Figure 3.9.1

Location of Proposed Master Plan for Road and Bridge Construction

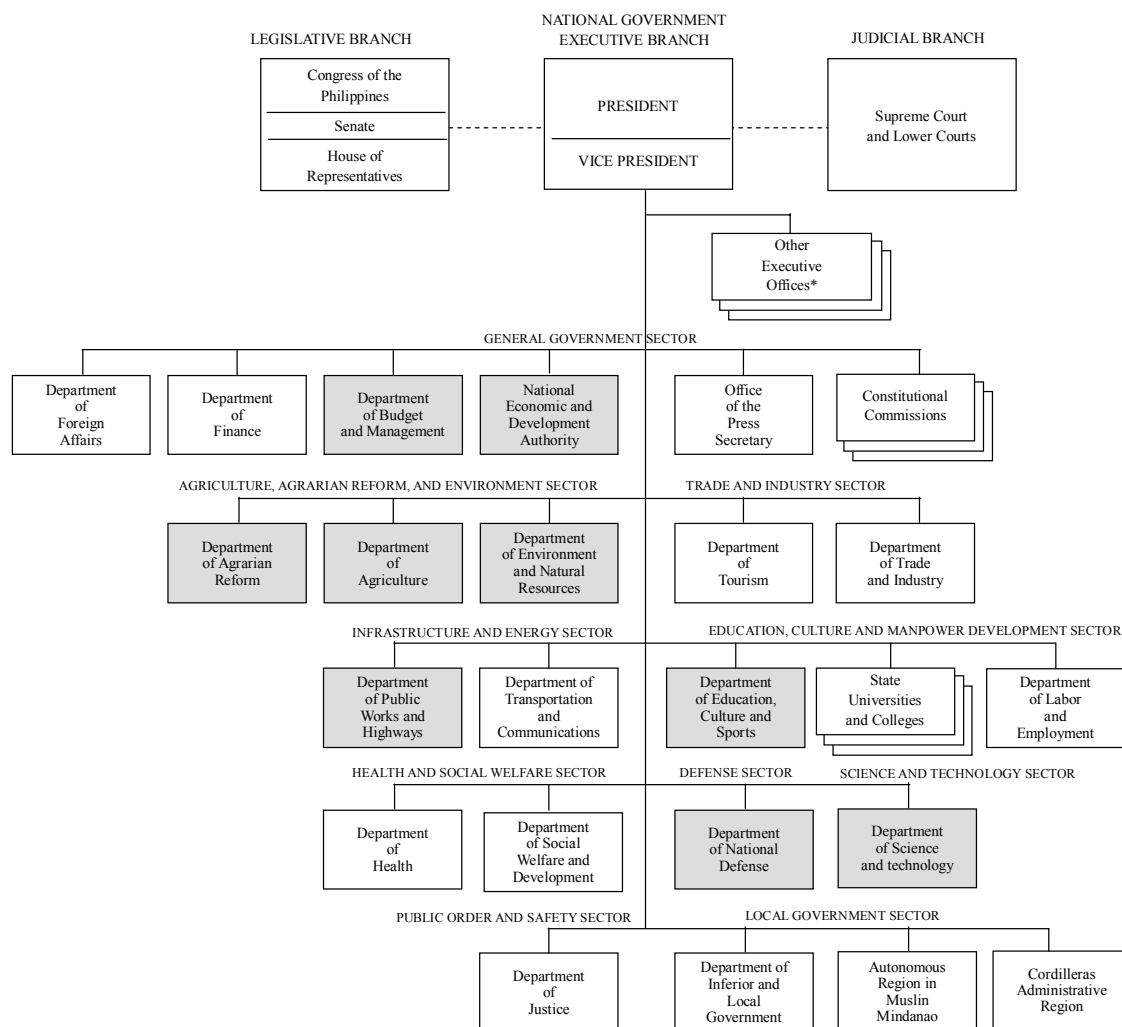| L E G E N D			
SYMBOLS	SCOPE OF WORK REQUIRED	PROPOSED PROJECT	LOCATION
B1	Reconstruction of Bridge	Maculcol Bridge for Reconstruction	Sto. Tomas River
B2	Reconstruction of Bridge	Bucao Bridge for Reconstruction	Bucao River
B3	Reconstruction of Bridge	Maloma Bridge for Reconstruction	Maloma River
R1	Reconstruction of Road	Access Road for Place of Residence	R1-1-1) along Sto. Tomas River
		at Upper Stream (Community Road)	R1-1-2) to Mapanuepe Lake
			R1-2-1) along Bucao River
			R1-2-2) along Balin-Baquero River
			R1-3) along Maloma River
R2	New Construction of Road	Tourist Road for Crater Lake at Mt. Pinatubo	R2) for R1-1-1 & R1-3
R3	New Construction Road	Plan of Province of Zambales	R3-1) Zambales-Tarlac Road
			R3-2) Zambales-Pampanga Road

THE GOVERNMENT OF THE PHILIPPINES
THE DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS

The Study on Sabo and Flood Control for Western River Basins of Mount Pinatubo in the Republic of the Philippines

JAPAN INTERNATIONAL COOPERATION AGENCY

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┌─────────────────────┐        ┌──────────────────┐        ┌──────────────────┐
│ Congress of the     │        │     PRESIDENT    │        │  Supreme Court   │
│ Philippines         │- - - - │                  │- - - - │  and Lower Courts│
│─────────────────────│        │──────────────────│        │                  │
│ Senate              │        │  VICE PRESIDENT  │        │                  │
│─────────────────────│        └──────────────────┘        └──────────────────┘
│ House of            │
│ Representatives     │
└─────────────────────┘
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                    ┌──────────────────┐
                    │ Other            │
                    │ Executive        │
                    │ Offices*         │
                    └──────────────────┘
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GENERAL GOVERNMENT SECTOR

| Department of Foreign Affairs | Department of Finance | Department of Budget and Management | National Economic and Development Authority | Office of the Press Secretary | Constitutional Commissions |

AGRICULTURE, AGRARIAN REFORM, AND ENVIRONMENT SECTOR   TRADE AND INDUSTRY SECTOR

| Department of Agrarian Reform | Department of Agriculture | Department of Environment and Natural Resources | Department of Tourism | Department of Trade and Industry |

INFRASTRUCTURE AND ENERGY SECTOR   EDUCATION, CULTURE AND MANPOWER DEVELOPMENT SECTOR

| Department of Public Works and Highways | Department of Transportation and Communications | Department of Education, Culture and Sports | State Universities and Colleges | Department of Labor and Employment |

HEALTH AND SOCIAL WELFARE SECTOR   DEFENSE SECTOR   SCIENCE AND TECHNOLOGY SECTOR

| Department of Health | Department of Social Welfare and Development | Department of National Defense | Department of Science and technology |

PUBLIC ORDER AND SAFETY SECTOR   LOCAL GOVERNMENT SECTOR

| Department of Justice | Department of Inferior and Local Government | Autonomous Region in Muslin Mindanao | Cordilleras Administrative Region |

* Other Executive Offices

1. Commission on Phillippinos Overseas
2. Commission on Population
3. Commission on Privatization
4. Cooperatives Development Authority
5. Energy Regulatory Board
6. Games and Amusement Board
7. Government Corporate Monitoring and Coordinating Committee
8. Housing and Land Regulatory Board
9. Housing and Urban Development Coordinating Council
10. xxxxx Special Development Authority

11. Movie and Television review and Classification Board
12. Metropolitan National Authority
13. National Commission on the Role of Philippino Women
14. National Computer Center
15. National Intelligence Coordinating Agency
16. National Security Council
17. National Statistical Coordination Board
18. National Stand Farm

19. Office of Energy Affairs
20. Office of Muslim Affairs
21. Office of the Northern Cultural Communities
22. Office of the Peace Commissioner
23. Office of the Southern Culturral Communities
24. Philippine xxxx Commission
25. Philippine Racing Commission
26. Philippine Sports Commission
27. Presidential Commission on Culture and Arts
28. Presidential Commission on Good Government

29. Presidential Commission for the Urban poor
30. Presidential Committee on the Philippine Nuclear Power Plant
31. Presidential Council on Youth Affaires
32. Presidential Legislative Liaison Office
33. Presidential Management Staff
34. Securities and Exchange Commission
35. Videogram Regulatory Board

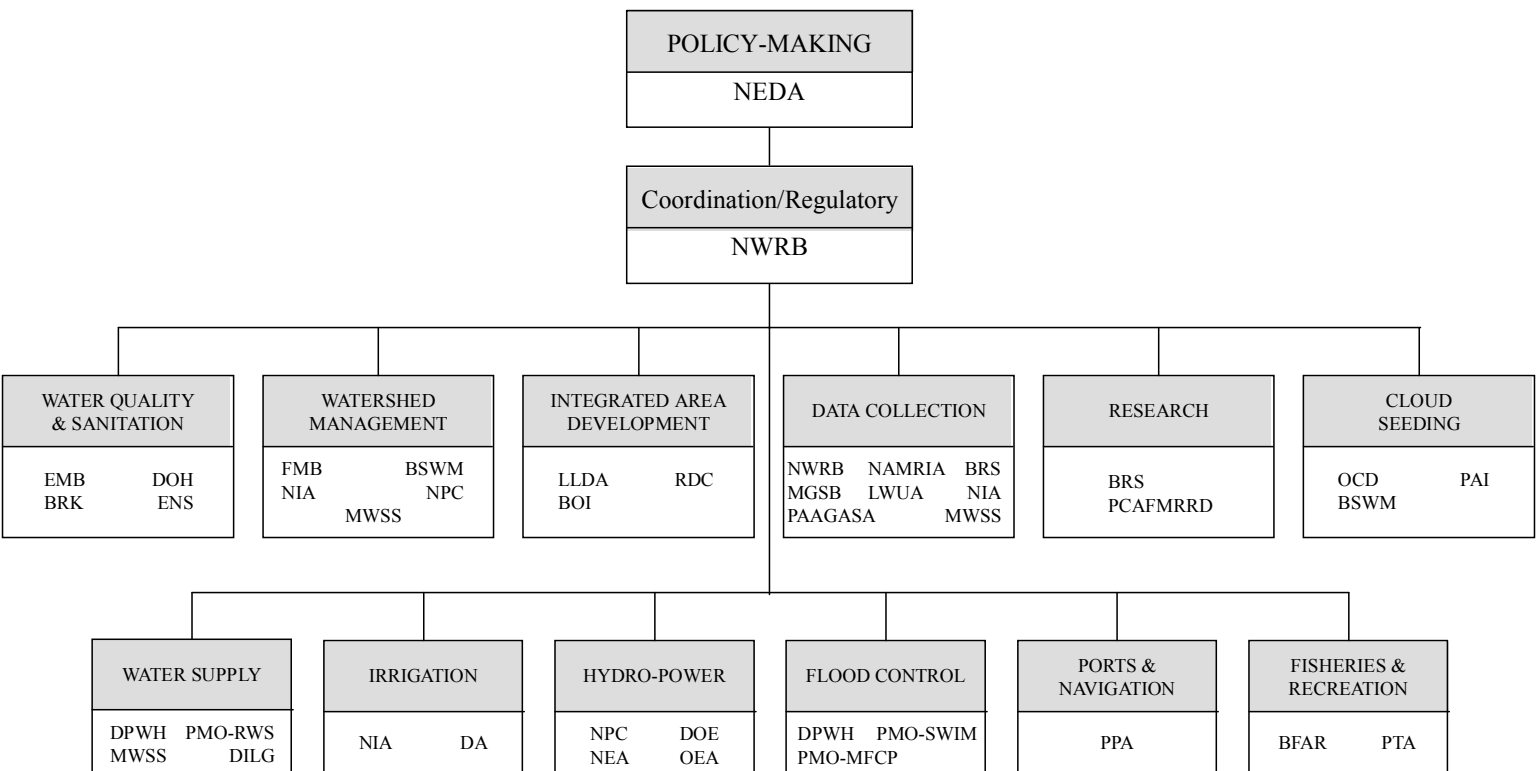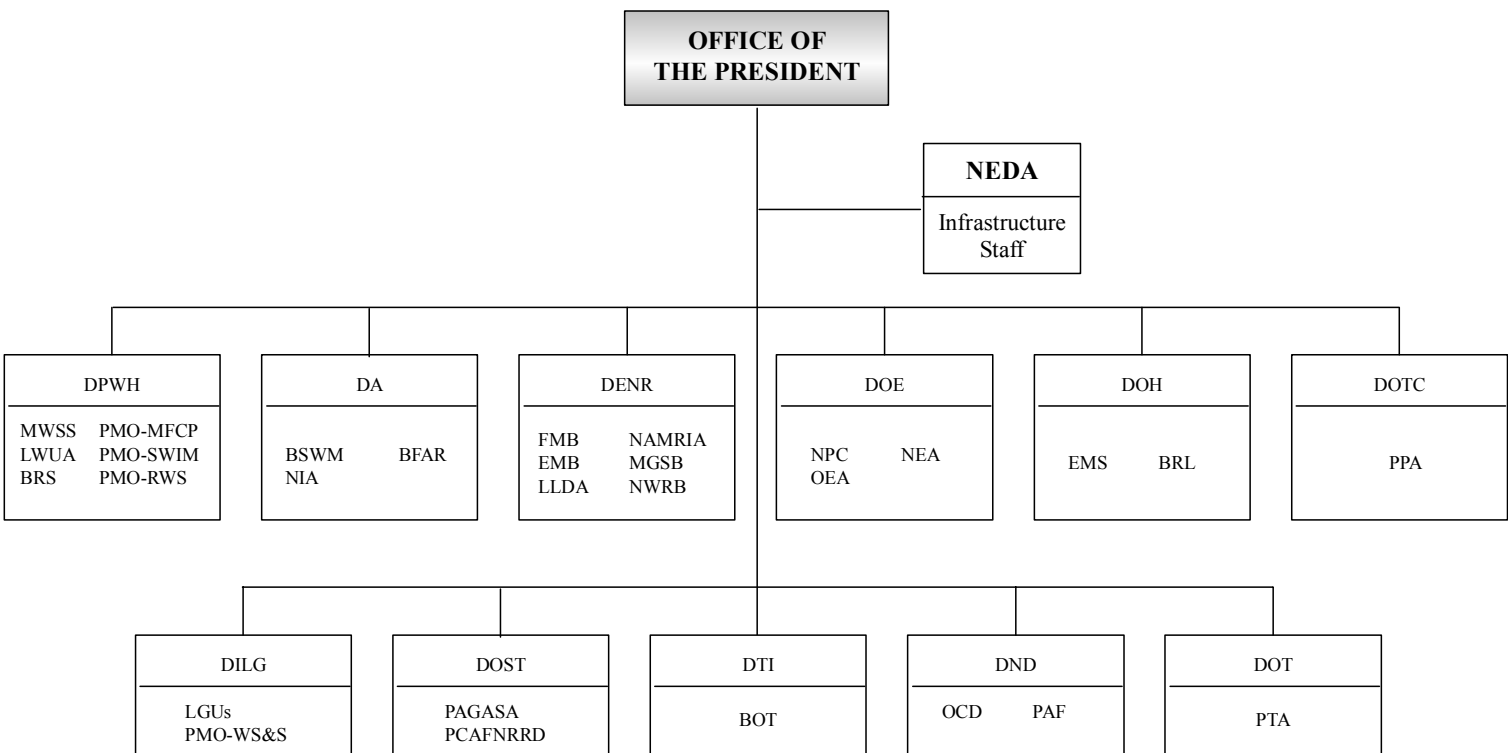| THE GOVERNMENT OF THE PHILIPPINES THE DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS	**Figure 3.11.1**
The Study on Sabo and Flood Control for Western River Basins of Mount Pinatubo in the Republic of the Philippines *JAPAN INTERNATIONAL COOPERATION AGENCY*	**Organization Chart of the Philippine Government**

JAPAN INTERNATIONAL COOPERATION AGENCY

THE GOVERNMENT OF THE PHILIPPINES
THE DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS

The Study on Sabo and Flood Control for
Western River Basins of Mount Pinatubo
in the Republic of the Philippines

Figure 3.11.2

**Functional Relationship for Water
Related Activities**

POLICY-MAKING
NEDA

Coordination/Regulatory
NWRB

WATER QUALITY & SANITATION
EMB   DOH BRK   ENS

WATERSHED MANAGEMENT
FMB   BSWM NIA   NPC MWSS

INTEGRATED AREA DEVELOPMENT
LLDA   RDC BOI

DATA COLLECTION
NWRB   NAMRIA   BRS MGSB   LWUA   NIA PAAGASA   MWSS

RESEARCH
BRS PCAFMRRD

CLOUD SEEDING
OCD   PAI BSWM

WATER SUPPLY
DPWH   PMO-RWS MWSS   DILG

IRRIGATION
NIA   DA

HYDRO-POWER
NPC   DOE NEA   OEA

FLOOD CONTROL
DPWH   PMO-SWIM PMO-MFCP

PORTS & NAVIGATION
PPA

FISHERIES & RECREATION
BFAR   PTA

Figure 3.11.3

Organizational Relationship for Water Related Activities

```
                          OFFICE OF
                        THE PRESIDENT

                                          NEDA
                                      Infrastructure
                                          Staff


   DPWH          DA          DENR          DOE          DOH          DOTC

MWSS PMO-MFCP              FMB NAMRIA
LWUA PMO-SWIM  BSWM  BFAR  EMB MGSB    NPC  NEA       EMS  BRL        PPA
BRS  PMO-RWS   NIA        LLDA NWRB    OEA


         DILG         DOST         DTI         DND          DOT

        LGUs        PAGASA                   OCD  PAF
      PMO-WS&S    PCAFNRRD       BOT                       PTA
```


Figure 3.11.3 Organizational Relationship for Water Related Activities
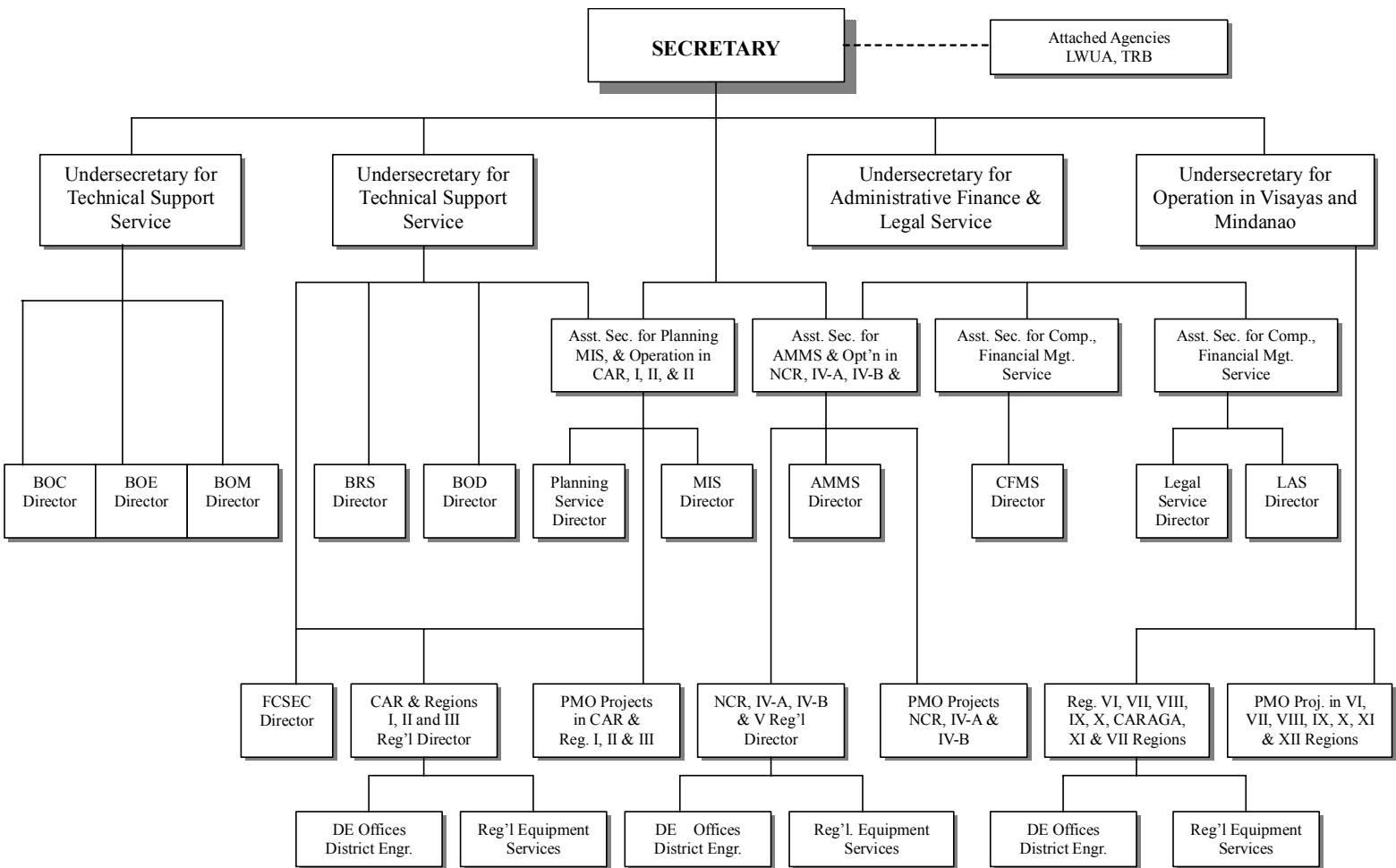
THE GOVERNMENT OF THE PHILIPPINES
THE DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS

The Study on Sabo and Flood Control for
Western River Basins of Mount Pinatubo
in the Republic of the Philippines

JAPAN INTERNATIONAL COOPERATION AGENCY

F-44

Figure 3.11.4
Department of Public Works and Highways
Central Office

SECRETARY		Attached Agencies LWUA, TRB

- Undersecretary for Technical Support Service
- Undersecretary for Technical Support Service
- Undersecretary for Administrative Finance & Legal Service
- Undersecretary for Operation in Visayas and Mindanao

- Asst. Sec. for Planning MIS, & Operation in CAR, I, II, & II
- Asst. Sec. for AMMS & Opt'n in NCR, IV-A, IV-B &
- Asst. Sec. for Comp., Financial Mgt. Service
- Asst. Sec. for Comp., Financial Mgt. Service

- BOC Director
- BOE Director
- BOM Director
- BRS Director
- BOD Director
- Planning Service Director
- MIS Director
- AMMS Director
- CFMS Director
- Legal Service Director
- LAS Director

- FCSEC Director
- CAR & Regions I, II and III Reg'l Director
- PMO Projects in CAR & Reg. I, II & III
- NCR, IV-A, IV-B & V Reg'l Director
- PMO Projects NCR, IV-A & IV-B
- Reg. VI, VII, VIII, IX, X, CARAGA, XI & VII Regions
- PMO Proj. in VI, VII, VIII, IX, X, XI & XII Regions

- DE Offices District Engr.
- Reg'l Equipment Services
- DE Offices District Engr.
- Reg'l. Equipment Services
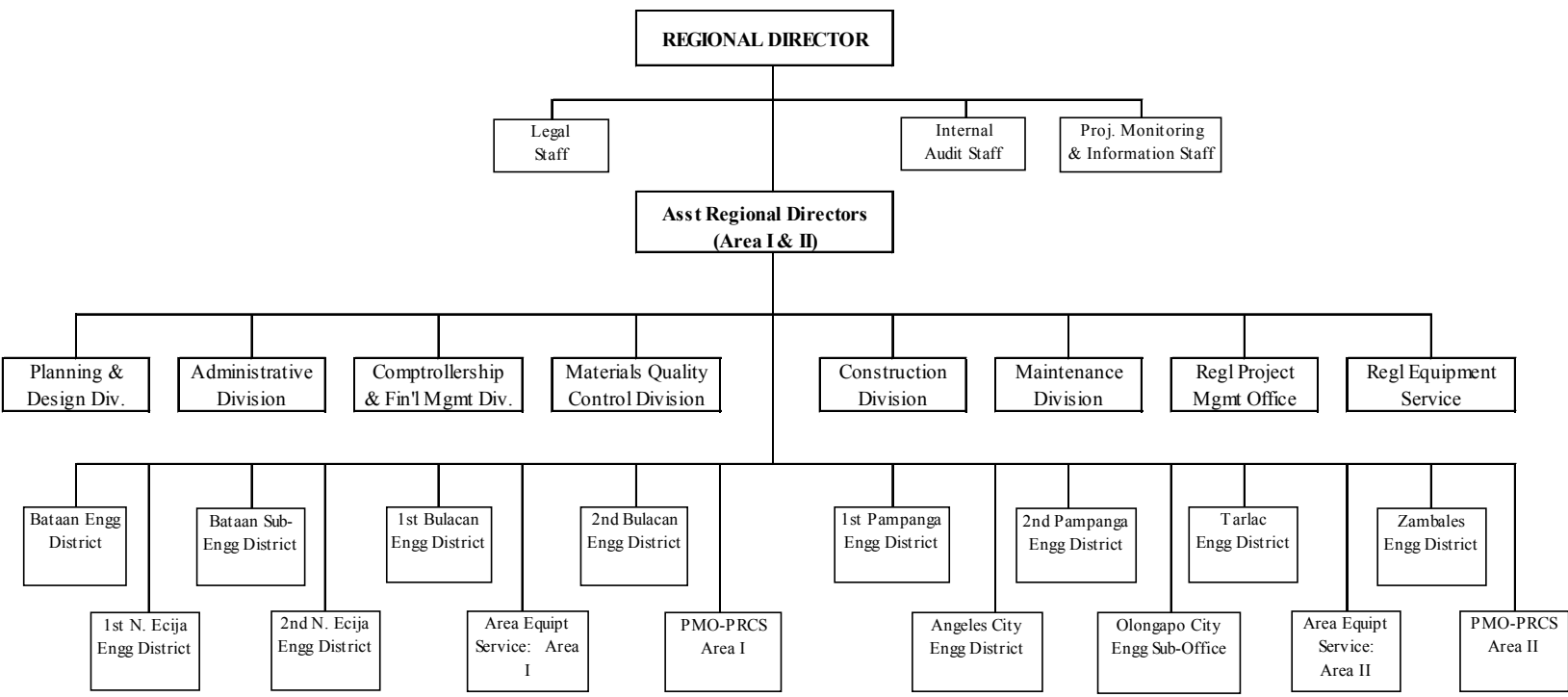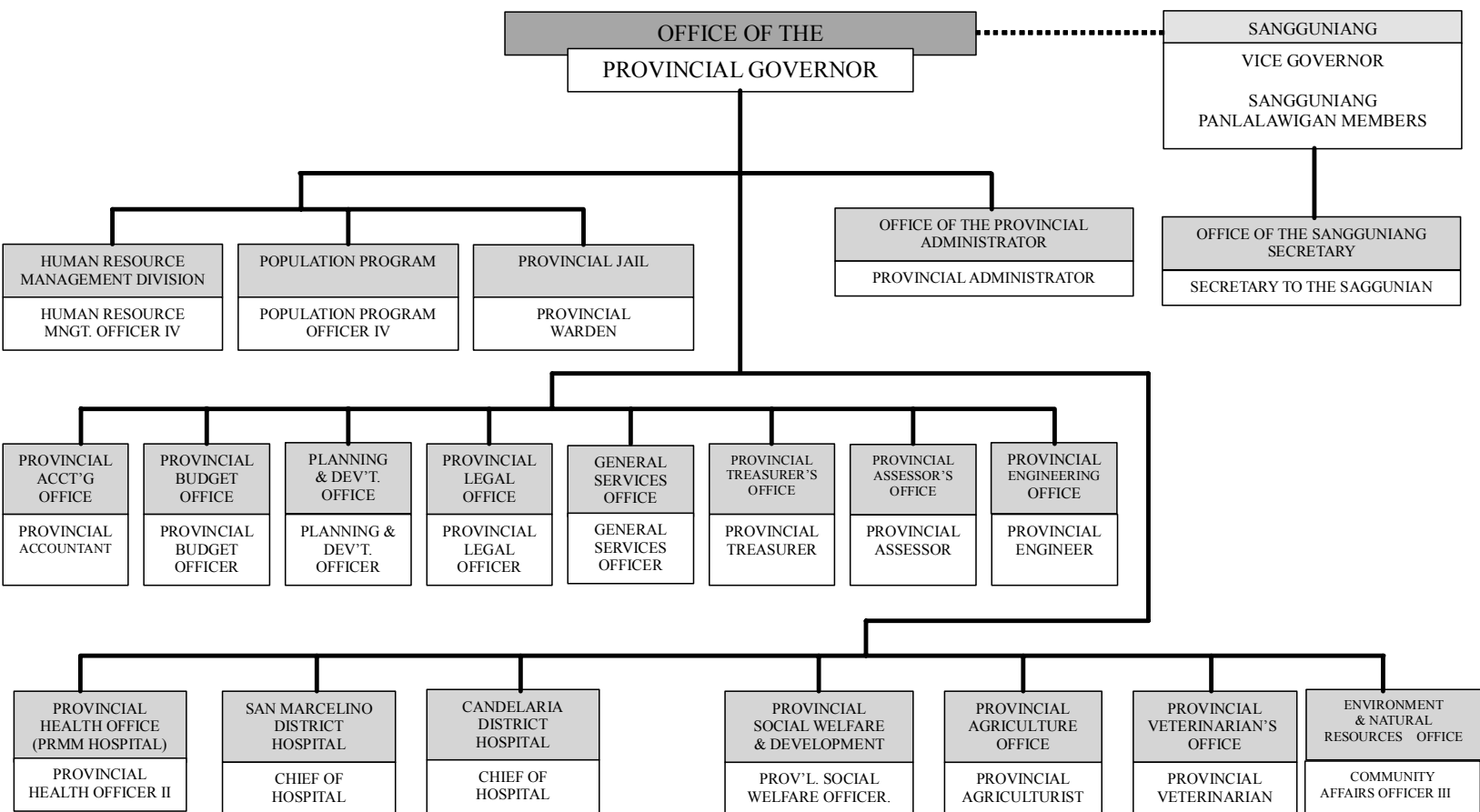- DE Offices District Engr.
- Reg'l Equipment Services

THE GOVERNMENT OF THE PHILIPPINES
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The Study on Sabo and Flood Control for
Western River Basins of Mount Pinatubo
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JAPAN INTERNATIONAL COOPERATION AGENCY

Figure 3.11.5

**Department of Public Works and Highways,
Region III**

```
                          ┌──────────────────────┐
                          │  REGIONAL DIRECTOR   │
                          └──────────────────────┘
         ┌────────────┐                          ┌──────────────┐  ┌──────────────┐
         │   Legal    │                          │  Internal    │  │ Proj. Monitoring │
         │   Staff    │                          │  Audit Staff │  │ & Information Staff │
         └────────────┘                          └──────────────┘  └──────────────┘
                          ┌──────────────────────┐
                          │ Asst Regional Directors │
                          │      (Area I & II)     │
                          └──────────────────────┘
```

| Planning & Design Div. | Administrative Division | Comptrollership & Fin'l Mgmt Div. | Materials Quality Control Division | Construction Division | Maintenance Division | Regl Project Mgmt Office | Regl Equipment Service |

| Bataan Engg District | Bataan Sub-Engg District | 1st Bulacan Engg District | 2nd Bulacan Engg District | 1st Pampanga Engg District | 2nd Pampanga Engg District | Tarlac Engg District | Zambales Engg District |

| 1st N. Ecija Engg District | 2nd N. Ecija Engg District | Area Equipt Service: Area I | PMO-PRCS Area I | Angeles City Engg District | Olongapo City Engg Sub-Office | Area Equipt Service: Area II | PMO-PRCS Area II |

JAPAN INTERNATIONAL COOPERATION AGENCY

The Study on Sabo and Flood Control for Western River Basins of Mount Pinatubo in the Republic of the Philippines

THE GOVERNMENT OF THE PHILIPPINES
THE DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS

Figure 3.11.6 Organization of Zambales Provincial Government


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                        OFFICE OF THE                    ·········    SANGGUNIANG
                     PROVINCIAL GOVERNOR                              VICE GOVERNOR

                                                                     SANGGUNIANG
                                                                     PANLALAWIGAN MEMBERS
```

HUMAN RESOURCE MANAGEMENT DIVISION	POPULATION PROGRAM	PROVINCIAL JAIL	OFFICE OF THE PROVINCIAL ADMINISTRATOR	OFFICE OF THE SANGGUNIANG SECRETARY
HUMAN RESOURCE MNGT. OFFICER IV	POPULATION PROGRAM OFFICER IV	PROVINCIAL WARDEN	PROVINCIAL ADMINISTRATOR	SECRETARY TO THE SAGGUNIAN

PROVINCIAL ACCT'G OFFICE	PROVINCIAL BUDGET OFFICE	PLANNING & DEV'T. OFFICE	PROVINCIAL LEGAL OFFICE	GENERAL SERVICES OFFICE	PROVINCIAL TREASURER'S OFFICE	PROVINCIAL ASSESSOR'S OFFICE	PROVINCIAL ENGINEERING OFFICE
PROVINCIAL ACCOUNTANT	PROVINCIAL BUDGET OFFICER	PLANNING & DEV'T. OFFICER	PROVINCIAL LEGAL OFFICER	GENERAL SERVICES OFFICER	PROVINCIAL TREASURER	PROVINCIAL ASSESSOR	PROVINCIAL ENGINEER

PROVINCIAL HEALTH OFFICE (PRMM HOSPITAL)	SAN MARCELINO DISTRICT HOSPITAL	CANDELARIA DISTRICT HOSPITAL	PROVINCIAL SOCIAL WELFARE & DEVELOPMENT	PROVINCIAL AGRICULTURE OFFICE	PROVINCIAL VETERINARIAN'S OFFICE	ENVIRONMENT & NATURAL RESOURCES OFFICE
PROVINCIAL HEALTH OFFICER II	CHIEF OF HOSPITAL	CHIEF OF HOSPITAL	PROV'L. SOCIAL WELFARE OFFICER.	PROVINCIAL AGRICULTURIST	PROVINCIAL VETERINARIAN	COMMUNITY AFFAIRS OFFICER III

Upstream

Issues / Needs after the Eruption
1) High vulnerability of Communities due to Poverty
2) Destroyed life style and culture of Aeta Tribe
3) Basin Degradation due to de-forestation
4) Water Pollution due to Mining Activities

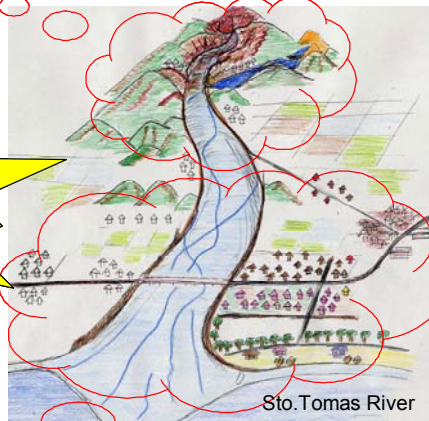**Upstream**

Measures to be Taken
1) Poverty Reduction Program
2) Recovery and Preservation of Aeta Tribe
3) Community Based Forest Management
4) Watershed Management

For Poverty Reduction And Environmental Management

Issues in upstream would increase potential risk for the downstream

Sto.Tomas River

Community Based Disaster Prevention

Non-Structural Measures

Structural Measures

Comprehensive Disaster Prevention Approach

For Upgrading Security And Economic Development

Downstream

Issues / Needs after the Eruption
1) High Mudflow Hazard Potential with continuous riverbed aggradation
2) Low Agriculture Productivity
3) Low Development in Tourism Sector

Downstream

Measures to be Taken
1) Structural Measures for Sabo and Flood Control / Mudflow Monitoring and Evacuation System
2) Recovery on Irrigation Facilities & Agriculture Land
3) Improvement of Reliability on National Highway No.7

THE GOVERNMENT OF THE PHILIPPINES THE DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS	**Figure 4.3.1**
The Study on Sabo and Flood Control for Western River Basins of Mount Pinatubo in the Republic of the Philippines	**Basic Concept of the Master Plan**
JAPAN INTERNATIONAL COOPERATION AGENCY	

Source: NEDA Region III

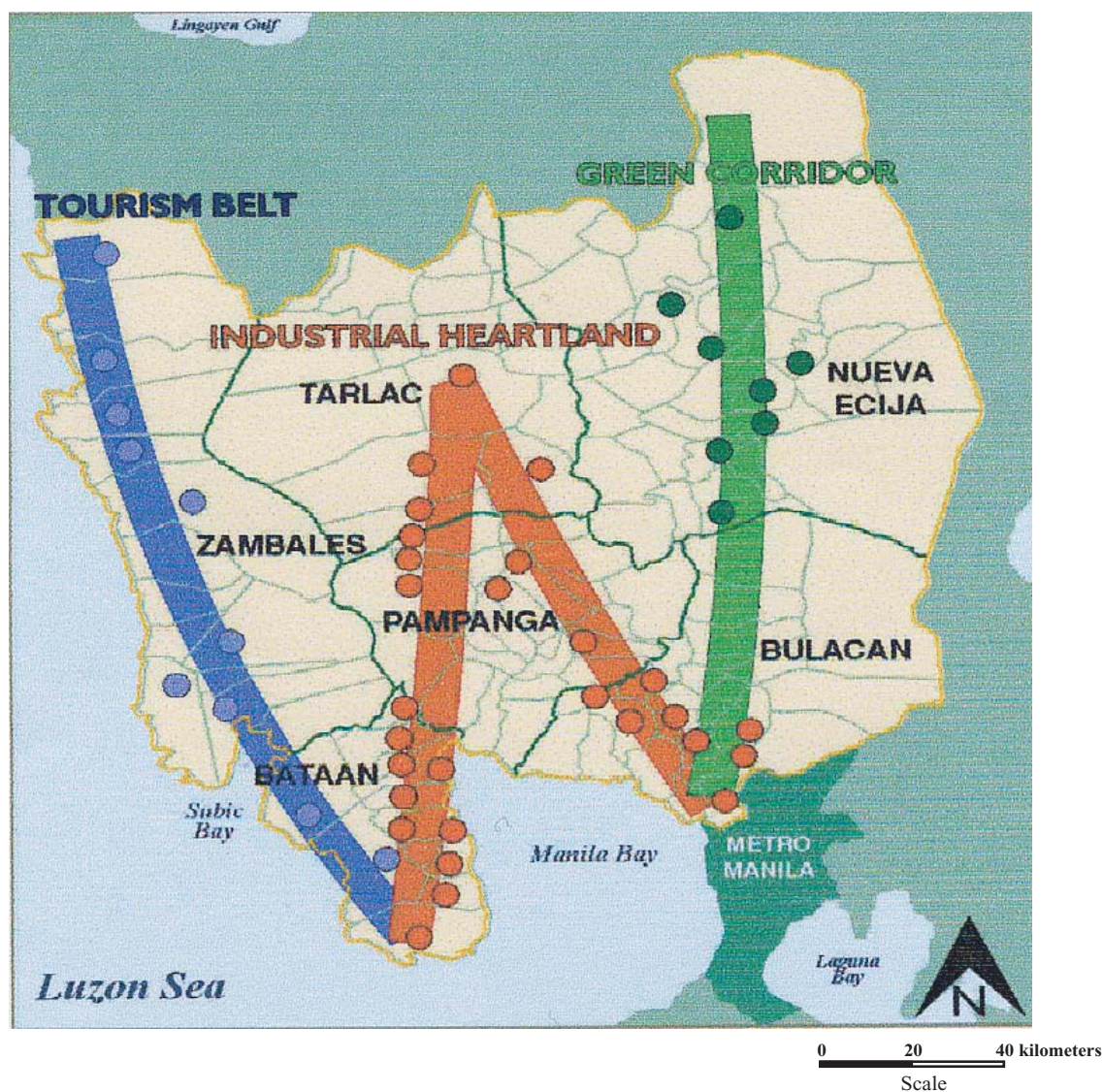|	
	Figure 4.3.2 **"W" Shaped Spatial Development Strategy of Central Luzon**

THE GOVERNMENT OF THE PHILIPPINES
THE DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS

The Study on Sabo and Flood Control for
Western River Basins of Mount Pinatubo
in the Republic of the Philippines
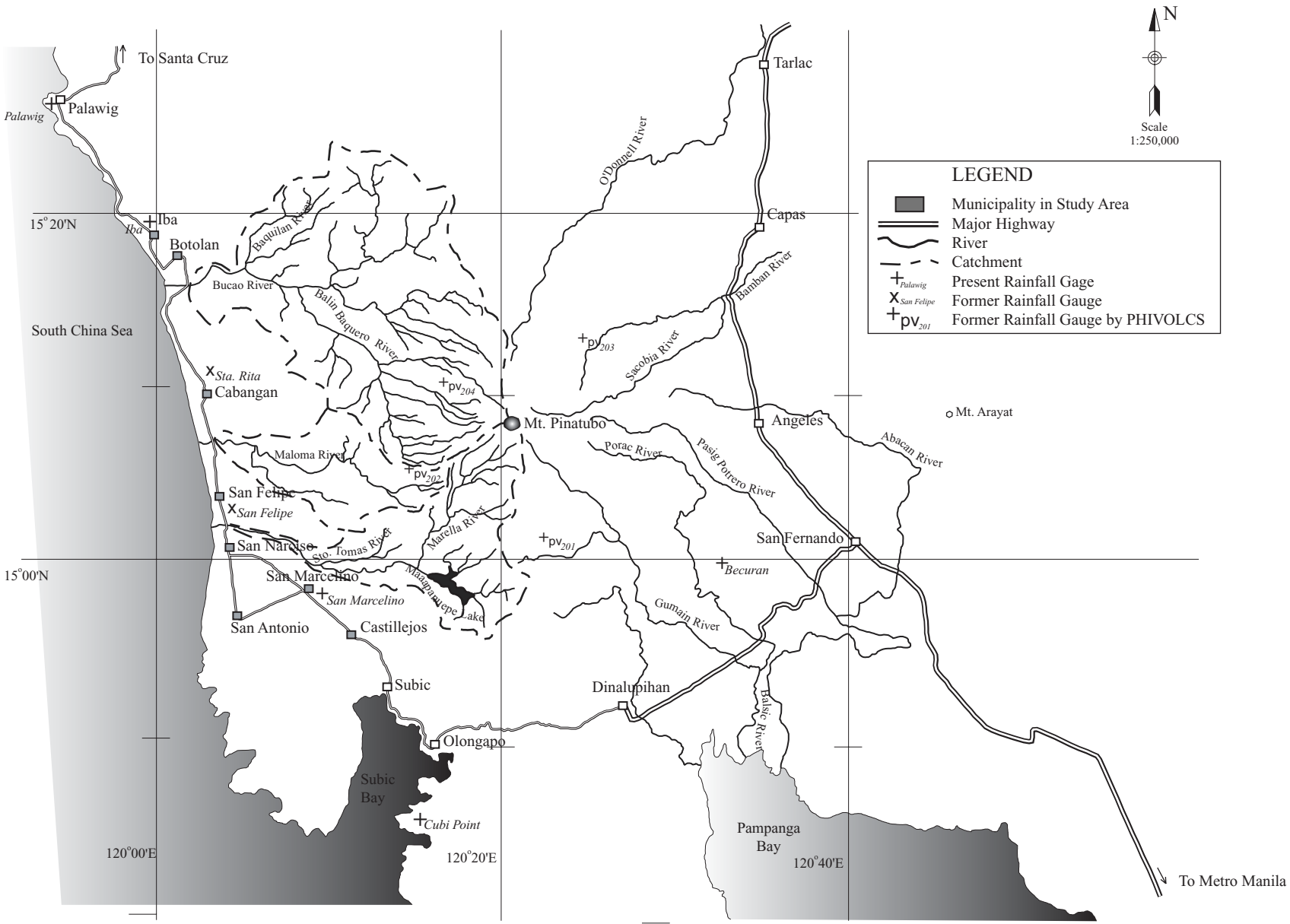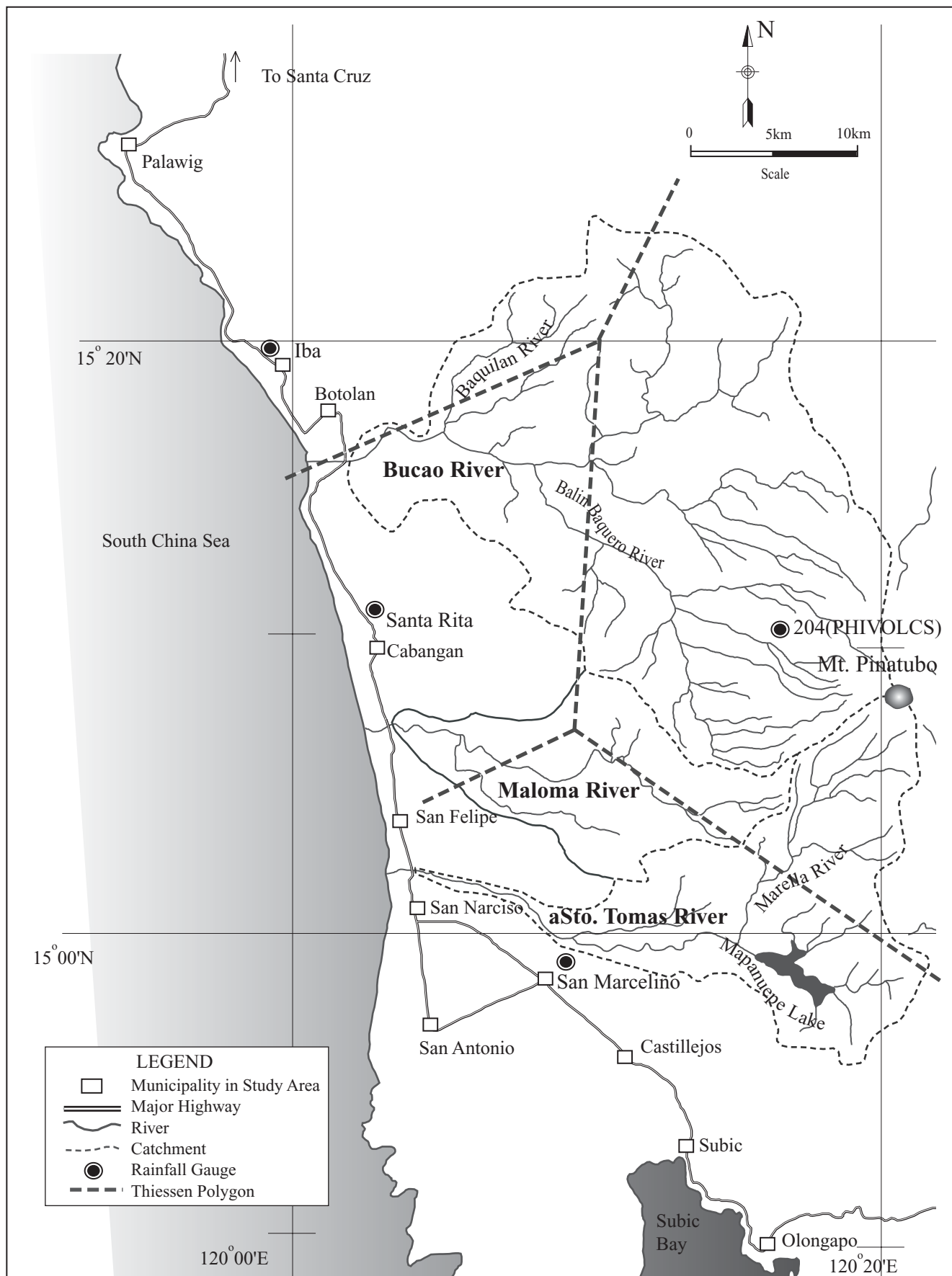
JAPAN INTERNATIONAL COOPERATION AGENCY

Figure 5.1.1

Location of Present and Former
Rainfall Gauges

N

Scale
1:250,000

LEGEND

�	Municipality in Study Area
	Major Highway
	River
	Catchment
+Palawig	Present Rainfall Gage
×San Felipe	Former Rainfall Gauge
+pv201	Former Rainfall Gauge by PHIVOLCS

To Santa Cruz

Palawig Palawig

15° 20'N

Iba Iba

Botolan

Bucao River

Baquilan River

Balin Baquero River

South China Sea

×*Sta. Rita*
Cabangan

+pv204

Maloma River

Mt. Pinatubo

San Felipe
×*San Felipe*

San Narciso

Sto. Tomas River

Marella River

+pv202

+pv201

15°00'N

San Marcelino
+*San Marcelino*

Maapaquepe Lake

+*Becuran*

San Antonio

Castillejos

Subic

Subic
Bay

Olongapo

+*Cubi Point*

Dinalupihan

Balsic River

Gumain River

Pampanga
Bay

120°00'E

120°20'E

120°40'E

To Metro Manila

O'Donnell River

Tarlac

Capas

Bamban River

+pv203

Sacobia River

Angeles

Porac River

Pasig Potrero River

Abacan River

o Mt. Arayat

San Fernando

To Santa Cruz

Palawig

N

0   5km   10km

Scale

15° 20'N   Iba

Botolan

Baquilan River

Bucao River

Balin Baquero River

South China Sea

Santa Rita
Cabangan

204(PHIVOLCS)

Mt. Pinatubo

Maloma River

Marella River

San Felipe

San Narciso

aSto. Tomas River

15° 00'N

San Marcelino

Mapanuepe Lake

San Antonio

Castillejos

LEGEND

☐   Municipality in Study Area
━━   Major Highway
～   River
- - -   Catchment
◉   Rainfall Gauge
▬ ▬   Thiessen Polygon

Subic

120° 00'E

Subic
Bay

Olongapo
120° 20'E

THE GOVERNMENT OF THE PHILIPPINES
THE DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS

**The Study on Sabo and Flood Control for
Western River Basins of Mount Pinatubo
in the Republic of the Philippines**

JAPAN INTERNATIONAL COOPERATION AGENCY

Figure 5.1.2

Thiessen Polygon for Study Area