants to these issues show that stakeholders, especially those directly affected by flooding, are not only able to identify the causes of flooding in their areas but also come-up with proposals on the flood control projects that should be implemented to mitigate flooding. Their participation in the whole project cycle is therefore important.

6.2 Summary of Problems in Flood Control Works for Principal Rivers

In order to examine the problems in the implementation system for the principal rivers, problems and/or issues are extracted from:

- National development plans and policies for flood control;
- Survey results of past flood control projects; and
- PCM workshops conducted with relevant national governments, local governments and beneficiaries.

(1) Requirements in National Development Plans and Policies

(a) MTPDP 2001 - 2004

- Pursue proper O & M of flood control and drainage facilities including an effective garbage collection and disposal in coordination with other concerned government agencies and LGUs;
- Relocate and prevent informal settlers living along the banks of rivers/esteros/ creeks;
- Implement sabo projects for the prevention/mitigation of sediment-related disasters, debris and lahar flow/landslide;
- Study and formulate guidelines leading to sustainable development/land use in sediment-related disaster-prone areas, and
- Implement comprehensive measures consisting of construction, warning/ evacuation, livelihood programs in coordination with concerned agencies and LGUs

(b) MTIDP – DPWH 2001 - 2004

- Comprehensive planning and identification of inundation areas in major and principal rivers;
- Provide flood control facilities and sabo works, and pursue non-structure measures in flood/sediment disaster-prone areas;
- Strengthen the FCSEC for research and studies, information center and sabo engineering program; and
- River management in coordination with LGUs.

(c) Requirement of NFPP 2001 - 2030

- Prioritize and implement infrastructure projects that support the policy of national dispersal through regional concentration;

- Ensure compatibility of infrastructure with local land use and development plans, giving priority to projects with the most strategic impacts;
- Compatibility with NIPAS (National Integrated Protected Area System) and other production areas; and
- Incorporate disaster mitigation principles in infrastructure development.

(d) IWRM

- Evaluate properly the efficiency of flood control strategies;
- Improve data collection systems and access to information by users;
- Establish policy instruments and the legal and regulatory framework;
- Establish mechanisms for consultation and public participation and conduct intensely information/education campaign;
- Enhance capacity building of not only governmental agencies but also non-governmental organizations;
- Adopt the philosophy of flood management and create management agencies (including river basin organizations); and
- Establish mechanisms to achieve financial sustainability.

(2) Problems Identified by Survey on Flood Control Projects

Throughout the survey on past flood control projects for principal rivers, the following problems are identified.

(a) Engineering

- Lack of flood data/information and survey works for rivers and flood-prone area;
- Deficiencies in technical standards and regulations;
- Lack of consultation and coordination with other related agencies; and
- No comprehensive study of flood control project implementation for principal rivers.

(b) Implementation

- Choice of works and priority in implementation are dictated by political expediency rather than by actual appropriateness;
- Wrong construction method being adopted;
- Lack of continuity of the project (piece-meal implementation);
- Lack of cooperation and coordination with relevant agencies and LGUs concerned during the construction period.

(c) Operation and Maintenance

- Responsibility of the LGU in O&M is not clear;
- No clear agreement made between LGU and DPWH regarding O&M;
- No funds and no manpower at the LGU level to undertake O&M; and
- No O&M budget and team that would monitor all flood control structures in the DEO.

(d) Rules and Regulations

- DPWH's mandate to be "tasked to carry out ensuring the safety of all infrastructure facilities – " in EO 124 is not well implemented;
- Implementation rules and regulations of Water Code shall be prepared in compliance with actual conditions; and
- Implementation rules and regulations of Local Government Code shall be revised to clarify the jurisdiction of river areas.

(3) PCM Workshop

Selecting the core problem to be "Flood control projects for principal rivers are not effectively implemented", five direct causes were recognized in the PCM workshops as follows:

(a) No comprehensive implementation program

- Technical standards and guidelines for flood control plans are not well established nor disseminated among DPWH offices;
- Inadequate manpower to prepare flood control master plan in DPWH regional and district offices
- Basic data gathering/surveys/investigations are limited, and processed and stored data are inadequate for planning;
- Attention/emphasis is only given to structural measures in addressing flood control; and
- Planning is not participatory.

(b) Roles and functions are not clear

- Relevant laws and regulations hardly meet actual conditions;
- Inadequate information and education campaign and consultation with beneficiaries, negatively affected group, and other stakeholders; and
- Neither exchange nor data/information between DPWH and other relevant agencies.

(c) Importance of Flood Control Projects

- Importance of flood control projects for principal rivers is not well recognized/understood by the government as well as the people; and
- Funds for flood control projects of principal rivers are not adequate.

(d) Coordination between implementing agencies

- Relevant data/information gathered by respective agencies shall be provided among them;
- Funds for flood control projects that are within their agencies' scope of responsibilities shall be provided;
- Relevant agencies shall participate in the planning, design, implementation and monitoring flood control projects; and
- Relevant agencies shall participate in the information and education campaign.

(e) Operation and maintenance

- DPWH shall provide technical assistance to the responsible agency for O&M;

- Information and education campaign regarding importance of flood control works shall be intensely conducted;
- Training for O&M of flood control works shall be given to the direct beneficiaries; and
- DPWH shall monitor and feedback of the flood control works.

(4) Integration of Problems and Issues

Through the analysis and grouping all problems and issues, they are integrated into eight main agenda as follows and Summary Matrix is shown in **Table 6.1**.

- (1) Jurisdiction of River Areas
 - No definition on the jurisdiction for rivers and their areas under the law.
 - No coordination among governmental agencies to undertake river works.
- (2) Coordination and Cooperation between DPWH and LGUs
 - No data/information exchange between DPWH and relevant agencies.
 - No coordination and cooperation during construction.
 - No clear arrangement for O & M between DPWH and LGUs.
- (3) Proper Management System of Data/Information
 - Basic data gathering/surveys/investigations are limited including processing and storing.
 - No proper data collection systems, and access to information by users.
 - No proper monitoring and feedback mechanism for project implementation.
- (4) Flood Control Project Identification
 - Importance of flood control is not well recognized.
 - Choice of projects and priority in implementation shall be dictated by actual project appropriateness.
 - Study to formulate sabo projects is urged for sustainable development/land use in sediment-related disaster-prone areas.
- (5) Planning Resources/Capability
 - Technical standards and guidelines are not well disseminated among DPWH offices.
 - Hydraulic/hydrologic analytical capacities are not well developed.
 - Inadequate manpower to prepare master plan of river basin flood control.
- (6) River Basin approach and Flood Management
 - No comprehensive implementation of flood control including non-structural measures as well as livelihood program.
 - No management body covering river basin.
- (7) Public Consultation and Participatory
 - Inadequate information & education campaign, and consultation with stakeholders.
 - Participation of beneficiaries and stakeholders is not well practiced in the planning,

design, implementation and O&M.

(8) Fund for Implementation and O&M

- Funds for flood control projects for principal rivers are not adequate.
- No funds and no manpower at the DPWH DEOs as well as LGU level to undertake O&M.
- No mechanisms to achieve financial sustainability are established.

Summarized eight main agenda are categorized into the respective stages of Infrastructure Development Cycle as follows:

Issues and Problems	Infrastructure Project Cycle			
	Identification	Preparation	Implementation	Operation & Maintenance
1. Jurisdiction of River Area				
2. Coordination and Cooperation between DPWH and Relevant Agencies				
3. Proper Management System of Data/Information				
4. Flood Control Project Identification				
5. Planning Resources/Capability				
6. River Basin Approach and Flood Management				
7. Public Consultation and Participatory				
8. Fund for Implementation and O&M				

The problems and issues concerning all stages of the Cycle shall be counteracted and solved in the long-term with all the efforts of the government, while those concerning one to three stages are tackled by mainly DPWH and related agencies.

CHAPTER 7. IMPROVEMENT PLAN OF FLOOD CONTROL PROJECT IMPLEMENTATION SYSTEM

7.1 Possible Solutions

(1) PCM Objective Tree

Based on the initial Objectives Analysis (**Figure 7.1** – Objective Tree) performed on the Problem Tree and other issues, the draft PDM is prepared as shown in **Table 7.1**.

Output 1: Comprehensive plan of principal rivers flood control works will be proposed.

- a) Establishment of technical standards and guidelines for flood control master planning.
- b) Enhancement of technical capacity of engineers/officers in DPWH regional and district engineering offices.
- c) Rehabilitation/establishment of hydrologic gauging stations, and enhancement of capacity of personnel in the operation and maintenance of these stations.
- d) Establishment of systematic processing and storage of data/information (database).
- e) Identification of funding sources.
- f) Provision of adequate non-structural flood mitigating measures (i.e. reforestation, solid waste management, etc).
- g) Participatory approach to be employed in the whole project cycle.

Output 2: Roles and functions in flood control project of relevant organizations will be clarified.

- a) Revision of laws and regulations to meet actual conditions.
- b) Formulation of IEC and consultation strategies.
- c) Establishment of systematic information system.

Output 3: Necessity of flood control works for principal rivers will be recognized.

- a) Establishment of extensive IEC.

Output 4: Optimal utilization of funds for flood control projects.

- a) Explore the viability of establishing an agency/body that will regulate the implementation of flood control projects in principal rivers, and assure that these projects are implemented according to the comprehensive plan.
- b) Identification of funding sources.

(2) Methods for Solution of Problems/Issues

Including possible solutions to problems and issues from PCM Objective Tree, the directions/actions and concerned agencies (except DPWH) are recognized as follows:

(1) Jurisdiction of River Areas (Legislative Body, NRW, LGUs)

- Revise IRR of Water Code
- Clarify jurisdiction and obligation of LGUs in Local Government Code

- (2) Coordination and Cooperation between DPWH and Relevant Agencies (DENR, LGUs)
 - Basically, DPWH shall control river flow and river area of the channel sections in the developed area, and other area of river basin could be controlled by DENR.
 - Create an organization for Flood Management for river basin
- (3) Proper Management System of Data/Information (PAGASA, NWRB, NAMRIA, OCD)
 - Enhancement/rehabilitation of observation system of PAGASA and BRS
 - Establish information network for DPWH
 - Add the function of information center to FCSEC
- (4) Flood Control Project Identification (DENR, OCD, NWRB)
 - Conduct inventory survey for flood and sediment disasters
 - Conduct inventory survey for rivers and river basins
 - Ranking or prioritizing the river basin for flood control works
- (5) Planning Resources/Capability (DENR, NWRB, NHRC, PHIVOLCS, LGUs)
 - Continue and strengthen the activities of FCSEC
 - Recruit more engineers to FCSEC
 - Reorganization of planning sector in DPWH
 - Exchange information among the related agencies
- (6) River Basin Approach and Flood Management (DENR, NWRB, NEDA)
 - Capacity development for planning in DPWH
 - Expansion of FCSEC's function
 - Close coordination among agencies through an organization of flood management
- (7) Public Consultation and Participatory (LGUs, NEDA)
 - Develop the methodology for participatory planning
 - Employ the results into the project evaluation
 - Conduct general IEC of flood control nation-wide
- (8) Fund for Implementation and O&M (NEDA, DBM, DOF)
 - Establish the rules for cost sharing between national agency and LGUs for implementation and O&M
 - Develop the financial sources for flood control works

7.2 Formulation of Improvement Plan

In the preparation of flood control plan for major rivers, most of which were conducted with the technical cooperation of JICA and financial assistance of JBIC, those aspects such as IWRM, basin-wide approach, integrated planning including structural/non-structural measures and sediment control have been included and examined. As well the related agencies were also involved in the planning stage by organizing a steering committee for the project. Further, the methods of participatory planning and social impact assessment have been developed in the flood control project implementation in the recent years.

On the other hand, the aforementioned aspects and/or methods have been not considered, and the coordination with related agencies and their works has not pursued for flood control project implementation for principal rivers. As the projects have been designed and implemented by Regional Office or District Engineering Office, the capacities of offices and fund allocated were not adequate.

In order to formulate the improvement plan of flood control project implementation system for principal rivers, a *Comprehensive Flood Control Project Implementation Plan* for principal rivers shall be emphasized as summarized in Chapter 6. The stage or term-wise approach is prepared to attain the above objectives. Categorizing the plan into two terms, the period of each term is assumed as follows:

Medium-Term: 2005 to 2010 (6 years)

Long-Term: 2011 to 2030 (20 years)

(1) Action Plan for Medium-Term (2005-2010)

Inclusive of the preparation of comprehensive flood control project implementation plan, the projects and activities to be carried out for medium-term in the course of improvement of implementation system are enumerated as follows:

- Preparation of comprehensive flood control project implementation plan for principal rivers;
- Establishment of data/information management system for flood control and sabo works;
- Preparation and implementation of IEC campaign for flood control and sabo works; and
- Implementation of the flood control 1st medium-term plan.

(a) Preparation of Comprehensive Flood Control Project Implementation Plan

A comprehensive flood control implementation plan for principal rivers will be prepared within the early period in the Medium-Term Schedule (2005 to 2010).

(i) Inventory Survey

As an initial step, an inventory survey shall be conducted for 326 principal rivers (A catchment area is 40 km² to 1,400 km²) including identification of other principal rivers and review on the dimensions such as catchment area, river length, etc. The inventory survey will be made for the following items:

- Location and basin area (administrative region to belong);
- Topography, geology and vegetation;
- River length and gradient;
- Records of rainfall and water level stations, if any;
- Annual mean basin rainfall;
- Administrative units (province, city, municipality), their areas and populations;

- Land use and population within the river basin;
- Records of past flood and sediment damages, if any;
- Existing flood control facilities and their conditions;
- Area and population within the flood-plain area;
- Outline of water resources development projects, if any;
- Other regional development plans and projects, if any, and
- Others related to flood control.

(ii) Preparation of Comprehensive Flood Control Project Implementation Plan

With the key indices of importance and urgency in project implementation such as area and population of flood-plain for importance and magnitude/frequency of flood damages for urgency, priority for implementation will be placed to all subject rivers.

Selecting 20 rivers with higher priorities, a flood control master plan will be prepared for each selected river, while the master plan is mainly formulated with structural measures, as planning dimensions to be defined below:

- Project scale;
- Main structures and facilities;
- Project cost;
- Investment plan/economic evaluation;
- Management plans for natural/social environmental impacts; and
- Implementing bodies and schedules.

Assuming the project scale to be once in 30 to 50 years for recurrence probability, the optimum project scale will be selected through the economic evaluation. Aspect of IWRM and basin-wide approach shall be employed in the planning as well as consultation/coordination with relevant agencies and LGUs shall be carried out in the preparation. On the basis of the flood control master plans for 20 selected rivers, the implementing schedules including major structures, project costs, etc. will be tabulated as follows:

Priority	River	Area (km ²)/ Population			Region	Major Structures/ Facilities	Project Cost (mil. peso)	Implementa tion (Year)
		Catch ment	Flood	Popu- lation				
1.	Ambura yan	1,386			I	Dike, Revetment		2006 - 10
2.	Talisay	144			III	Dike, Dredging		2006 - 10
3.	Pansipit	656			IV-A	River Wall, Dredging		2006 - 10
4.	Imus	105			IV-A	Revetment, Dredging		2006 - 10
~								~
20.	Lucban	269			IV-A	Revetment		2011 - 15
21.	Yawa	70			V	Dikes, Revetment		2011 - 15
~								~
326.								

(b) Establishment of Data/Information Management System

A network for data/information will be established in the Medium-Term. Other than the data and information, of which the network has been constructed through NWIN, the river and flood data shall be firstly collected and processed into a database (*Flood Control Database = FCD*). Secondly, the database will be developed into an information network (*Flood Control Information Network = FCINET*) including NWIN.

For establishing the flood control information network by Planning Service as a lead office, the following works will be undertaken in the Medium-Term in collaboration with the related agencies:

(i) Inventory Survey on Existing River Data and Flood Data

Including past projects and studies of flood control, an inventory survey on river and flood data (refer to Section 2.3, Chapter 2) will be conducted with central and regional offices of DPWH.

(ii) Preparation of Data Format and Encoding

Referring the existing format for data encoding, a unified format will be prepared by integrating types of data and information. The unified format will be distributed to the regional offices for encoding. For this work, each regional office shall establish a *Working Group* for inventory and encoding the data and information on river and flood within its jurisdiction. Each regional office shall prepare a library in its office for storing and updating the raw data as well as encoded format for reference and future development.

(iii) Digitizing Data and Preparation of Database

After encoding the data into specified format, digitizing and preparing the database will be carried out by the central office (Planning Service).

(iv) Establishment of FCINET

Through an investigation of available telecommunication system such as Internet and exclusive communication line, a network (FCINET) for collection and dissemination of data/information of river and flood will be established.

(v) Management and Development of FCINET

FCSEC will preferably manage and develop the FCINET, including integration with other information network such as NWIN. Further, FCINET will be expanded for not only data/information but also monitoring of rivers and floods as well as their project implementation.

(c) Preparation and Implementation of Information and Education Campaign

For proper floodplain management, specifically smooth and effective flood control project implementation, a total information and education campaign shall be commenced in the early stage in the Medium-Term. Inclusive of concepts for IWRM and River Basin Approach, general policies and directions for flood mitigation shall be disseminated.

(i) Preparation of Program

Together with the preparation of Comprehensive Flood Control Project Implementation Plan, a program of information and education campaign will be prepared. The program shall emphasize the importance of public consultation and participatory planning.

The program preparation may refer to and develop the guidelines/methods of the recent practices of information and education campaigns, conducted in several projects such as Pasig-Marikina River Channel Improvement Project, Iloilo Flood Control Project, etc. Planning Service and Public Information Division of DPWH will prepare the program in collaboration with FCSEC.

(ii) Implementation of Campaign

Based on the program for information and education campaign, two types of campaign will be implemented. One is for general about all flood control works undertaken by the DPWH, which will be mainly conducted through the related organization and media. The other is for some specific flood control plans for principal rivers listed in the Comprehensive Flood Control Project Implementation Plan; therefore it will be conducted by the relevant regional offices by means of public consultation and participatory planning.

(d) Implementation of Flood Control 1st Medium-Term Plan

At the later part of Medium-Term, the flood control projects designated in the 1st Medium-Term will be started with the detailed engineering. The implementing office will be the regional office of which jurisdiction may cover the area of principal rivers for the implementation.

(i) Target Rivers

In the Comprehensive Flood Control Project Implementation Plan, four to five principal rivers will be selected with higher priorities for the implementation. The flood control projects are works for rather maintenance, rehabilitation and improvement than new construction, on account of the recent financial constraint.

(ii) Implementation Organization

The regional office will be an implementing office with technical assistance of FCSEC, assistance for contracting and administration from PMO-MFCP and monitoring by Planning Service.

(iii) Coordination with Related Agencies

Coordination with other related agencies at regional level would be also carried out by the subject Regional Office.

(2) Projects and Activities for Long-Term (2011–2030)

The Flood Control Project Implementation System will be finalized from the lessons and experiences through the Action Plan for Medium-Term.

(a) Major Undertakings

Integrating the flood control works for both principal and major rivers, a hierarchic organization and system for flood control and sediment disaster prevention (sabo) works will be prepared through the following undertakings mainly by DPWH:

- Review of the flood control medium-term plans;
- Review of the sabo medium-term plans; and
- Implementation of information and education campaign.

The works will be carried out on account of major issues identified in the existing flood control project implementation system such as IWRM, river basin approach, coordination with other agencies, participatory planning, etc.

(b) Flood Management for Long-Term Program

In the comprehensive flood control, now called as *Flood Management*, many governmental agencies are involved with their own mandates on the flood control and sediment-related disasters; DPWH for flood control and drainage while DENR for watershed management, NIA for soil conservation, PAGASA for weather and flood forecasting, LLDA for Laguna Lake development and conservation, NEDA for Regional Development, NHRC for hydraulics, PHIVOLCS for volcanic sediment disasters and NWRB for integrated water resources development.

Under the National Flood Management Committee, Regional Flood Management Committee is created in the flood plain, which the Secretary of DPWH designated consisting of the following members.

National Flood Management Committee

Chair	:	Department of Public Works and Highways
Co-chair	:	Department of Environment and Natural Resources
Member	:	Department of Public Works and Highways
	:	Department of Environment and Natural Resources
	:	Department of Interior and Local Government
	:	National Economic Development Authority
	:	Department of Agriculture/National Irrigation Administration
	:	PAGASA
	:	National Water Resources Board
	:	National Hydraulic Research Center
	:	Philippine Institute of Volcanology and Seismology
	:	Office of Civil Defense
	:	League of Governors

Regional Flood Management Committee

Chair		Department of Public Works and Highways
Co-Chair		Department of Environment and Natural Resources
Member		Department of Public Works and Highways
		Department of Environment and Natural Resources
		National Economic Development Authority
		Department of Agriculture/National Irrigation Administration
		Provinces
		Cities/Municipalities
		Private Sectors

(i) Definition of Flood Management

Flood Management is the action to mitigate the damages caused by flood- and sediment-related disasters, by means of structures such as floodway, dam and etc. and/or by non-structural method such as risk-mapping, forecasting & warning system and land use regulation provided in river basin-wide area, and other methods and activities in any forms to mitigate such damages.

(ii) Objectives

Objectives of creating National Flood Management Committee are:

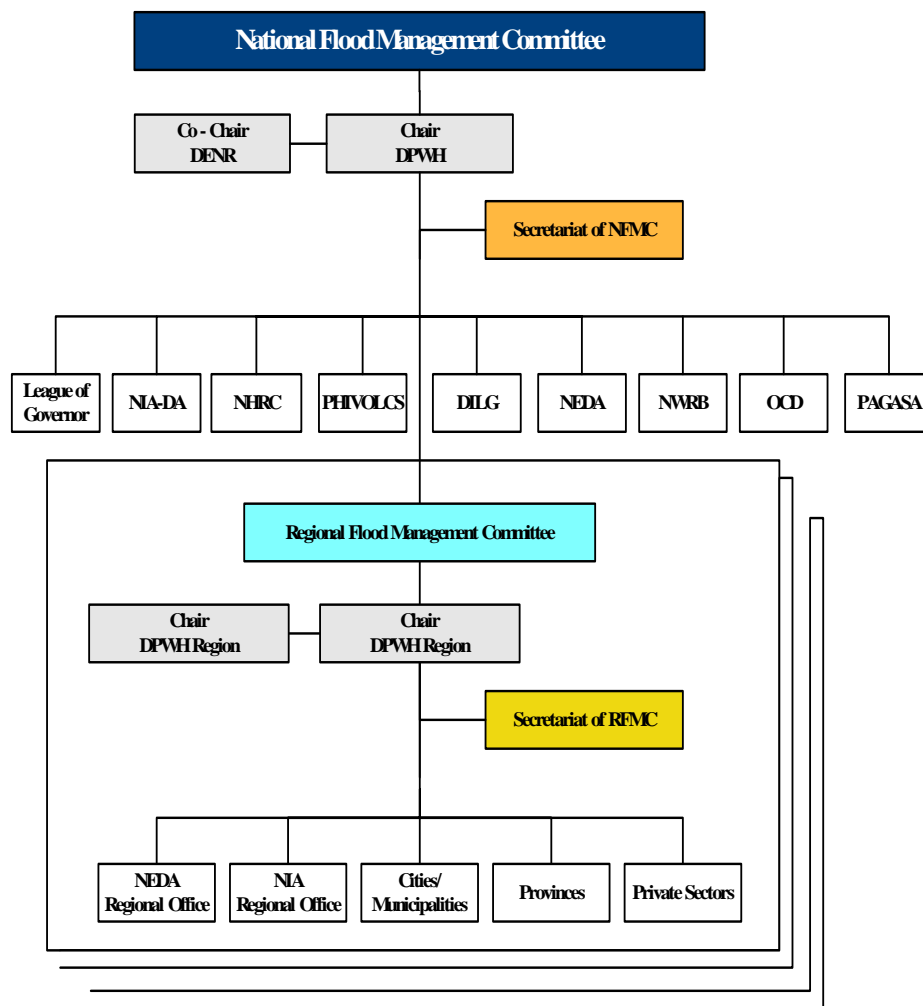
- Lead all agencies and people for flood disaster mitigation;
- Integrate all efforts and investments to be effective for flood disaster mitigation; and
- Coordinate all activities related to flood and water resources.

(iii) Roles and Functions

- Formulate and promulgate the national flood management guideline to promote the best interest of the country and the coordinated protection of flood- and sediment-related disaster prone areas.
- Organize the joint inspection team for flooding areas to identify and study the causes and countermeasures.
- Monitor the progress of the projects for flood mitigation.
- Provide necessary arrangement and coordination among the central government agencies for technical and administrative support to the local government units for the flood management.

(iv) Organization

The organization of the *National Flood Management Committee* is composed of the related government agencies as shown in the table below, while it has a regional branches: *Regional Flood Management Committee*, which should take action closely to the respective regions as well as LGUs therein under the guidelines and instructions of the *National Flood Management Committee*.



(v) Roles of Secretariats and Committee Member

The roles of Secretariats of both National and Regional Flood Management Committees are proposed as follows:

Secretariat of National Flood Management Committee

- Arrange the meeting of this National Committee regularly and periodically;
- Prepare the necessary materials for this National Committee;
- Draft the flood management guideline; and
- Provide necessary coordination for technical and administrative cooperation among the member agencies on the implementation of flood control, sabo and drainage projects.

Secretariat of Regional Flood Management Committee

- Arrange the meeting of this Committee regularly and periodically;
- Prepare the necessary materials for this committee;
- Draft the regional flood management guideline in line with the national flood management guideline;
- Provide necessary arrangement for technical and administrative support to the local government units on the implementation of flood control, sabo and drainage projects within its region.

For committee members of either National or Regional Flood Management Committees, their roles are enumerated as follows:

Department of Public Works and Highways

- Provide secretariat for this Committee;
- Provide all necessary data/information on flood control and sabo works;
- Prepare Medium-Term Flood Control and Sabo Plan under the flood management guideline and submit to the Committee; and
- Prepare annual flood control and sabo plan for both national and regional levels.

Department of Environment and Natural Resources

- Provide all necessary data/information on the forest management and watershed management; and
- Formulate and implement the forest management and watershed management according to the flood management guideline.

Department of Interior and Local Government

- Provide necessary arrangement for implementation of projects in jurisdiction of the local government units, and technical and administrative supports of the central government for the local government units; and
- Provide necessary arrangement for devolution of implementing projects

National Economic Development Authority

- Provide necessary arrangement on the national policy, development and foreign assistance; and
- Examine and evaluate the flood management guideline from the view of national development plan.

Department of Agriculture/National Irrigation Administration

- Provide all data/information on irrigation and drainage projects and soil conservation projects; and
- Formulate and implement the irrigation and drainage plan in accordance with the flood management guideline.

Philippine Atmospheric, Geophysical and Astronomical Services Administration

- Provide necessary data and information on meteorology and hydrology; and
- Prepare the plans of weather/flood forecasting systems nationwide.

National Water Resources Board

- Review and update the inventory of rivers and water resources;
- Provide the national policy and direction of water resources developments; and
- Prepare an expansion plan of the National Water Information Network (NWIN) and coordinate/arrange functions of agencies concerned.

National Hydraulic Research Center

- Provide necessary information and technical support on hydrology and hydraulics; and
- Introduce the modern technology for flood control and sabo engineering.

Philippine Institute of Volcanology and Seismology

- Provide necessary information and technical support on volcanic sediment flow; and
- Provide data on topographical and geological features of flood and sediment disaster prone areas.

Office of Civil Defense

- Provide necessary information on damages caused by floods and sediment related disasters, and
- Prepare the plans and measures of fighting, evacuation, rescue and restoration for natural disasters.

League of Governors

- Provide necessary arrangement for implementation of projects in jurisdiction of the local government units; and
- Coordinate technical and administrative supports of the central government for the local government units.

Provinces/Cities/Municipalities

- Provide data/information on damages and conditions of flood and sediment disasters in their jurisdictional area;
- Identify the flood control projects according to the regional flood management guideline; and
- Represent the benefit of their jurisdiction and public services and facilities

Private Sectors

- Provide data/information of affects and damages of flood and sediment disasters on private entities; and
- Perform their activities related to flood management in consistent with the regional flood management guideline.

(3) Organization for Implementation System

(a) Organizational Structures

Organizational resources will be maximized to effectively formulate and implement the Comprehensive Flood Control Project Implementation Plan. Based on the existing organizational structure of DPWH, (a) Strengthening the capacity of Planning Sector and (b) Extending functions of FCSEC, are proposed to pursue the Action Plan in the Medium-Term as follows:

(i) Strengthening the Capacity of Planning Sectors

Create the *Flood Control Planning Section* to the Development Planning Division, the Planning Service. This section is in charge of the followings:

- Manage the information on flood control and sabo works over the country;
- Formulate/examine the flood control and sabo programs/projects;
- Monitor and evaluate the flood control and sabo project implementation;
- Coordinate with the other agencies concerned with flood control and sabo projects;
- Supervise the Regional Offices for works on the flood control and sabo; and
- Consult and cooperate with FCSEC on technical matters.

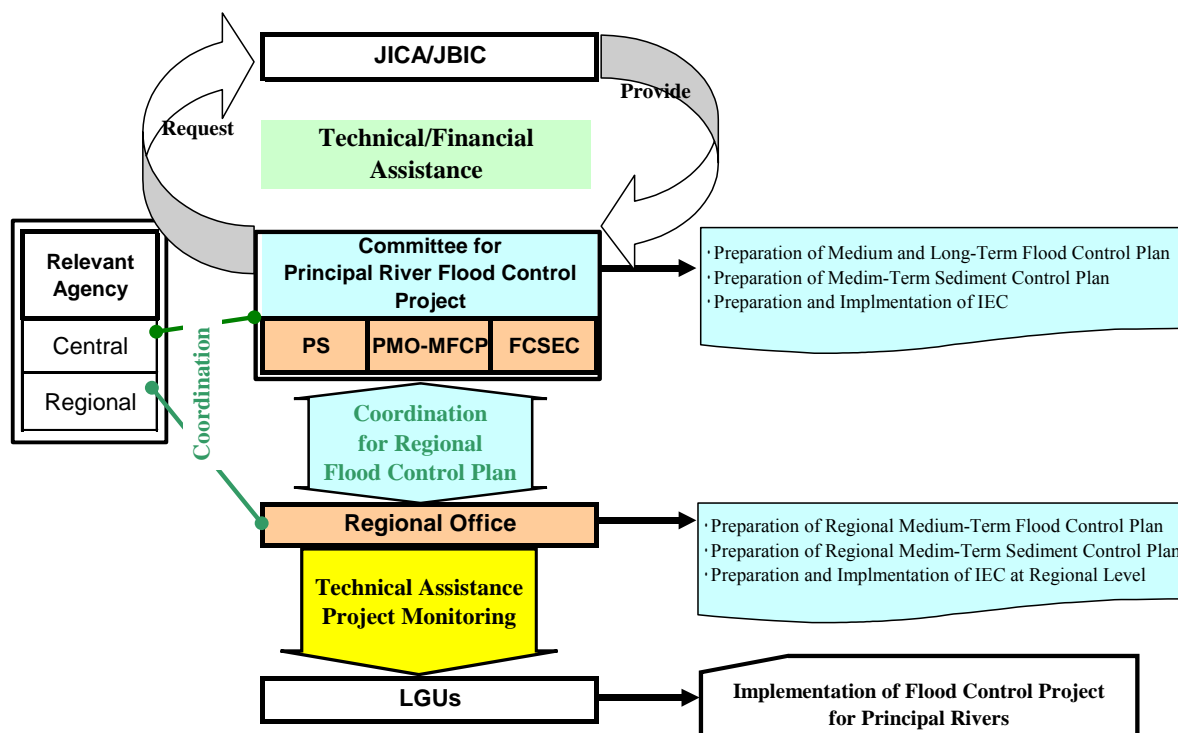
Create the *Flood Control Planning Section* to Planning and Design Division in Regional Office. This section is in charge of the followings works in their jurisdiction:

- Manage the information on flood control and drainage;
- Formulate/examine the flood control and drainage programs/projects;
- Implement the flood control and drainage projects;
- Coordinate with other agencies concerned on the flood control and drainage at the regional level; and
- Evaluate the project implementation and report to the Central Office.

Both Flood Control Planning Sections in Planning Service of DPWH Central Office and Regional Offices shall make sufficient coordination for preparation of flood control plans. The flood control projects will be implemented in coordination among the bureaus as well as the regional offices.

(i) Executing Body for Medium-Term Projects and Activities

The organizational configuration is proposed as follows:

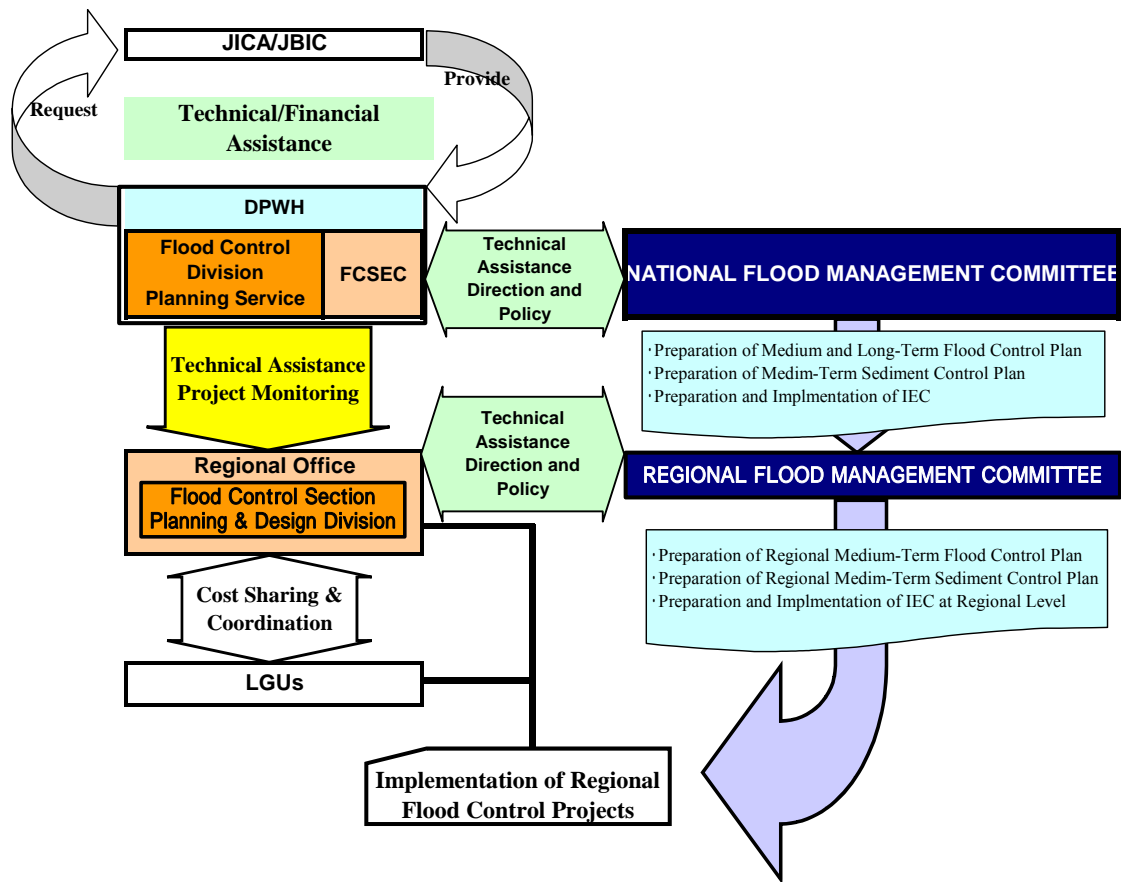


With this organizational structure, the main works to be undertaken are as follows:

- By creating “*Principal River Flood Control Project Committee*”, which consisting of engineers of FCSEC, PS and PMO-MFCP, an expected JICA study for nation-wide flood control plan will be carried out by the Committee.
- Simultaneously, the engineers of planning & design division of ROs, which belongs to the region where the subject river is located, shall be members of the Committee.
- The regional office shall implement the medium-term flood control plan, as leading executing body. The Committee shall function for providing the technical assistance and monitoring the project implementation.
- The regional office shall coordinate with the relevant agencies as well as LGUs concerned for management for natural and social environmental impacts and O&M after construction.
- The Committee will prepare the medium-term flood control plan after 1st medium-term plan, further study for optimum organization for principal river flood control implementation.
- The Committee shall prepare the medium-term sediment control plan.
- The above work items and necessary assistances by FCSEC are enumerated in the diagram as shown in **Figure 7.2**.

(ii) Executing Body for Long-Term Projects and Activities

The organizational configuration is proposed as follows:



With this organizational structure, the main works to be undertaken are as follows:

- Principal River Flood Control Committee will be converted into a permanent office for planning, ex. “Flood Control Division in Planning Services, DPWH” which shall undertake the preparation of flood control plan for both principal and major rivers in the Philippines.
- A “River Division” will be created in every Regional Office for design and construction of flood control projects.
- All projects implemented by the District Engineering Offices will be integrated into the project for the implementation of the Regional Office.

TABLES

Table 6.1 SUMMARY MATRIX OF PROBLEMS AND ISSUES IN FLOOD CONTROL PROJECT IMPLEMENTATION FOR PRINCIPAL RIVERS

Requirements in National Development Plans and Policies		Problems Identified by Survey on Flood Control Project Implementation		PCM Workshop		SUMMARY OF ISSUES AND PROBLEMS
MEDIUM-TERM PHILIPPINE DEVELOPMENT PLAN	Pursue proper O & M of flood control and drainage facilities including an effective garbage collection and disposal in coordination with other concerned government agencies and LGUs	ENGINEERING	Lack of flood data/information and survey works for rivers and flood-prone area	NO COMPREHENSIVE IMPLEMENTATION PLAN	Technical standards and guidelines for flood control plans are not well established nor disseminated among DPWH offices.	1. Jurisdiction of River Area <ul style="list-style-type: none">- No definition on the jurisdiction for rivers and their areas under the law.- No coordination among governmental agencies to undertake river works.- Relevant laws and regulations hardly meet actual conditions.
	Relocate and prevent informal settlers living along the banks of rivers/esteros/creeks		Deficiencies in technical standards and regulations		Inadequate manpower to prepare flood control master plan in DPWH regional and district engineering offices.	
	Implement sabo projects for the prevention/mitigation of sediment-related disasters, debris and lahar flow/landslide		Lack of consultation and coordination with other related agencies		Basic data gathering/surveys/investigations are limited, and processed and stored data are inadequate for planning	2. Coordination and Cooperation between DPWH and Relevant Agencies <ul style="list-style-type: none">- No data/information exchange between DPWH and relevant agencies- No coordination and cooperation during construction- No clear arrangement for O & M between DPWH and LGUs
	Study and formulate guidelines leading to sustainable development/land use in sediment-related disaster-prone areas				Attention/emphasis is only given to structural measures in addressing flood control	
	Implement comprehensive measures consisting of construction, warning/evacuation, livelihood programs in coordination with concerned agencies and LGUs		No comprehensive study of flood control project implementation for principal rivers		Planning is not participatory	3. Proper Management System of Data/Information <ul style="list-style-type: none">- Basic data gathering/surveys/investigations are limited including processing and storing- No proper data collection systems, and access to information by users- No proper monitoring and feedback mechanism for project implementation
MEDIUM-TERM DPWH INFRASTRUCTURE DEVELOPMENT PLAN	Comprehensive planning and identification of inundation areas in major and principal rivers	IMPLEMENTATION	Choice of projects and priority in implementation are dictated more by political expediency rather than by actual project appropriateness.	ROLES AND FUNCTIONS ARE NOT CLEAR	Relevant laws and regulations hardly meet actual conditions	
	Provide flood control facilities and sabo works, and pursue non-structure measures in flood/sediment disaster-prone areas				Inadequate Information & Education Campaign (IEC), and consultation with beneficiaries, negatively affected group, and other stakeholders	
	Strengthen the FCSEC for research and studies, information center and sabo engineering program		Wrong construction method being adopted	No exchange nor transfer of data/information between DPWH and other relevant agencies	5. Planning Resources/Capability <ul style="list-style-type: none">- Technical standards and guidelines are not well disseminated among DPWH offices.- Hydraulic/hidrologic analytical capacities are not well developed.- Inadequate manpower to prepare master plan of river basin flood control.	
	River management in coordination with LGUs		Lack of continuity of the system (piece-meal implementation);	Importance of flood control projects for principal rivers is not well recognized/ understood by the government as well as the people		
NATIONAL FRAMEWORK FOR PHYSICAL PLANNING	Prioritize and implement infrastructure projects that support the policy of national dispersal through regional concentration	IMPORTANCE OF FLOOD CONTROL	Lack of cooperation and coordination with relevant agencies and LGUs concerned during construction period	COORDINATION BETWEEN IMPLEMENTING AGENCIES	Funds for flood control projects for principal rivers are not adequate	6. River Basin Approach and Flood Management <ul style="list-style-type: none">- No comprehensive implementation of flood control including non-structural measures as well as livelihood program.- No management body covering river basin
	Ensure compatibility of infrastructure with local land use and development plans, giving priority to projects with the most strategic impacts		No funds and no manpower at the LGU level to undertake O&M		Relevant data/information being gathered by their respective agencies shall be provided among them	
INTEGRATED WATER RESOURCES MANAGEMENT POLICY	Compatibility with NIPAS (National Integrated Protected Area System) and other production areas	OPERATION AND MAINTENANCE	Responsibility of the LGU in operation and maintenance is not clear	OPERATION & MAINTENANCE	Funds for flood control projects that are within their agencies' scope of responsibilities shall be provided	7. Public Consultation and Participatory <ul style="list-style-type: none">- Inadequate information & education campaign, and consultation with stakeholders- Participation of beneficiaries and stakeholders is not well practiced in the planning, design, implementation and O&M
	Incorporate disaster mitigation principles in infrastructure development		No clear agreement exist between LGU and DPWH regarding operation and maintenance		Relevant agencies shall participate in the planning, design, implementation and monitoring of flood control projects	
	Evaluate properly the efficiency of flood control strategies		No operation and maintenance budget and team that would monitor all flood control structures in the district engineering office		Relevant agencies shall participate in the Information and Education Campaign	
	Improve data collection systems and access to information by users				DPWH shall provide technical assistance to the responsible agencies	
	Establish policy instruments and the legal and regulatory framework	LAW ARRANGEMENT	DPWH mandate in EO 124 are not well implemented.	Information and education campaign regarding the importance of flood control works shall be intensely conducted	8. Fund for Implementation and O&M <ul style="list-style-type: none">- Funds for flood control projects for principal rivers are not adequate- No funds and no manpower at the DPWH DEOs as well as LGU level to undertake O&M- No mechanisms to achieve financial sustainability is established	
	Establish mechanisms for consultation and public participation, and conduct intensely information/education campaign		Implementation rules and regulations of Water Code shall be prepared in compliance with actual conditions.	Training for O&M of flood control works shall be given to the direct beneficiaries		
	Enhance capacity building of not only governmental agencies but also non-governmental organizations		Implementation rules and regulations of Local Government Code shall be revised to clarify the jurisdiction of river areas.	DPWH shall monitor and feedback of the flood control project implementation		
	Adopt philosophy of flood management and create management agencies (including river basin organizations)					
Establish mechanisms to achieve financial sustainability						

Table 7.1 Draft Project Design Matrix

Narrative Summary	Objectively Verifiable Indicators	Means of Verification	Important Assumptions
Overall Goal More effective and appropriately designed flood control and sabo structures/facilities will be constructed by the DPWH in accordance with technical standards and guidelines (TSG), technical manuals and guidelines formulated and produced by the Project.			
Project Purpose Improved flood control project implementation system.	Proper recommendations will be made for flood control project implementation of principal rivers.	Submission of Final Report. Implementation and evaluation of pilot projects.	
Outputs I. Collected and analyzed data/information of flood control project (1) Current conditions of flood control projects by both national and local governments will be analyzed. (2) Data/information of flood control projects for major and principal rivers will be collected and processed.	1-1 Current conditions of flood control works in the country will be compiled through data collection and interview with residents. 1-2 Relevant information on flood control works will be collected and processed by the Project until June 2004.	1-1 Conduct of participatory workshop 1-2 Preparation & submission of Interim Report.	
II. Formulated/prepared Flood Control Project Implementation System (1) Comprehensive plan of principal rivers flood control works will be proposed. (2) Roles and functions in flood control project of relevant organizations will be clarified. (3) Necessity of flood control works for principal rivers will be recognized. (4) Optimal utilization of funds for flood control projects.	2-1 Flood control comprehensive plan of principal rivers will be proposed until Sept. 2004. 2-2 Function-role matrix of relevant organizations to flood control will be prepared until Sept. 2004. 2-3 80% of attendants to the Technical Transfer Seminar could basically absorb the technical principles of flood control works of principal rivers. 2-4 Establishment of an agency/body that will regulate the implementation of flood control projects in principal rivers.	2-1 Comprehensive flood control plan will be concurred by the government. 2-2 Function-role of relevant organizations will be agreed by themselves. 2-3 Questionnaire survey in Seminar 2-4 Institutional and financial study on implementation and O&M of flood control projects.	No major changes in relevant laws and regulation
Activities Presented below by Project Output.	Input [Japan side] JICA Study Team (3 experts) and local engineers and staff Japanese staff in FCSEC [Philippine side] - Counterparts to JICA Study Team - Counterparts in FCSEC		The Project is continued. Security conditions are not changed. <hr/> Pre-conditions FCSEC continues its activities

FIGURES

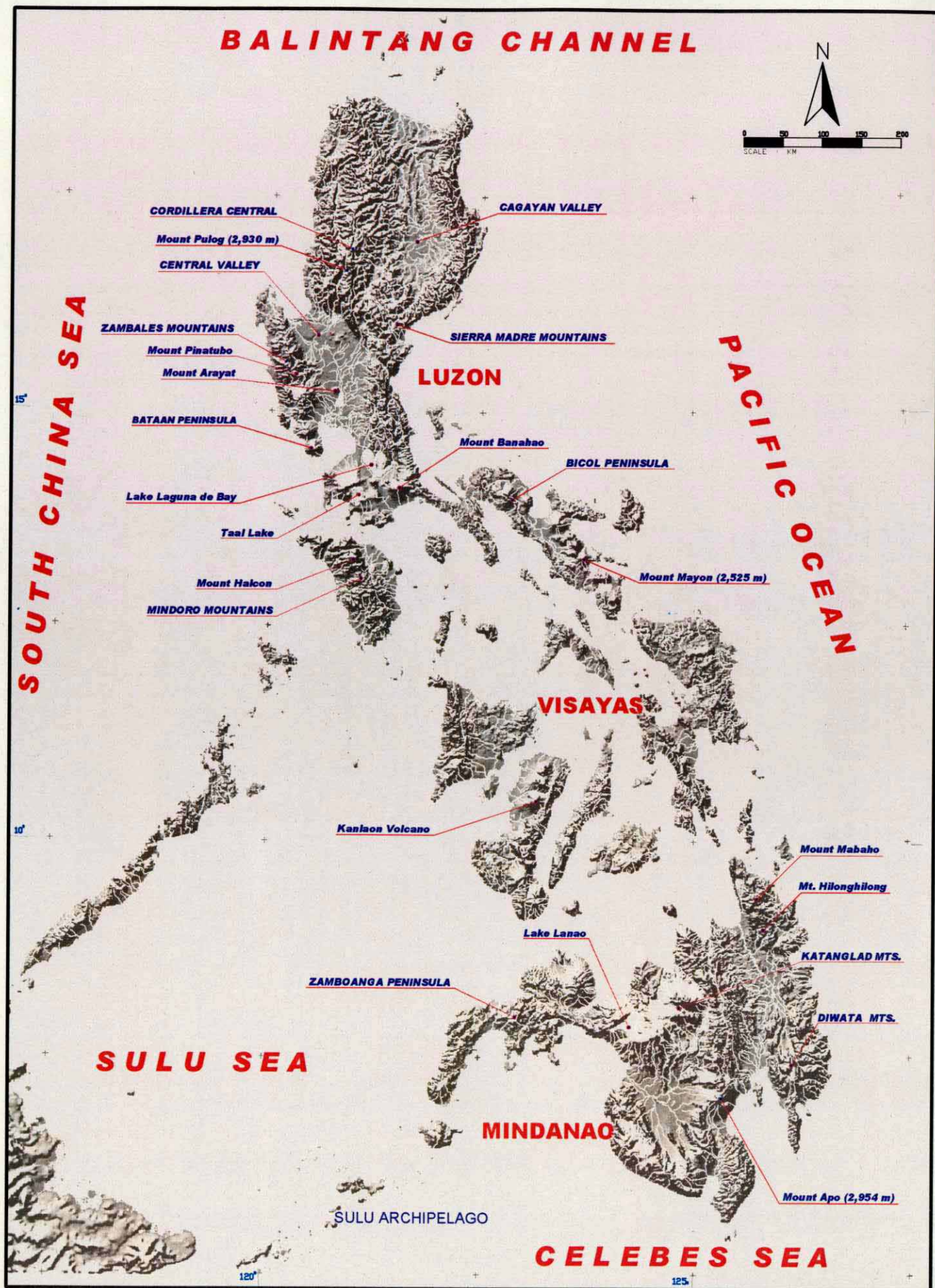


FIGURE 2.1 TOPOGRAPHY OF THE PHILIPPINES

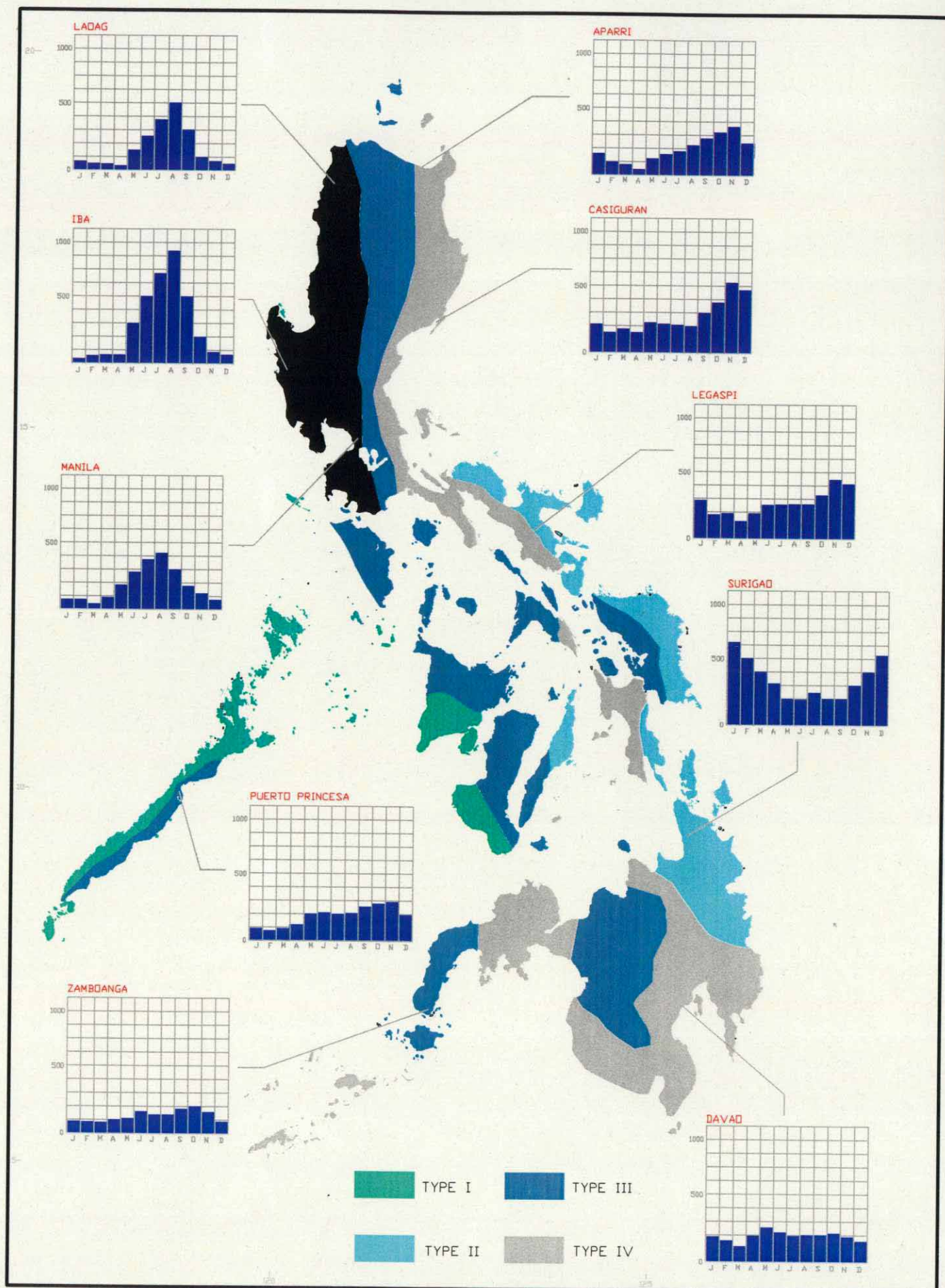


FIGURE 2.2 CLIMATOLOGICAL MAP OF THE PHILIPPINES

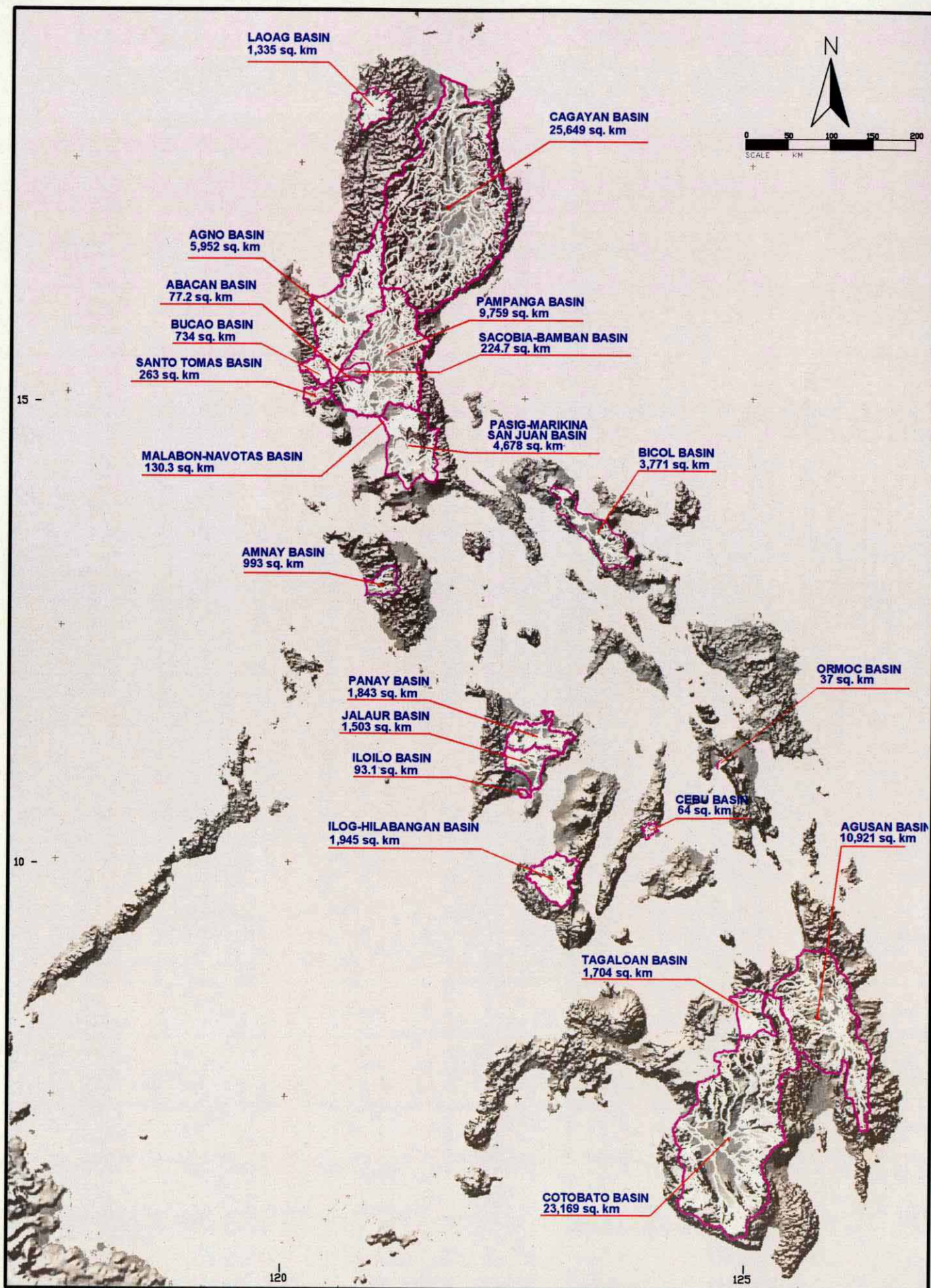
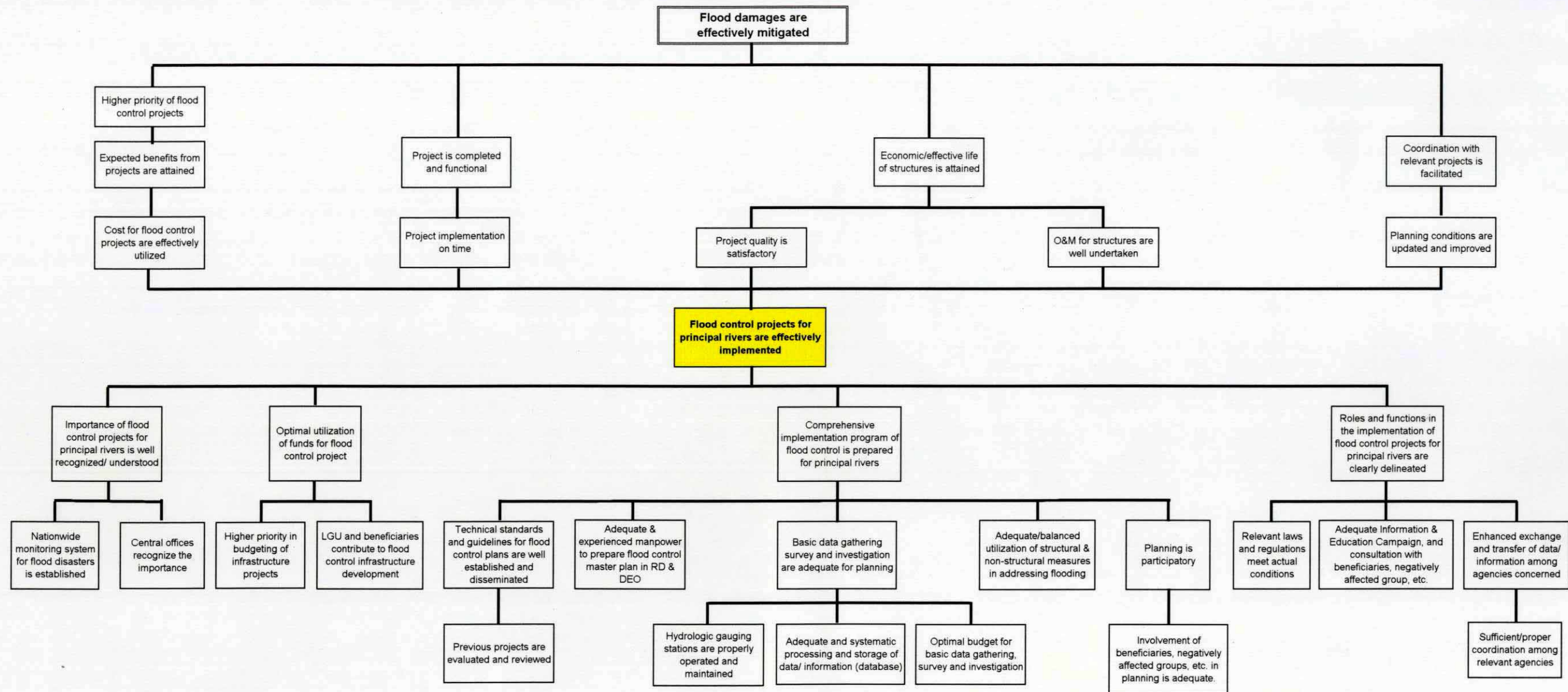


FIGURE 2.3 LOCATION OF 18 MAJOR RIVER BASINS

**FIGURE 7.1 PCM OBJECTIVE TREE
FLOOD CONTROL PROJECT IMPLEMENTATION FOR PRINCIPAL RIVERS**



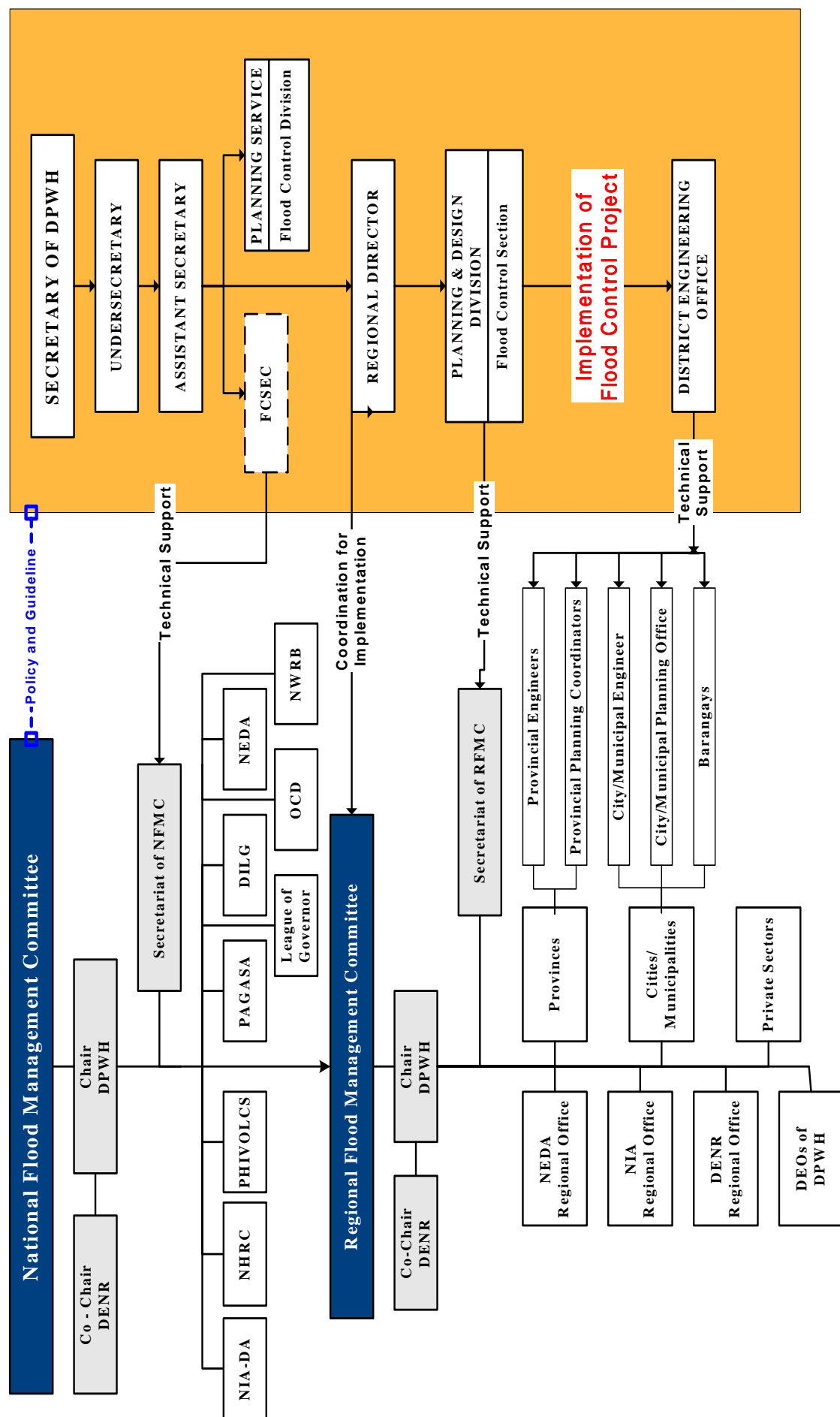


Figure 7.2 Organizational Structure of Flood Management System of DPWH with National Flood Management Committee

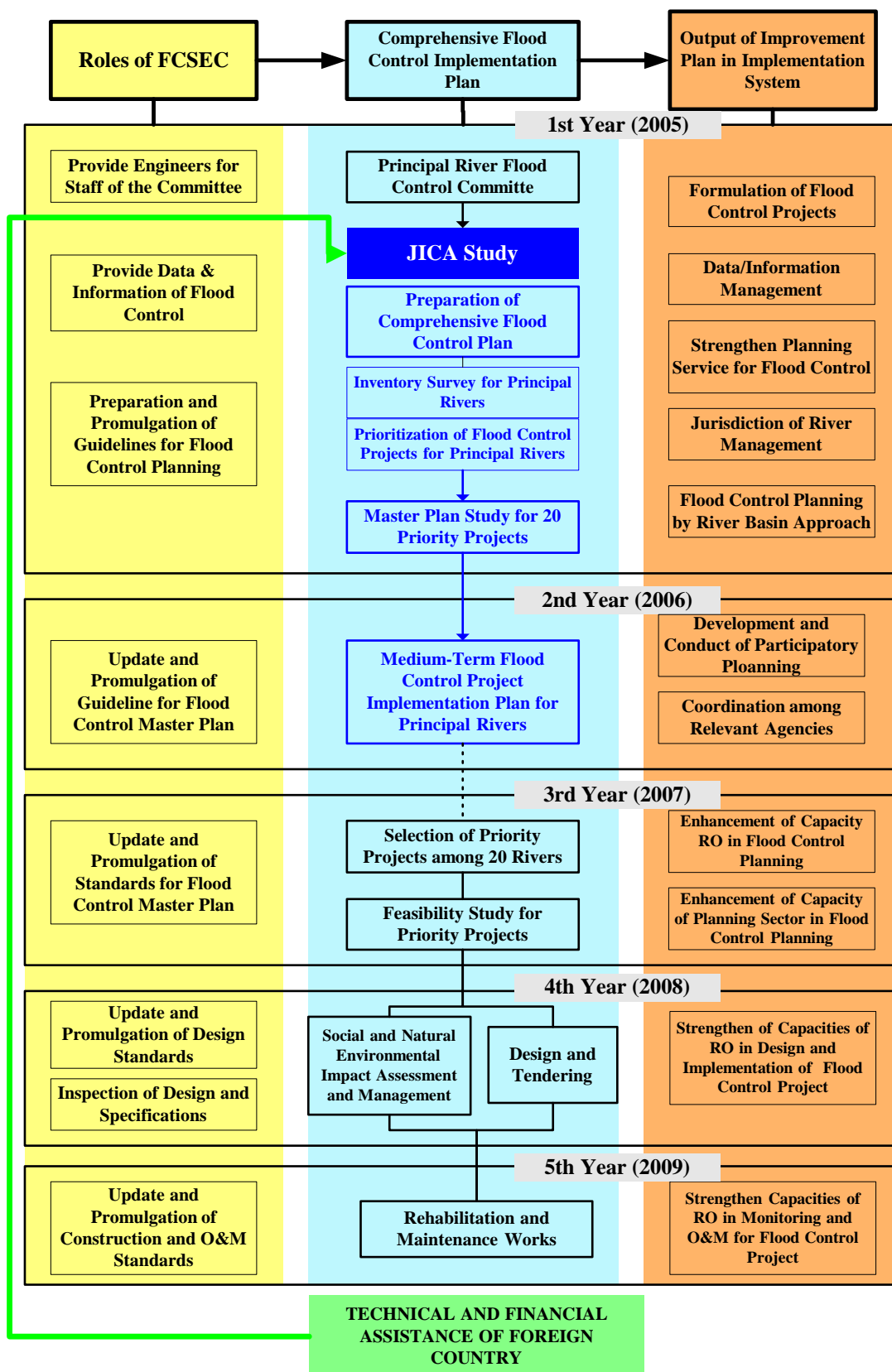


Figure 7.3 Schedule Diagram of Action Plan and Roles of FCSEC