JAPAN INTERNATIONAL COOPERATION AGENCY

DEPARTMENT OF THE INTERIOR AND LOCAL GOVERNMENT
THE REPUBLIC OF THE PHILIPPINES

STUDY ON THE PROVINCIAL WATER SUPPLY, SEWERAGE AND SANITATION SECTOR PLAN IN THE REPUBLIC OF THE PHILIPPINES

VOLUME II - 4

MAIN REPORT

PROVINCIAL WATER SUPPLY, SEWERAGE AND SANITATION SECTOR PLAN FOR THE PROVINCE OF

OCCIDENTAL MINDORO

FEBRUARY 1996

NIPPON JOGESUIDO SEKKEI CO., LTD.

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Province of Occidental Mindoro

Mamburao

OFFICE OF THE GOVERNOR

FOREWORD

The enactment of the 1991 Local Government Code has shifted the responsibility of providing the necessary social services and facilities from the national government to the local government units. The commitment to improve the quality of life of Filipino families is the vision of the Philippines 2000. This is further pursued by the Social Reform Agenda which involves the commitment of all sectors.

The Provincial Water Supply, Sewerage and Sanation Sector Plan (PW4SP) aims to provide the LGUs with the appropriate perspective in undertaking the development efforts and in ensuring that services for this sector are responsive to the basic needs.

With the implementation of this plan, we envision healthy Mindorenos living in a clean environment.

JOSEPHINE Y. RAMIREZ-SATO
Governor

PROVINCIAL WATER SUPPLY, SEWERAGE AND SANITATION SECTOR PLAN

VOLUME II - 4 MAIN REPORT

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LIST OF ABBREVIATIONS

ADB	-	Asian Development Bank
AIDAB	-	Australian International Development Assistance Bureau
AIM	-	Asian Institute of Management
AIP	-	Annual Investment Plans
BC	-	Barangay Council
BMGS	-	Bureau of Mines and Geo-Sciences (defunct), the now Mines and Geo-Sciences Bureau
BOD	-	Biochemical Oxygen Demand
BWP	-	Barangay Water Program
BWSA	-	Barangay Waterworks and Sanitation Association
CBO	-	Community-Based Organizations
CDF	-	Countryside Development Fund
CDTS	-	Community Development and Training Specialist
CIDA	-	Canadian International Development Agency
CPC	-	Country Program for Children
CPH	-	Census on Population and Housing
CPSO	-	Central Project Support Office
CSC	-	Civil Service Commission
D/D	-	Detailed Design
DA	-	Department of Agriculture
DAP	-	Development Academy of the Philippines
DBM	-	Department of Budget and Management
DECS	-	Department of Education, Culture and Sports
DENR	-	Department of Environment and Natural Resources
DEO	-	District Engineering Office
DILG	-	Department of the Interior and Local Government
DOF	-	Department of Finance
DOH	-	Department of Health
DPWH	-	Department of Public Works and Highways
DSWD	-	Department of Social Welfare and Development
DTI	-	Department of Trade and Industry
F/S	-	Feasibility Study
FW4SP	-	First Water Supply, Sewerage and Sanitation Sector Project
GOP	-	Government of the Philippines
IBRD	-	International Bank for Reconstruction and Development
IEC	-	Information, Education and Communication
IRA	-	Internal Revenue Allotment
IRR	-	Implementing Rules and Regulations
ITN	-	International Training Network
JICA	-	Japan International Cooperation Agency
LGC	-	Local Government Code
LGU	-	Local Government Unit
LWUA	-	Local Water Utilities Administration
MEO	-	Municipal Engineer's Office
MLGOO	-	Municipal Local Government Operations Officer
MPDO	-	Municipal Planning and Development Office
MS	-	Monitoring Specialist
MSL	-	Municipal Sector Liaison

MTPDP	-	Medium-Term Philippine Development Plan
MWSS	-	Metropolitan Waterworks and Sewerage System
NAMRIA	-	National Mapping and Resource Information Authority
NDCC	-	National Disaster Coordinating Council
NEDA	-	National Economic and Development Authority
NGOs	-	Non-Governmental Organizations
NMP	-	National Master Plan
NMYC	-	National Manpower Youth Council
NSMP	-	National Sector Master Plan
NSO	-	National Statistics Office
NWRB	-	National Water Resources Board
O&M	-	Operation and Maintenance
PD	-	Presidential Decree
PDC	-	Provincial Development Council
PEO	-	Provincial Engineer's Office
PHO	-	Provincial Health Office
PLGOO	-	Provincial Local Government Operations Officer
PMO	-	Project Management Office
PMU	-	Provincial Monitoring Unit
POPCOM	-	Population Commission
PoW	-	Program of Work
PPAC	-	Philippine Plan of Action for Children
PPDC	-	Provincial Planning and Development Coordinator
PPDO	-	Provincial Planning and Development Office
PSPT	-	Provincial Sector Planning Team
PST	-	Provincial Sector Team
PW4SP	-	Provincial Water Supply, Sewerage and Sanitation Sector Plan
PWSO	-	Provincial Water and Sanitation Office
RA	-	Republic Act
RHUs	-	Rural Health Units
RWSA	-	Rural Waterworks and Sanitation Association
UNDP	-	United Nations Development Programme
UNICEF	-	United Nations International Children's Emergency Fund
VIP	-	Ventilated Improved Pit Latrine
WASAMS	-	Water and Sanitation Monitoring System
WATSAN	-	Water and Sanitation
WD	-	Water District
WHO	-	World Health Organization
WSSE	-	Water Supply and Sanitation Engineer

Chapter 1

INTRODUCTION

1. INTRODUCTION

1.1 Sector Development in the Philippines

The Government of the Philippines (GOP) has, over the last decade, with the assistance from external donors, made considerable progress in developing the water supply and sanitation sector. Developments have covered physical and institutional framework nationwide.

Nevertheless, infrastructure service delivery including this sector during the period of 1987 to 1995 has been insufficient to keep pace with the demand which was magnified by natural calamities.

About 66% (42.6 M) of the population nationwide enjoyed access to potable water supply in 1992 (61% in 1986). In urban areas outside Manila, 47% (9.97 M) has access to safe water supply services, while in the rural areas, 80% (26.65 M) was covered by point water services. However, of the rural population, it was estimated that only 72% (23.9 M) was served by the existing facilities because some facilities were damaged or non-functioning. Furthermore, population served adequately by safe sources may be discounted.

Private sanitary toilets were available to 77% (9.4 M) of the total household nationwide in 1992. About 87% (5.3 M) of the households in urban areas was served by sanitary toilets, while only 67% (4.1 M) of the rural households was served. Comparing the service coverage of 77% in 1992 with that of 73% in 1987, an increase of a mere 5% of the number of available sanitary toilets was achieved within a 5 year period. Communal toilet facilities are generally found only at schools, public markets and in some cases, bus terminals and town parks. For sewerage, only portions of the cities of Metro Manila, Cebu and Baguio have sewerage systems. Municipal refuse collection using trucks is limited to urban areas. In 1992, majority of the households (81%) practiced individual disposal, while the remaining 19% relied on municipal garbage collection and disposal.

Activities in the sector are currently guided by the Water Supply, Sewerage and Sanitation Master Plan of the Philippines 1988-2000, issued in 1988 and the Medium-Term Philippine Development Plan (MTPDP: 1993-1998) in 1992. The National Sector Master Plan (NSMP) sets ambitious targets to reach large segments of the population and to redress the imbalances between rural and urban areas. Meanwhile, the MTPDP revised the targets for water supply services based on current conditions.

Development in the sector has previously to a high degree been directed by central government agencies. However, the GOP is currently in the process of decentralizing the responsibilities for implementation of infrastructure projects to Local Government Units (LGUs), in line with the Local Government Code of 1991.

The GOP is under preparation on detailed arrangements in accordance with broad reforms aimed at streamlining sectoral activities. Therefore, the institutional framework in the provincial plan is tentative.

1.2 Provincial Sector Planning

1.2.1 Objectives of Sector Planning

The main objectives of the provincial sector plan are:

(1) To prepare a Long-Term Development Plan with a target year of 2010 for the water supply, sewerage and sanitation sector;

(2) To prepare a Medium-Term Investment Plan for the sector covering the years 1996-2000 to form the basis for implementing foreign and locally funded projects;

(3) To recommend arrangements and logistics for implementing; and

(4) To identify the needs for institutional strengthening

1.2.2 Scope of Sector Planning

The study covers the following major elements to achieve the objectives mentioned above.

(1) Collection and Review of Previous Studies and Existing Data, and Establishment of Data Base: Inventories on existing conditions and facilities

1) Natural conditions and geographical features
2) Socio-economic conditions
3) Population
4) Health status
5) Environmental conditions
6) Existing facilities and service coverage
   - Water Supply
   - Sanitation and Sewerage

7) Existing sector arrangements and institutional capacity
   - Sector institution
   - Current community development and training approaches
   - Existing sector monitoring systems
8) Past financial performance in the sector development

(2) Long-Term Development Plan

1) Projection and assumption of planning framework: Projection of population and relevant frame values, and targets of the sector plan
2) Service coverage by target year
   - Water Supply
   - Sanitation and Sewerage
3) Water source development
4) Service expansion plan
5) Estimation of project cost
6) Investment program

(3) Medium-Term Investment Plan (5-year)

1) Facilities and equipment, and rehabilitation required to meet the target services
2) Identification of priority projects
3) Sector management plan
   - Institutional arrangements
   - Community development and training
   - Procurement, construction and operation and maintenance
   - Sector coordination
4) Estimation of project cost
5) Financial arrangements
   - Sources of fund
   - Additional funding requirements
   - Investment need ranking of municipalities
   - Implementation arrangements
   - Cost recovery

(4) Monitoring for Evaluation of Provincial Plan Implementation

1.2.3 Financing of Sector Plan

The First Water Supply, Sewerage and Sanitation Sector Project (FW4SP) has been implemented with financial assistance of the World Bank (IBRD). With reference to the Project, the technical assistance to help Provincial Government prepare 37 provincial sector plans in Luzon area is financed by various bilateral and multilateral agencies. Among them, nine (9) provinces including Occidental Mindoro province are assisted by the Japan International Cooperation Agency. The PW4SP will be the basis to permit execution of the sector development from the proceeds of the IBRD financed sector loan and other donors in addition to LGUs budget and internal revenue allotment from National Government.

1.3 The Provincial Plan for the Province of Occidental Mindoro

1.3.1 Preparation of the Plan

The PW4SP for the Province was prepared by a Provincial Sector Planning Team (PSPT) organized by the provincial government consisting of the Provincial Planning and Development Coordinator (PPDC), planning and development officers from PPDO, and staff members from Provincial Engineers Office (PEO) and Provincial Health Office (PHO). Preparation of the plan was also assisted by the Department of Interior and Local Government (DILG), the Department of Public Works and Highways (DPWH), the Department of Health (DOH), the Local Water Utilities Administration (LWUA), the National Economic and Development Authority (NEDA), and other national line agencies as well as Non-Government Organizations (NGOs) active in the sector. The PSPT was assisted in the preparation of the plan by JICA Study Team through technical grant assistance from Japanese Government (refer to Minutes of Discussions between DILG and JICA, and Figure 1.3.1 Organization Chart, 1.3.1 Preparation of the Plan, Supporting Report).

The PW4SP has been prepared at municipal level covering all sub-sectors for each municipality of the Province.

The report consists of three (3) volumes: I - Summary Report, II - Main Report and III - Supporting and Data Report.

1.3.2 Outline of the Report

The PW4SP is a framework plan that would serve as the basis for future implementation work in the sector. It will be carried out either as large scale projects funded by international agencies or as a small size project carried out by local parties. It should be noted that the PW4SP is a sector development plan for the entire province and that it does not include detailed planning of individual projects. The individual projects will commonly cover selected sub-sector/s for limited areas and detailed planning/design work has to be conducted for the respective projects before start of construction work. The planning process is presented in Figure 1.3.1. and the following are the contents of the Main Report (List of data and information collected is included in 1.3.2 Outline of the Report, Data Report).

Chapter 2 describes the planning approach for the sector development, which guides the preparation of the plan: the background and rationale for provincial planning, and a planning tool that would rely heavily on local participation and is flexible to improve planning and implementation.

Chapter 3 provides provincial profile with reference to current sector conditions: natural conditions and geographical features, socio-economic conditions, demographic trends, health status and environmental conditions as the planning environment.

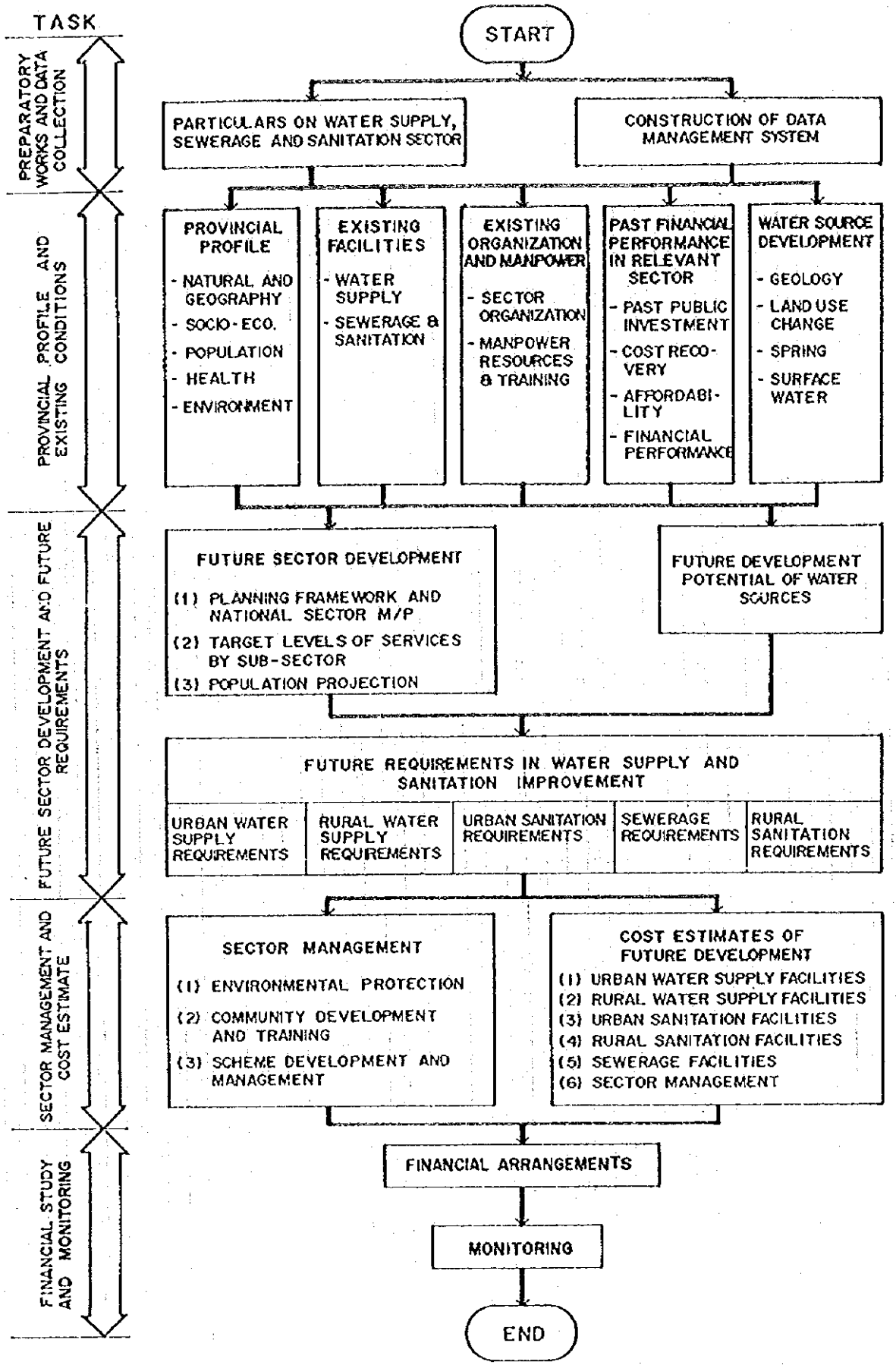
Chapter 4, 5, and 6 provide existing sector conditions in physical, managerial and financial aspects: existing water supply and sanitation facilities by service level and service coverage; sector institutions, community development, training and monitoring systems; and financial performances entailing cost recovery and affordability, which are the basis and references to come up with future development plan.

Chapter 7 analyzes the possibility of water source development for the water supply component: geological and hydrological conditions in the province, and future development potential of different water sources.

Chapter 8, 9 and 10 develop the Long-Term Development Plan and the Medium-Term Investment Plan both for physical and sector management requirements. Emphasis is placed on the sector management entailing institutional arrangements, community development, training and project implementation needs. Required cost for physical and institutional elements are also presented according to the implementation arrangements.

FIGURE 1.3.1

FLOW DIAGRAM OF SECTOR PLANNING



Chapter 11 presents financial arrangements based on identified sources of fund. The shortfall in terms of finance is shown to meet provincial targets established for the Medium-Term Investment Plan. Manner of national budget (IRA) allocation to municipalities by sub-sector is illustrated and trial calculation was made for the target year. Investment need ranking of municipalities as the factor of financial allotment is considered based on synthetic evaluation of sector components. Cost recovery by both beneficiaries and LGUs is also discussed.

Chapter 12 provides recommendations on monitoring of implemented projects covering procedures and responsibilities in different administrative levels. Periodic monitoring will allow for the updating of the PW4SP and modification of respective projects both in quality and quantity.

1.4 Acknowledgments

The Provincial Sector Planning Team (PSPT), responsible for the preparation of the PW4SP, acknowledges the extended cooperation, support and assistance in sharing essential data and planning principles by the Department of Interior and Local Government (DILG), and other national, regional, provincial, municipal and/or city, and barangay institutions (List of individuals and their corresponding offices who directly participated in the preparation of the plan is included in 1.4 Acknowledgments, Data Report). The Japanese Government through JICA has generously provided technical assistance to the PSPT throughout the course of the planning work.

Chapter 2

PLANNING APPROACH FOR FUTURE SECTOR DEVELOPMENT

2. PLANNING APPROACH FOR FUTURE SECTOR DEVELOPMENT

2.1 General

The primary basis of the PW4SP is summarized referring to national sector policy and strategies as well as major legislation and regulations relevant to the sector. Planning framework is also discussed with reference to key measurable targets. Guiding principles for preparation of the plan are described in application of computer-aided planning approach.

2.2 Planning Framework

The GOP, through the *Water Supply, Sewerage and Sanitation Master Plan of the Philippines 1988-2000* and the Medium-Term Philippine Development Plan (MTPDP): 1993-98, has manifested its commitment to the development of safe and dependable water supply and sanitation facilities. Policies and investment programs are compiled in these documents which lay out the basis of a strategy to accelerate sector development through the equitable mobilization of resources between urban and rural areas and institutional reforms at all government levels. Guiding principles set in the MTPDP include: decentralization; private sector-led development; democratic consultation; full cost recovery; social equity; and macro-economic stability.

According to MTPDP targets for the year 1998, the population served with potable water shall be increased up to 79% (57.1M). This corresponds to 71% (9.1M) of the Metro Manila population; 71% (15.5M) in other urban areas, and 85% (32.5M) in the rural areas. Sewerage facilities in Metro Manila and other highly urbanized areas will be constructed. About 1.8 million toilets will be built nationwide.

Given these MTPDP targets, as well as the goals set in the 1988 National Sector Master Plan, the current indications and the planning cycle adopted for this provincial sector planning, the national targets as shown in Table 2.2.1 will be used as the basis for setting the provincial targets.

Table 2.2.1: National Sector Coverage Targets

Sub-Sector	Year 1992	Year 2000[1]	Year 2010[2]
Urban Water Supply	47%	71%	93%
Rural Water Supply	80%	85%	95%
Sanitation	77%	93%	94%

Note: [1]Based on the 1998 MTPDP targets.
[2]Based on the long-term targets set in the previous National Sector Master Plan.

2.3 Sector Objectives

The objectives of the sector are:

(1) To provide safe and adequate water supply and sanitation to meet basic needs;

(2) To pursue proper O & M of facilities for sustainable water supply;

(3) To undertake the phased construction and installation of sewerage facilities; and

(4) To develop the capabilities of LGUs to implement water supply, sewerage and sanitation programs with the national government providing assistance in the areas of community participation, sub-sector planning, program management, regulation of development, selection of technologies, financial management, construction supervision, monitoring and reporting.

2.4 Current Sector Policies and Strategies

(1) One clear policy shift has been towards the promotion of **self-reliance** and **local community management** of services. Since the seventies, formation of local water districts in provincial urban areas has been aggressively pursued. During the eighties, this shift was further induced with the establishment of community-run BWSAs and RWSAs to provide services in smaller rural and peri-urban areas.

(2) An **integrated approach to water, sanitation and hygiene education** has been prescribed in order to achieve full health benefits of improved services. The GOP promotes intensified health education and information programs to improve hygiene practices at the household level.

(3) **Cost recovery** of capital and O & M is promoted in urban areas for piped water systems; partial recovery of operating costs in rural and low-income areas is advocated. This is a clear switch from subsidies which characterized previous strategies. Current priorities also stress the need to improve collection of water tariffs.

Reviews of previous projects have repeatedly highlighted the need to focus on **sustainability** of the projects through a truly **demand-driven** and community-based approach.

(4) **Private sector participation** is encouraged to bring into the sector business principles and practices and private capital to accelerate social and economic development; to

improve sector efficiencies; and to ease the burden on the GOP's budget and foreign borrowing.

(5) **An integrated water resources strategy** has been adopted in areas combining irrigation, power, flood control, and domestic and industrial water supply. Small and medium scale water resources projects through the active participation of the populace are encouraged. **Watershed management**; water conservation and erosion and sediment control are deemed critical.

2.5 Major Legislation and Regulations Affecting the Sector

(1) The **Local Government Code of 1991** (RA 7160) provides for a more responsive and accountable local government structure. Local government units now exercise more authority and responsibilities and provide resources to accelerate the provision of basic services and facilities, including water supply, sanitation and sewerage. The Implementing Rules and Regulations (IRR) to effect the devolution of water and sanitation responsibilities and resources are under preparation.

(2) The **Water Code of the Philippines** (PD 1067) consolidates legislation relating to the ownership, development, utilization, exploitation and conservation of water resources. The Code established the basic principles and framework on the appropriation, control and conservation of water resources to achieve their optimum economic efficiency and rational development. In addition, PD 424, declares that the National Water Resources Board (NWRB) shall be responsible for coordinating and integrating all activities related to water resources. PD 1067 also pertains to the grant of water right privileges (water permits) to appropriate and use water. Water permit applications are reviewed and granted by the NWRB.

(3) The **Provincial Water Utilities Act of 1973** (PD 198) authorizes the formation of local water districts in the provincial areas outside the Metropolitan Manila area, and provides for their administration and operation. It also created the Local Water Utilities Administration (LWUA) as a specialized lending institution for the promotion, development and financing of local water districts.

(4) **The Metropolitan Waterworks and Sewerage System (MWSS) Charter** (RA 6234) was enacted in 1971. The utility was formed to take over the facilities of NAWASA in

1971. The Charter was amended by PD 1046 expanding further its territorial jurisdiction to include areas that may be included in the growing metropolis.

(5) The **Philippine Environmental Policy** (PD 1151) requires all public and private entities to undertake an environmental impact assessment of all projects which significantly affect the quality of the environment. The **Philippine Environmental Code** (PD 1152) establishes standards for air and water quality, and guidelines for land use management, natural resource management and conservation, utilization of surface and groundwater, and waste management.

(6) The **Sanitation Code (1975)** was promulgated to deal with water supply, excreta disposal, sewerage and drainage issues. The Sanitation Code and the **National Building Code (1977)** require that new buildings be connected to a water-borne sewerage system. Where such systems do not exist, sewage must be disposed of onto Imhoff tanks or septic tanks with a subsurface absorption field. In addition, the facilities are required to conform with the **1959 National Plumbing Code.**

(7) The **1981 Rules and Regulations for Domestic Wastewater Disposal** require all subdivisions and condominiums, etc. to have adequate sewage collection, conveyance, treatment and disposal facilities. A permit must be obtained prior to commissioning a new system.

2.6 Planning Principles and Data Management

2.6.1 Planning Principles

The PW4SP shall be prepared to ensure that the sector investments are optimized under the constraints of funds and water source availability as well as planning capability. Furthermore, the plan shall ensure its sustainability at the provincial level. The overviews of the plan will be progressively adjusted and refined at different detailed implementation stages. Accordingly, the demarcation is a prerequisite between a sector plan and succeeding detailed plan/s. Specifically, the following are required as planning principles.

(1) The plan is conceived to be flexible, consistent and as simple as possible to respond to the changing socio-economic conditions of the province, accumulated technical information and updated policy of local governments allowing for periodic upgrading.

(2) The plan is arranged to allow planners to run different scenarios for project implementation, especially with reference to the interface between the provincial plan (break-down) and project proposals from municipalities (bottom-up).

(3) The plan is conceived to be adaptable to the local planning capacity and to ensure its full "ownership" by LGUs.

In addition, the following shall be taken into account to help the provincial planners perform their tasks.

(1) The plan follows existing provincial and municipal planning routines to minimize duplicated planning activities. It is essential to maintain and extend the involvement of local officials for data collection.

(2) The plan, as a comprehensive tool, considers the consistency to derive the next level of planning.

(3) The plan entails monitoring and evaluation of actual implementation progress, as investments are undertaken.

The guideline for preparation of the PW4SP is included in the Planning Approach for Future Sector Development, Data Report. It identifies all tables and figures with respective forms by main, supporting and data report.

2.6.2 Data Management

The data management system was established to come up with the basic outputs commensurate to the objectives of the provincial plan and at the same time reflect the planning approach mentioned above. It will provide a map of relative needs in the province allowing for adjustment and updating when further information becomes available. Monitoring and evaluation are to be done using the tool, thereby serving as baseline information for the improvement of planning and implementation. Different scenarios may be worked out by planners using the program in application of variable parameters.

The need for full and continuous involvement of local officials is indispensable to establish a reliable database.

(1) Computer-based system

Data management system is designed to perform simple and direct interfaces in data processing. Since a limited number of municipalities is the planning level entailing data collection from the administrative units, EXCEL was selected to facilitate data storage, retrieval, updating and processing.

The data storage system was arranged to parallel the structure of questionnaires and contain the same system of logical categories under institutional hierarchical system of the Philippines (refer to Figures 2.6.1 and 2.6.2). Data are encoded into the hierarchical level.

A series of EXCEL routines was established to allow summaries and consolidation of data into the forms required for analysis and presentation. Details are included in 2.6.2 Data Management, Supporting Report (Questionnaire Forms together with User's Guide for Computer-aided Planning are referred to 2.6.2 Data Management, Data Report).

(2) Key Parameters

Establishment of criteria and assumptions are requisites in the planning process. In this connection, key parameters are identified to allow for preparation of alternative plans and updating in accordance with sector improvement policy in the future. The parameters for relevant sub-sectors are assumed on an urban and rural basis for respective municipalities referring to current conditions and practices on national and provincial levels. The following are selected parameters in this context.

1) Number of households to be served by a Level I facility
2) Safe and unsafe percentages of Level I facilities
3) Standard number of students to be served by a unit of sanitary toilet
4) Standard number of toilets for a public utility
5) Provincial sector targets by sub-sector
6) Composition of different types of toilets
7) Per capita water consumption for Level III system
8) Composition of different types of well sources and their specifications
9) Percentage of Level I wells to be rehabilitated
10) Unit construction cost of different facilities per person/household/facility/system
11) Percentage of sector management cost to construction cost
12) Physical and price contingencies
13) Unit recurrent cost of different systems/facilities
14) Allocation factors/percentages of IRA

Figure 2.6.1 Institutional Hierarchical System of the Philippines

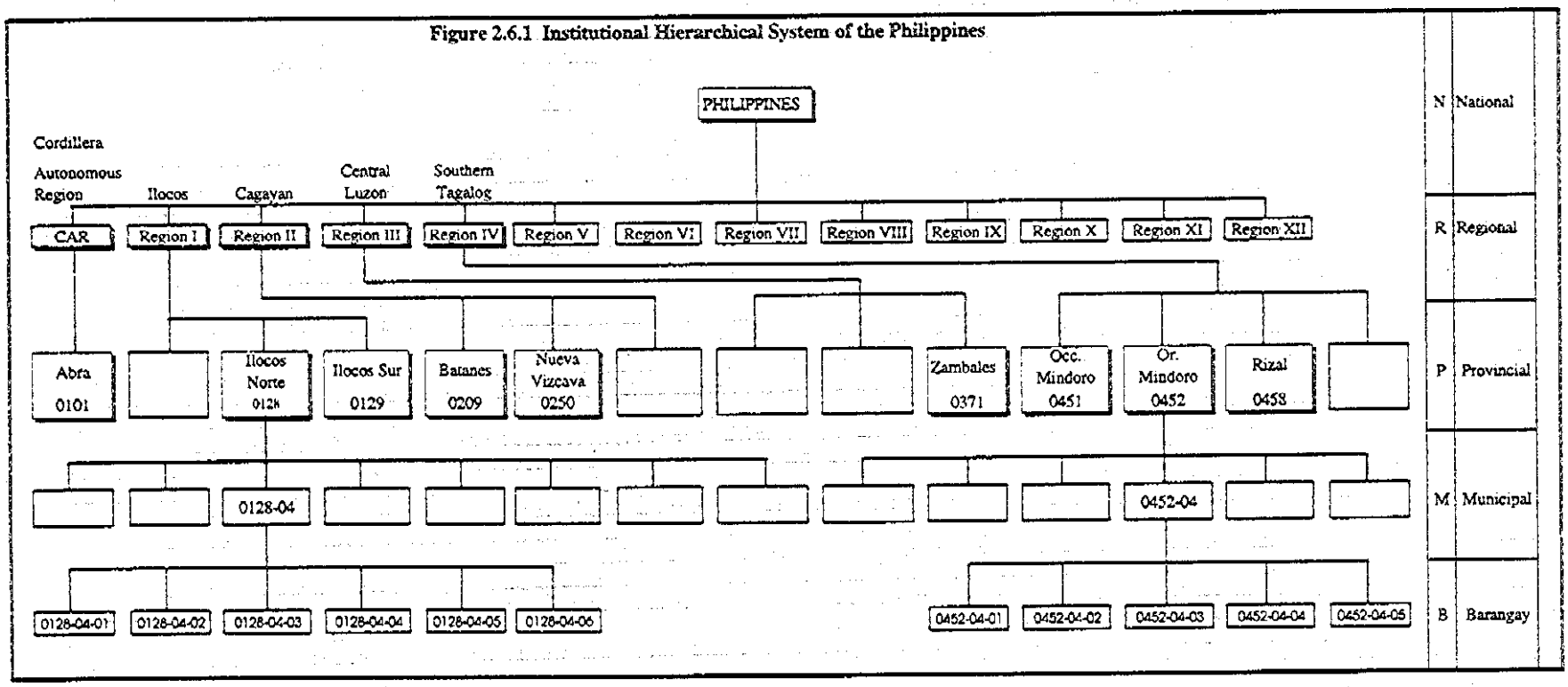


Figure 2.6.2 Structure of Questionnaire

Grouping of Data	Data Collection Level					
	Nat. N	Reg. R	Prov. P	Mun. M	Bar. B	Sys. S
1 SOCIO ECONOMIC CONDITIONS						
1.1 Area and Population			P 1.1	M 1.2		
1.2 Past Population			P 1.2.1	M 1.2.1		
			P 1.2.2	M 1.2.2		
1.3 Projected Population			P 1.3	M 1.3		
1.4 Household Number			P 1.4	M 1.4		
1.5 Services			P 1.5	M 1.5		
1.6 Occupation Category			P 1.6	M 1.6		
1.7 Family Income, Education and Literacy			P 1.7	M 1.7		
2 LAND USE						
2.1 Existing Land Use			P 2.1	M 2.1		
2.2 Future Land Use			P 2.2	M 2.2		
3 HEALTH						
3.1 Morbidity and Mortality			P 3.1	M 3.1		
3.2 Facility and Practioner			P 3.2	M 3.2		
4 WATER SOURCE						
4.1 General Information			P 4.1	M 4.1		
4.2 Water Source			P 4.2	M 4.2		
5 WATER SUPPLY SYSTEMS						
5.1 Level II Systems						S 5.1.1
						S 5.1.2
5.2 Level III Systems						S 5.2.1
						S 5.2.2
						S 5.2.3
						S 5.2.4
6 ENVIRONMENTAL SANITATION						
6.1 Private Toilet			P 6.1	M 6.1		
6.2 School/Public Toilet			P 6.2	M 6.2		
6.3 Drainage Facility			P 6.3	M 6.3		
6.4 Solid Waste Collection and Disposal			P 6.4	M 6.4		
7 INVESTMENT						
7.1 Previous Annual Investment			P 7.1			
7.2 Planned Annual Investment			P 7.2			

15) Funding levels/percentages for different financing scenarios
16) Scoring factors for municipal investment ranking
17) Annual distribution of investment cost (medium-term development)

These parameters are not included in the database program, since they are to be established through sensitivity analysis. Assumed figures are directly entered into a separate spreadsheet that is linked to the output files.

(3) Data Processing

Collected data are entered into the forms constructed in EXCEL database. The data are consolidated into final forms in application of small programs prepared for this planning. Linked outputs in tables and graphics are prepared in EXCEL spreadsheets for final analysis and presentation. Key parameters are entered in a key parameter table linked to the output tables (refer to 2.6.2 Data Management, Supporting Report).

Data in the questionnaire forms (database) are transferred to the output tables for final calculations. Adjustments are made through manipulation of the key parameter table.

Chapter 3

PROVINCIAL PROFILE

3. PROVINCIAL PROFILE

3.1 General

Occidental Mindoro is one of the two provinces comprising Mindoro Island. It is located south of Batangas and north of the Visayas. It is bounded on the north by Calavite Passage and Verde Island Passage, on the east by Oriental Mindoro, on the west by Apo East Pass, and on the south by Mindoro Strait. Other than the mainland, the province is also composed of several islands, namely: Cabra, Lubang, Ambil, and Galo on the northeast; Ambulong and Ilin on the southwest; and Apo and Menor on the west. Figure 3.1.1 presents the Location Map.

The province has a total land area of 5,879.8sq.km that is 2% of the Philippine total land area of about 300,000sq.km. It is composed of 11 municipalities with Mamburao as the provincial capital. The southern town of San Jose is the most highly urbanized municipality. There are 162 barangays, of which 49 are urban and 113 rural. Provincial total population was 282,593 in 1990. About 72% of the population resided in rural areas, while the remaining 28% in urban areas. At present, there are two (2) water districts in the province. Table 3.1.1 presents the breakdown per municipality of the land area, population and density, as well as administrative composition (NSO population census in 1990).

Table 3.1.1 Outline of Municipalities

Municipality		Land Area (sq.km)	1990 Population		Number of Barangays		
Code	Name		Number	Density (persons/sq.km)	Urban	Rural	Total
045101	Abra de Ilog	533.70	13,609	25	1	8	9
045102	Calintaan	382.50	18,117	47	1	6	7
045103	Looc	90.40	7,037	78	3	6	9
045104	Lubang	113.10	18,800	166	9	7	16
045105	Magsaysay	296.70	21,580	73	1	11	12
045106	Mamburao	339.50	21,781	64	9	6	15
045107	Paluan	564.50	7,549	13	6	6	12
045108	Rizal	242.50	23,379	96	1	10	11
045109	Sablayan	2,188.80	46,546	21	2	20	22
045110	San Jose	446.70	87,520	196	14	24	38
045111	Sta. Cruz	681.40	16,675	24	2	9	11
Provincial Total		5,879.80	282,593	48	49	113	162

Note: Municipal Code corresponds to NEDA Geographic Coding System.

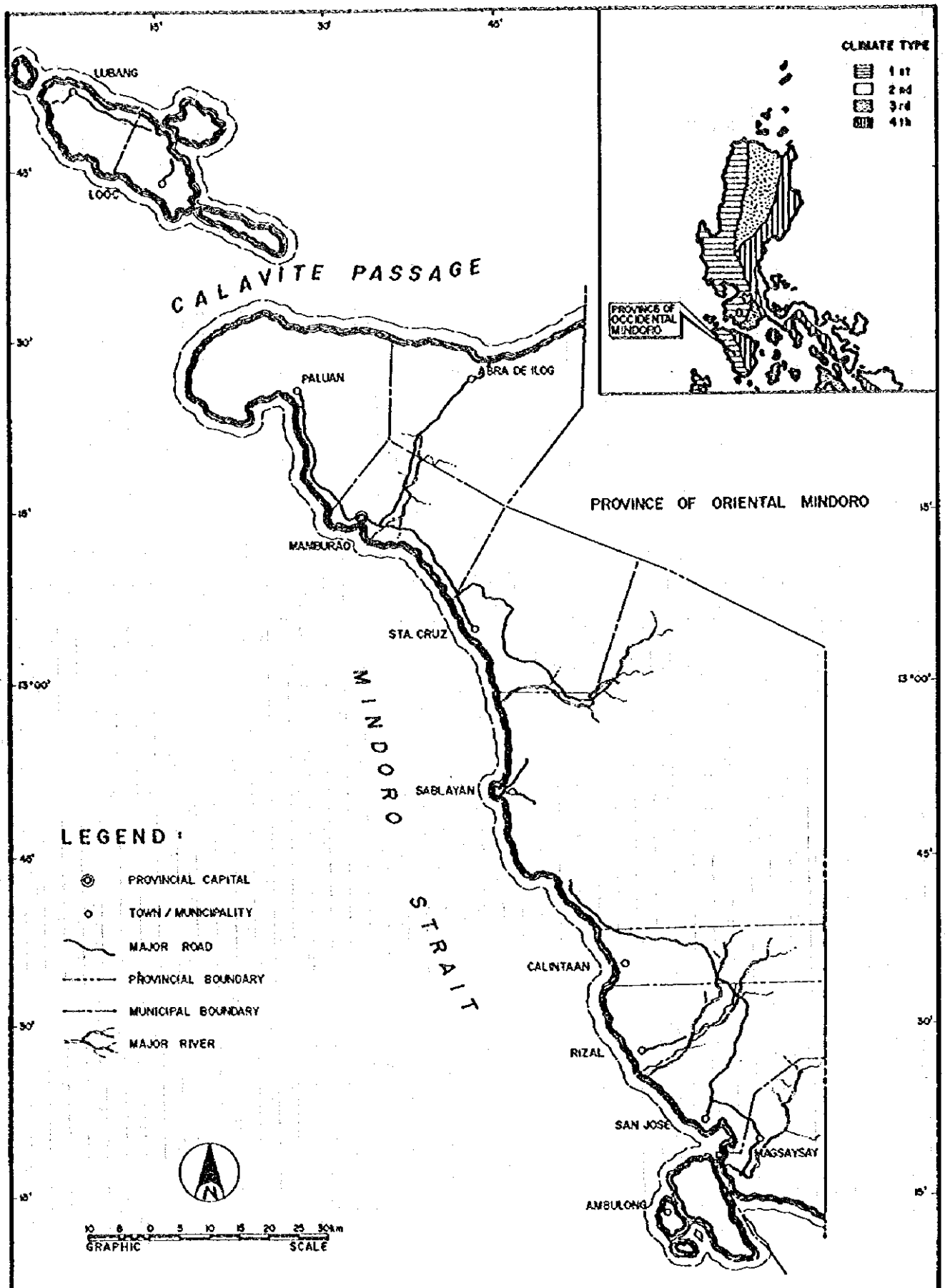


FIGURE 3.1.1

LOCATION MAP

PROVINCE OF OCCIDENTAL MINDORO

3.2 Natural Conditions and Geographical Features

3.2.1 Meteorology

The province has Type I climate under the Coronas classification and is characterized by pronounced dry and wet seasons as reflected in Figure 3.1.1, Location Map. It is normally wet during the months of June to October and dry the rest of the year. Using the 13-year records of the San Jose Station, the average annual rainfall was registered at 2,493 mm. Average maximum rainfall of 626 mm was recorded during the month of August, while the average minimum of 5.33 mm was in March.

The average annual temperature is 26.6°C with a range of 25.4°C in January to 28°C in May. The prevailing wind is southeasterly with wind speed varying by the month.

3.2.2 Land Use

Forest area constitutes about 58% of the total area of the province located mostly in the Mindoro Range. Pasture land (grassland) and Agricultural land comprise 15% and 12%, respectively. Built-up areas are limited to a mere 1.38% and are often concentrated along the coastal areas. Idle and open lands represent 12% of the total. The existing land use pattern as presented in Table 3.2.1 depicts a sustainable growth deserving and enhancing its present trend. The forest that still constitutes over half of the land area primarily serves as watershed rather than as source of timber. An efficiently managed watershed collects and regulates flow of water, controls soil erosion and minimizes water pollution. Conversion of forest land to other uses will restrict its function as a watershed. Correspondingly, a significant increase in agricultural area will result in a high demand of water uses.

Table 3.2.1 Current Land Use

Land Use	Area (sq.km)	Percentage over Total Land Area
Forest Land	3,431.22	58.40
Grassland	868.89	14.79
Built-up	79.86	1.38
Agricultural	725.94	12.38
Mangrove, Fishponds, Inland water area	45.38	0.78
Openlands	728.51	12.27
TOTAL	5,879.80	100.00

3.2.3 Topography and Drainage

General topography of the province is characterized by rugged mountains rising moderately to steeply sloping and relatively flat areas along the coast. About 65% of the total land area falls within the hilly to mountainous sections, while the remaining 35% is plain. Large plain areas are located in the municipalities of San Jose and Sablayan. Elevation ranges from near sea level to 2,488 meters above mean sea level. Mt. Baco in Sablayan is the highest mountain with a peak elevation of 2,488m. Other major mountains are the Calaarte Mt., Tusk Peak, Hagdanaw Peak and Obelsk.

The natural drainage systems generally flow westward and empty into South China Sea. Principal rivers are the Amnay, Busuanga, Caguray, Mamburao and Mongpong. Secondary rivers include Patrict, Tuay, Anuwis, Labangan, Ibod and Lumintad. Figure 3.2.1 shows the drainage systems of Occidental Mindoro. Table 3.2.2 is a list of the main rivers and their corresponding drainage areas with recorded flow rates (refer to Table 3.2.1 flow data of major rivers, Data Report). Two (2) typical rivers in the province were selected for water quality analysis, namely: Caguray and Busuanga. Examined river water was turbid and showed some color. In addition, there were high level of Iron (Fe) contents probably due to the mineral rich volcanic rocks found in the Mindoro Mountain Range. Ammonia-Nitrogen content from Caguray river was also high, probably from the extensive use of fertilizers on ricefields flanking both sides of the river.

Table 3.2.2 Drainage Areas and Flow Rates of Major Rivers

River Name	Station ID Number	Drainage Area (sq.km.)	Flow Rate (cu.m./sec)			Water Districts (using river water)
			Minimum	Average	Maximum	
Caguray River	04SW122211PW054	136	5.97	11.59	308.95	NONE
Busuanga River	04SW123210PW053	434	1.71	37.66	733.61	NONE
Mamburao River	04SW131203PW051	189	3.43	19.93	97.76	NONE
Pagbahan River	04SW130204PW052	263	4.55	29.49	374.98	NONE

Source: Philippine Water Resources Summary Data Volume 1,2 (Department of Public Works and Highways, 1991)

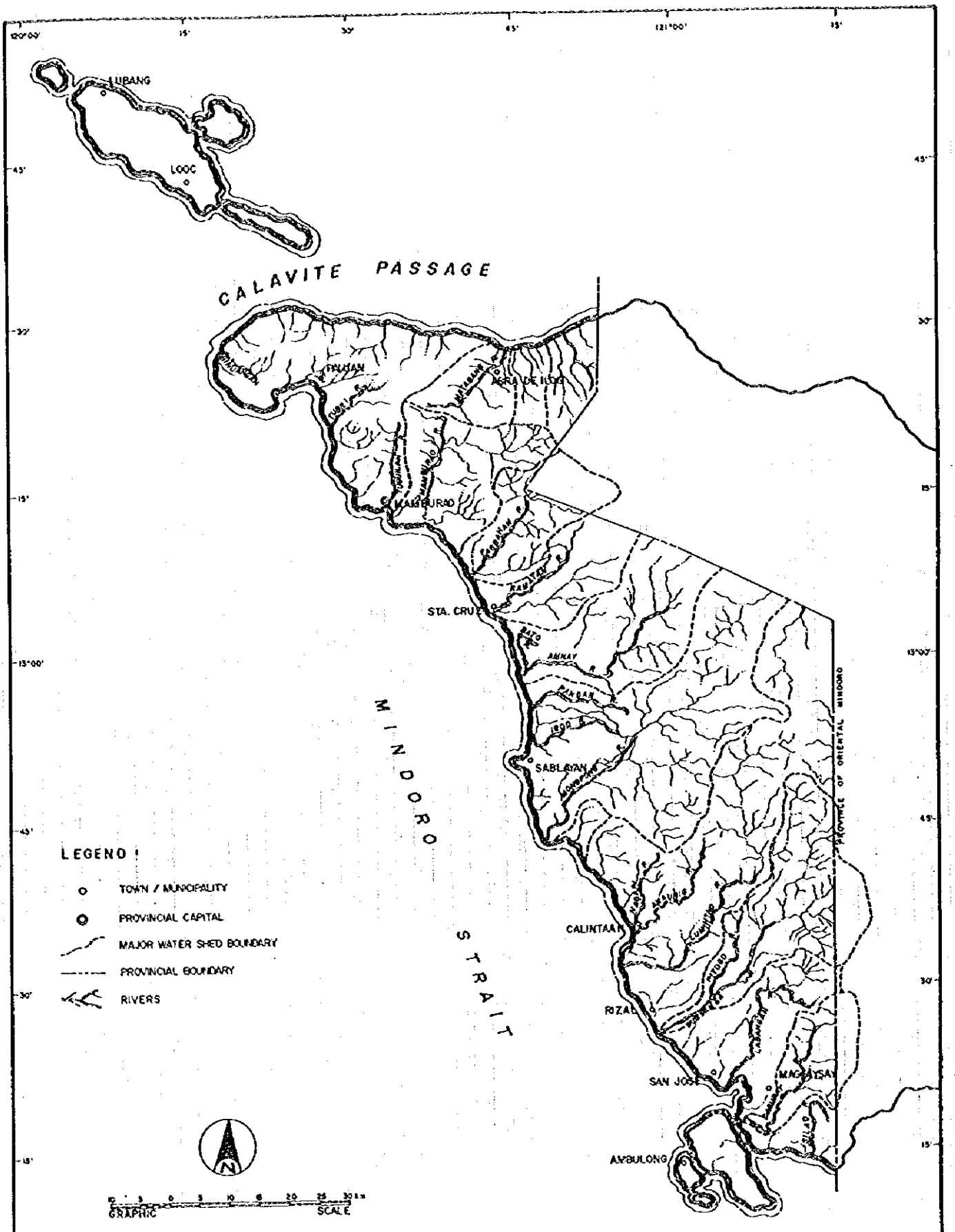


FIGURE 3.2.1

MAJOR RIVER NETWORKS

PROVINCE OF OCCIDENTAL MINDORO

3.3 Socio-economic Conditions

3.3.1 Economic Activities and Household Income

Occidental Mindoro is basically an agricultural province. The major economic activities are farming and other agriculture-related activities. Major crops cultivated are rice, peanuts, vegetables and fruits. Fishing is another important activity, since all municipalities are located along the coastline. At present, the province is promoting tourism as another income-generating activity.

The National Statistics Office (NSO) Family Income and Expenditures Survey in 1991 showed that the average annual household income of the province was ₱ 61,132, while the median was at ₱ 40,019. Distribution of households by income class in the region and province is shown in Figure 3.3.1 (refer to Table 3.3.1, Supporting Report). Percentages of households of lower income levels were greater than the average figures in the region. Based on the established poverty threshold income of ₱ 51,486 in Region IV for 1991, approximately 60% of the total number of families lived within and below the poverty threshold.

As to the number of workers by major industry group, agriculture, fishery and forestry had the dominant share followed by social and personal services, and wholesale and retail trade (refer to Table 3.3.2, Supporting Report). By major occupation group, farmers, forestry workers and fishermen had the highest share of 53%, followed by elementary occupations as shown in Figure 3.3.2.

3.3.2 Basic Infrastructure

All municipalities have electric supply, although the service coverage at household level is low. Telephone service is still limited. There are 12 post office or stations in the province. Land transportation is available by means of jeepneys, minibuses and buses. The province has two airports and 7 sea ports. There are 999 business establishments. Table 3.3.1 presents a provincial outline of public services and Table 3.3.2 reflects the number of public facilities and services by municipality (refer to Table 3.3.1, Data Report).

3.3.3 Education

The province has a total of 261 schools consisting of 223 elementary schools, 28 high schools and 10 colleges. The 1990 NSO census indicated that the province had a 93.7% literacy rate of household population 10 years old and over. A large part of the population had attained elementary or high school levels of education as reflected in Figure 3.3.3 (refer to Table 3.3.3, Supporting Report).

Figure 3.3.1 Distribution of Households by Income Class

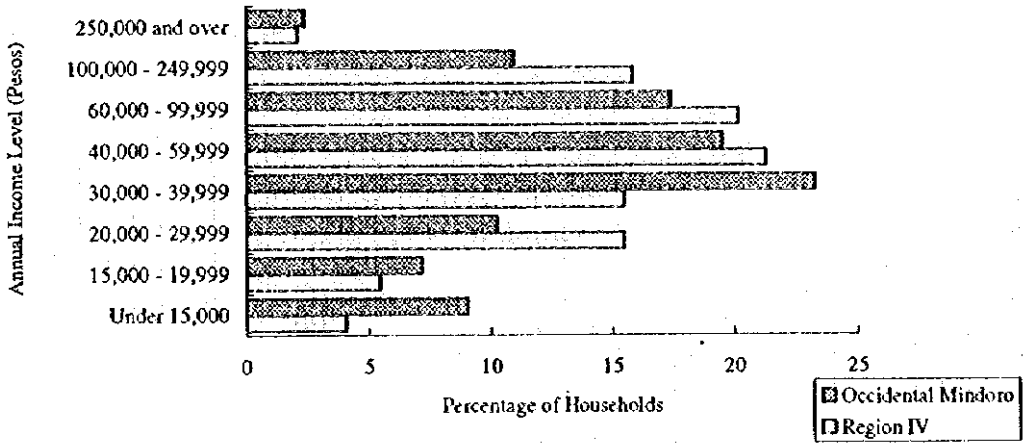


Figure 3.3.2 Population Distribution by Occupation

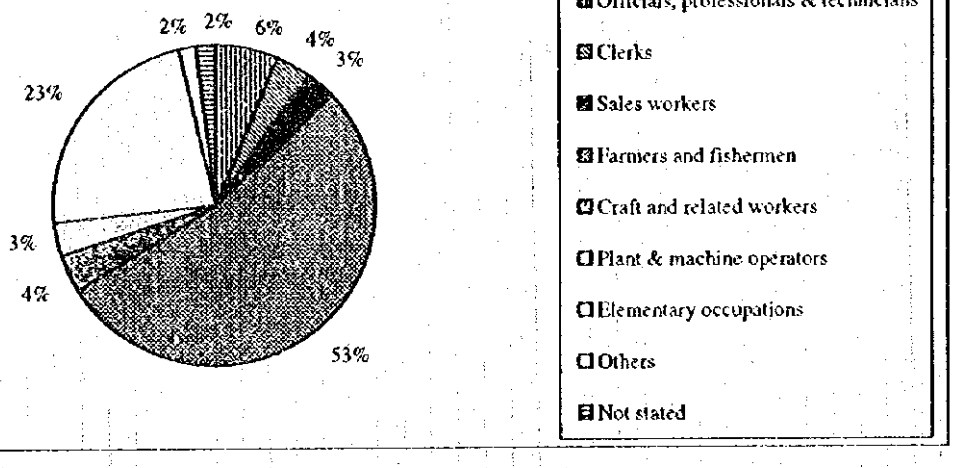


Figure 3.3.3 Population Distribution by Highest Attainment of Education

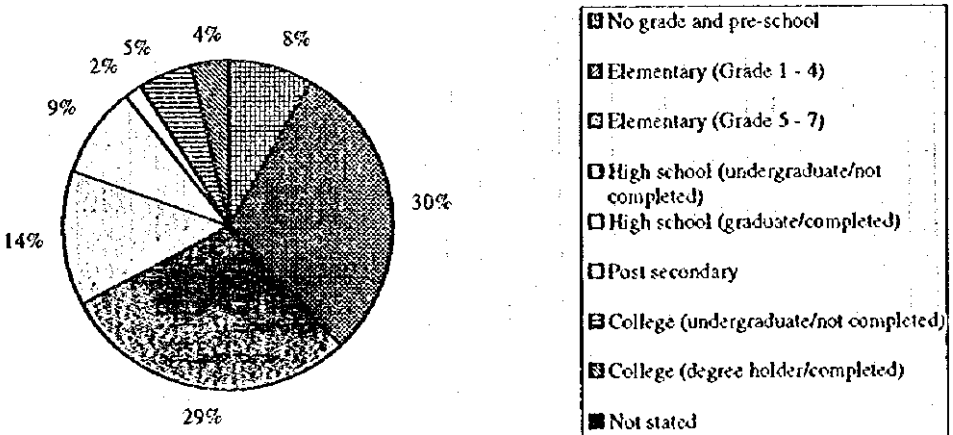


Table 3.3.1 Provincial Outline on Public Services

Items	Unit	Qty.	Items	Unit	Qty.
(1) Roads			**(8) Tourism facilities**	Number	9
a) Total Length	km	1,663.30	(Hotel resort, lodges, recreational		(Tourist
b) Barangay roads	Percent	48.6	facilities, etc.)		Spots)
(2) Electricity service coverage			**(9) Schools**		
a) Municipality	Percent	100	a) Elementary level	Number	223
b) Barangay	Percent	53.3	b) Secondary level	Number	28
c) Household	Percent	24	c) Tertiary level	Number	10
(3) Telecommunication Services			**(10) Health Facilities**		
a) Availability in municipality	Percent	0	a) Hospital/clinics	Number	8
b) Telegraph station	Number	15	b) Main health centers, rural health	Number	43
c) Telephone station	Number	1	units, barangay health center, etc.		
(4) Post Office	Number	12	**(11) Labor**		
			a) Labor force participation ratio	Percent	59.9
(5) Transportation services	Mode	Bus,Jeep	b) Employment rate	Percent	90.9
	(ex. Bus,	7 Seaports			
	jeep, taxi,.)	2 Airports	**(12) Average family income**		
			a) Monthly income	Pesos/Month	5,094
(6) Banking Facilities	Number	7	b) Monthly expenditure	Pesos/Month	4,174
a) Private bank	(by Private				
b) Public bank	and public)				
(7) Industrial/business/commercial					
establishment	Number	999			

Sources:

PSPT, Provincial Socio-economic Profile Development Plan, 1990 Population Census, 1991 Family Income and Expenditures Survey by NSO

Table 3.3.2 Public Facilities and Services by Municipality

Municipality	High School			College	Hospital	Public Market	Bank	Annual Growth Rate of Population (1980-1990)
	Public	Private	Total					
	nos.	nos.	nos.	nos.	nos.	nos.	nos.	Percent
Abra de Ilog	1	1	2	0	1	1	0	0.5
Calintaan	4	0	4	0	0	1	0	2.3
Looc	1	0	1	0	0	0	0	0.3
Lubang	1	1	2	0	1	1	0	2.1
Magsaysay	2	0	2	0	0	1	0	2.1
Mamburao	1	0	1	1	1	2	2	3.4
Paluan	1	0	1	0	1	2	0	0.1
Rizal	2	0	2	0	1	0	0	2.3
Sablayan	5	1	6	1	1	1	1	2.4
San Jose	3	2	5	8	1	1	4	2.8
Sta. Cruz	2	0	2	0	1	1	0	4.3
TOTAL	23	5	28	10	8	11	7	2.4

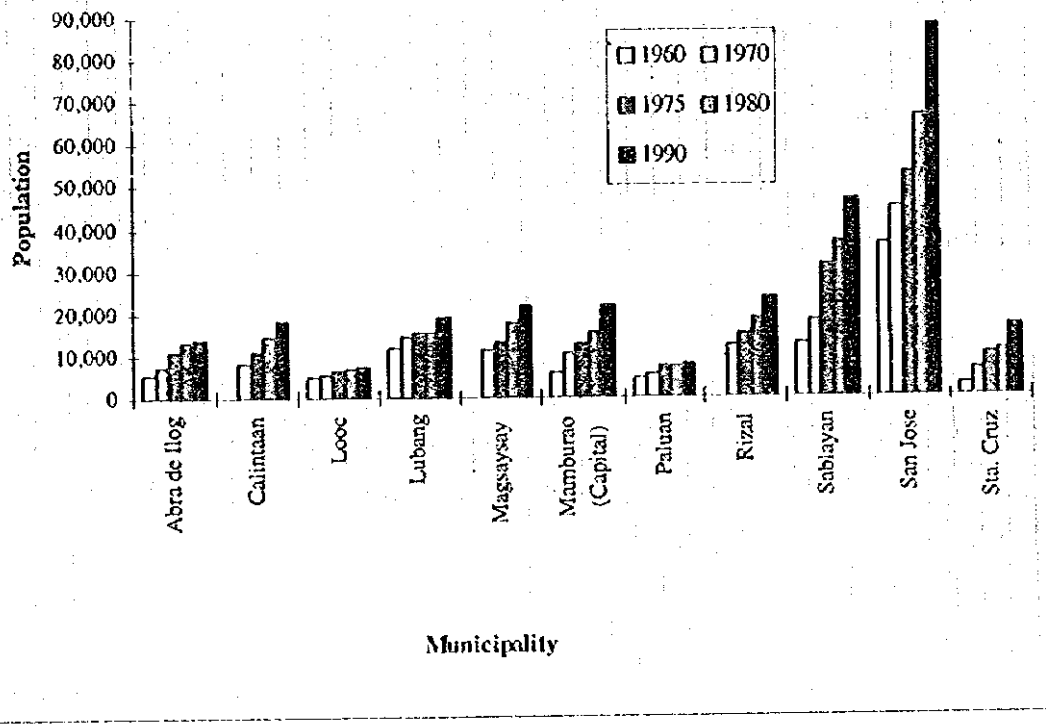
3.4 Population

3.4.1 Previous Population Development

A declining provincial population growth rate had been experienced since the last six (6) census years (1948-1990) as indicated in Figure 3.4.1. From an average annual growth rate of 5.7% during the period 1948 to 1960, it gradually decreased to 2.4% (1980-1990). A summary of the average annual growth rates of the province is as follows:

Year	Population	Ave. Annual Growth Rate (%)	Period
1960	84,316	5.7	1948 - 1960
1970	144,032	5.5	1960 - 1970
1975	185,787	5.2	1970 - 1975
1980	222,431	3.7	1975 - 1980
1990	282,593	2.4	1980 - 1990

Figure 3.4.1 Previous Population Development of the Province



A consideration on how the population growth behaved in the past and how it is likely to behave in the future is important because of the issue of resource allocation including the water supply and sanitation sector requirements.

The 1994 population was estimated to provide the planning base for this Master Plan (refer to Section 8.3.1 Population Projection, Main Report). Table 3.4.1 shows a breakdown of the past population development by municipality including the 1994 estimated population.

Table 3.4.1 Previous Population Development by Municipality

Municipality	Previous Population						Est. Pop.
	1948	1960	1970	1975	1980	1990	1994
Abra de Ilog	4,504	5,346	7,356	10,810	12,917	13,609	13,627
Calintaan	0	0	7,949	10,740	14,416	18,117	19,787
Looc	4,299	5,101	5,569	6,491	6,801	7,037	7,347
Lubang	10,282	11,647	14,335	15,292	15,293	18,800	20,537
Magsaysay	0	0	11,475	13,132	17,560	21,580	23,593
Mamburao (Capital)	5,571	5,822	10,559	12,655	15,533	21,781	24,428
Paluan	2,718	4,597	5,383	7,346	7,438	7,549	7,911
Rizal	0	0	12,108	14,938	18,609	23,379	25,819
Sablayan	3,332	12,685	18,256	31,117	36,699	46,546	51,528
San Jose	12,443	36,211	44,761	53,100	66,262	87,520	97,420
Sta. Cruz	0	2,907	6,281	10,166	10,903	16,675	18,450
TOTAL	43,149	84,316	144,032	185,787	222,431	282,593	310,447

3.4.2 Classification of Urban and Rural Areas

NSO classifies a barangay as urban when it satisfies any of the following conditions on the economic and social functions.

(1) In their entirety, all municipal jurisdictions which, whether designated as chartered cities, provincial capital or not, have a population density of at least 1,000 persons per square kilometer.

(2) Poblaciones or central districts of municipalities and cities which have a population density of at least 500 persons per square kilometer.

(3) Poblaciones or central districts (not included in nos. 1 and 2) regardless of population size, which have the following:

1) Street pattern, i.e., network of streets either at parallel or in right angle orientation;

2) At least six establishments (commercial, manufacturing, recreational and/or personal services); and
3) At least three of the following:
   a) a town hall, church or chapel with religious services at least once a month;
   b) a public plaza, park or cemetery;
   c) a market place or building where trading activities are carried on at least once a week; and
   d) a public building like school, hospital, puericulture and health center or library.

(4) Barrios/Barangays having at least 1,000 inhabitants, which meet the conditions setforth in no. 3 above, and in which the occupation of the inhabitants is predominantly non-farming/fishing.

All areas not falling under the urban classification are defined as rural area. Distribution of the classified areas is shown in Figure 3.4.1, Supporting Report.

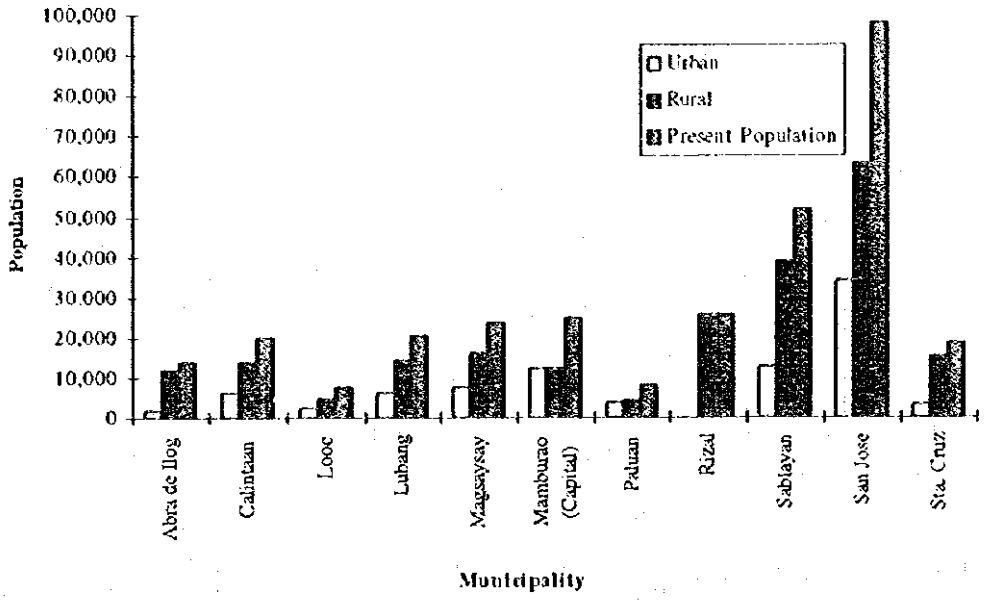
For this Master Plan, the 1990 NSO classification of urban and rural barangays is the basis, however, some barangays were modified by the PPDO to reflect the actual conditions prevailing in the area. A total of 3 urban barangays was re-classified as rural. With the re-classification, there are 46 urban barangays and 116 rural barangays for a total of 162 barangays in Occidental Mindoro.

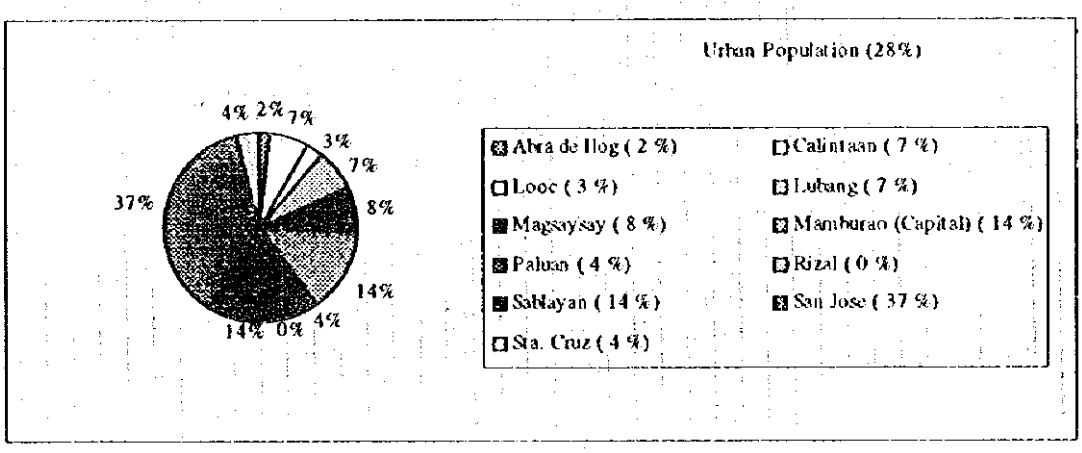
3.4.3 Present Population Distribution

Utilizing the modified classification of the barangays, urban-rural population was derived. Rural population accounts for 72% of the provincial total, while the remaining 28% is urban as reflected in Figure 3.4.2. Table 3.4.2 presents the breakdown of the number of urban and rural barangays by municipality and its corresponding present population.

There are 55,176 households with 39,603 residing in rural areas and 15,573 households in urban areas. The average provincial household size is 5.1 persons/household. Table 3.4.3 presents a breakdown per municipality on the number of households and household sizes by urban and rural area.

Figure 3.4.2 Present Population Distribution





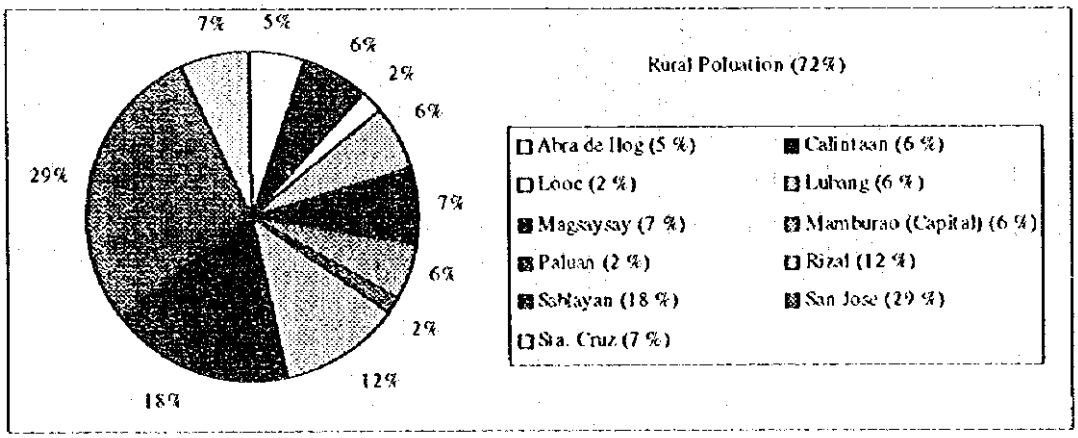


Table 3.4.2 Outline of Urban and Rural Areas in the Province

Municipality	Land Area (sq.km)	Number of Barangay			Population (1990)		
		Urban	Rural	Total	Urban	Rural	Total
Abra de Ilog	533.70	1	8	9	1,680	11,929	13,609
Calintaan	382.50	1	6	7	5,280	12,837	18,117
Looc	90.40	3	6	9	1,684	5,353	7,037
Lubang	113.10	8	8	16	5,717	13,083	18,800
Magsaysay	296.70	1	11	12	6,584	14,996	21,580
Mamburao	339.50	9	6	15	11,414	10,367	21,781
Paluan	564.50	6	6	12	3,207	4,342	7,549
Rizal	242.50	0	11	11	0	23,379	23,379
Sablayan	2,188.80	2	20	22	9,786	36,760	46,546
San Jose	446.70	13	25	38	30,735	56,785	87,520
Sta. Cruz	681.40	2	9	11	2,602	14,073	16,675
Provincial Total	5,879.80	46	116	162	78,689	203,904	282,593

Table 3.4.3 Household Numbers and Household Sizes

Municipality	Number of Households			Household Size (person / HH)		
	Urban	Rural	Total	Urban	Rural	Total
Abra de Ilog	347	2,542	2,889	4.8	4.7	4.7
Calintaan	966	2,464	3,430	5.5	5.2	5.3
Looc	388	1,105	1,493	4.3	4.8	4.7
Lubang	1,313	2,685	3,998	4.4	4.9	4.7
Magsaysay	1,293	2,800	4,093	5.1	5.4	5.3
Mamburao	2,321	2,029	4,350	4.9	5.1	5.0
Paluan	669	946	1,615	4.8	4.6	4.7
Rizal	0	4,468	4,468	0.0	5.2	5.2
Sablayan	1,848	7,190	9,038	5.3	5.1	5.2
San Jose	5,966	10,698	16,664	5.2	5.3	5.3
Sta. Cruz	462	2,676	3,138	5.6	5.3	5.3
Provincial Total	15,573	39,603	55,176	5.1	5.1	5.1

3.5 Health Status

3.5.1 Morbidity, Mortality and Infant Mortality

The number one cause of morbidity in 1990 was diarrhea, a water-borne and water-washed disease followed by acute respiratory infection. Bronchitis and anemias ranked fourth and fifth, respectively. Other causes of morbidity in descending order were malaria, influenza, chicken pox, measles, tuberculosis and heart diseases. Regarding mortality, the number one cause was pneumonia, followed by tuberculosis. Skin and heart diseases ranked third and

fourth, respectively. Other causes include diarrhea, meningitis, malaria, and influenza. Pneumonia, diarrhea and prematurity were the three (3) leading causes of infant mortality in the province (refer to Table 3.5.1, Data Report).

The general health status of the populace of the province in 1990 was relatively fair compared with the national condition. The incidence of diseases was lower in Occidental Mindoro than the Philippines as a whole. Table 3.5.1 presents a comparative statistics on the ten leading causes of morbidity, mortality and infant mortality of the province as well as of the Philippines.

Table 3.5.1 Number and Rates of Ten Leading Causes of Morbidity, Mortality and Infant Mortality

Rate: 1/100,000

	Causes	OCCIDENTAL MINDORO 1994		Philippines 1990		
		Number	Rate	Number	Rate	Ranking
Morbidity	1. Diarrhea	3,135	1,009.8	943,580	1,520.7	2
	2. ARI	1,282	413.0			
	3. Bronchitis	702	226.1	980,557	1,580.3	1
	4. Pneumonia	622	200.4	235,947	380.3	4
	5. Malaria	405	130.5	73,625	118.7	8
	6. Influenza	370	119.2	544,768	878.0	3
	7. Varicella, Chickenpox	187	60.2			
	8. Measles	119	38.3	42,938	69.2	9
	9. Tuberculosis	95	30.6	152,688	246.1	5
	10. Heart Diseases	64	20.6	99,688	160.7	7
Mortality	1. Pneumonia	119	38.3	41,240	66.5	2
	2. Tuberculosis	75	24.0	24,307	39.1	4
	3. Skin Diseases	48	15.5			
	4. Heart Diseases	33	10.6	46,272	74.4	1
	5. Diarrhea	14	4.5	7,493	12.0	7
	6. Meningitis	12	3.9			
	7. Malaria	2	0.6			
	8. Influenza	1	0.3			
Infant Mortality	1. Pneumonia	26	8.4	9,383		1
	2. Diarrhea	8	2.6	1,838		4
	3. Prematurity	7	2.2			
	4. Septicemia	5	1.6	1,532		5
	5. Heart Diseases	3	0.9			

Water-related diseases in the ten leading causes of morbidity include diarrhea (rank 1st) and malaria (rank 5th), although the control of this disease is beyond the scope of the sector. Diarrhea also ranked 5th and 2nd as the leading causes of mortality and infant mortality, respectively.

3.5.2 Water Related Diseases

An indicator of health problems related to water supply and sanitation is the incidence of water-related diseases. The World Health Organization (WHO) has classified diseases related to water into four (4) categories: 1) water-borne diseases e.g., cholera, typhoid, hepatitis A, diarrhea and dysentery; 2) water-based diseases e.g., schistosomiasis; 3) water-washed diseases e.g., diarrhea, intestinal parasitism, scabies, conjunctivitis (sore eyes), and skin diseases; and 4) water-vector related diseases e.g., malaria, filariasis and dengue or H-fever. As with malaria, the control of filariasis is beyond this Master Plan. A safe water supply, sanitary toilet and proper hygiene practices are conditions necessary for the control and prevention of these diseases.

Water-related diseases reported in the province in 1990 were typhoid/paratyphoid, diarrhea, dysentery, conjunctivities, skin diseases and malaria. Table 3.5.2 presents the reported cases and deaths of notifiable water-related diseases in the province.

Table 3.5.2 Reported Cases and Deaths of Notifiable Water Related Diseases in 1990

Rate: 1/100,000

Diseases	Morbidity		Mortality		Infant Mortality	
	Number	Rate	Number	Rate	Number	Rate
Water-borne						
1. Typhoid/Parathyphoid	41	13.2	0	0	0	0
2. Diarrhea	3,135	1,009.8	14	4.5	8	2.6
3. Dysentery	3	0.9	0	0	0	0
Water-washed						
1. Conjunctivities	95	30.6	75	24.0	0	0
2. Skin Disease	0	0.0	48	15.5	0	0
Water vector						
1. Malaria	405	130.5	2	0.6	0	0

3.5.3 Health Facilities and Practitioners

Present facilities serving the health care of the populace are 8 hospitals, 11 rural health units and 32 barangay health stations. The ratio of the population to these facilities and to the health practitioners are very well below as compared to the national average figures (refer to Table 3.5.1 number and ratio of population to health facilities and/or medical practitioners, Supporting Report).

3.6 Environmental Conditions

3.6.1 General

Ennvironmental issues and problems directly affecting the sector and/or how the sector affects these environmental concerns are dealt with in this sub-section. Specifically, the problems of water pollution and solid waste disposal spawned by rapid population growth and increasing industrial and economic activities are discussed. These problems put a strain on the provincial water resources and hinder their optimum utilization.

3.6.2 Water Pollution

There is no existing sanitary sewerage system in the province. Majority of the drainage facilities in all municipalities are open canals or ditches. The rivers and streams function as the drainage system. These rivers receive the domestic wastewater and storm water collected by the segmented drainage facilities in urban centers or poblacions.

A major water pollution source in urban areas is domestic wastewater. Graywater generated by households is simply allowed to discharge into nearby channels. Effluent from septic tanks or cesspools is also flowing into the streams. The other major pollutant is dumped refuse that finds its way to the river systems during rain or is thrown indiscriminately into the rivers. In rural areas, natural assimilation of the river may be expected to purify organic substances. However, pollution or contamination is anticipated caused by agricultural activities especially with reference to fertilizers and pesticides.

The province has no major pollution related industries. Only small-scale and cottage industries exist. Hence, the waterbodies are not yet polluted/contaminated by industrial pollutants. As of now, the rivers in the province have not been classified as to their usage by the Department of Environment and Natural Resources (refer to general information in Table 3.6.1 DENR Water Quality Criteria/Water Usage and Classification, Supporting Report).

3.6.3 Solid Waste Disposal

Of the 11 municipalities, only 2 have municipal refuse collection and disposal service as of 1994, namely: Mamburao and San Jose (details are referred to Table 3.6.1, Data Report). These municipalities have 1 unit of open dump truck each. In the province, a mere 10% of

the households is served, while the majority (90%) is unserved. Table 3.6.1 reflects the manner of solid waste collection and disposal, and service coverage by municipality in 1994.

Open dumping is commonly practiced by the LGUsas disposal of solid wastes. The dumped refuse is usually burned or left unattended. Some significant negative effects associated with this unsanitary method are surface and groundwater pollution, air pollution, scattered solid waste, breeding grounds for insects, rodents and other disease vectors and fire hazard. At the household level, unserved households by the LGUs primarily depend on individual waste disposal such as idumping in vacant lots or body of water, burying and composting.

Table 3.6.1 Municipal Solid Waste Collection and Disposal, and Service Coverage, 1994

Municipality	Number of Households 1994	With Service						Without Service				Percentage of Households Served	Percentage of Households Unserved
		Number of Collection Trucks			Disposal			Manner of Disposal (Number of Household)					
		Open Dump Trucks	Closed Type Trucks	Total Units	Number of Households Served by Open Dump Site	Number of Households Served by Sanitary Landfill	Total Households Served	Dumping (Land and Water)	Burying	Composting	Total Households Unserved		
Abra de Ilog	2,892	0	0	0	0	0	0	272	2,620	0	2,892	0	100
Calintaan	3,742	0	0	0	0	0	0	382	3,360	0	3,742	0	100
Looc	1,592	0	0	0	0	0	0	264	1,328	0	1,592	0	100
Lubang	4,336	0	0	0	0	0	0	950	3,386	0	4,336	0	100
Magsaysay	4,449	0	0	0	0	0	0	49	4,400	0	4,449	0	100
Mamburao (Capital)	4,889	1	0	1	1,085	0	1,085	583	3,221	0	3,804	22	78
Paluan	1,684	0	0	0	0	0	0	173	1,511	0	1,684	0	100
Rizal	4,965	0	0	0	0	0	0	1,098	3,867	0	4,965	0	100
Sablayan	10,010	0	0	0	0	0	0	2,993	7,017	0	10,010	0	100
San Jose	18,505	1	0	1	4,840	0	4,840	3,149	11,516	0	14,665	26	79
Sta. Cruz	3,448	0	0	0	0	0	0	285	2,170	993	3,448	0	100
Provincial Total	60,512	2	0	2	5925	0	5,925	10,198	44,396	993	55,587	10	90

Chapter 4

EXISTING FACILITIES AND SERVICE COVERAGE

4. EXISTING FACILITIES AND SERVICE COVERAGE

4.1 Water Supply

4.1.1 General

Existing water supply facilities and conditions were surveyed by municipality under the category of urban and rural areas (as of October, 1994). Facilities are classified into three service levels, of which Level I facilities are further classified into safe and unsafe for drinking purpose.

The percentages of service coverage by different service level were estimated covering urban and rural areas by municipality. The served population is defined as "population served adequately with access to safe water sources/facilities." The rest of the population with unsafe sources/facilities and without access to water supply facilities was then defined as "underserved population" and "unserved population," respectively. The service coverage was figured out using estimated population in 1994.

Service profile and operating conditions of existing facilities are summarized by service level to come up with problem areas and the need of rehabilitation to reflect in the development plan.

As a provincial total, approximately 49% of the present population (of which 37% in urban area and 63% in rural area) is considered as adequately served (refer to detailed study in Supporting Report). Under the area classification, 63% of urban population and 43% of rural population have access to safe water sources/facilities, while the rest is underserved and/or unserved. About117,500 persons or 77% of the served population depend on Level I facilities, while 35,300 persons or 23% are served by Level III and/or Level II systems. Lower service coverage in rural area is caused by the existence of many unsafe shallow wells and/or no provision of facilities.

4.1.2 Types of Facilities and Definition of Service Level Standard

(1) Composition of water supply system/facility

The National Sector Master Plan defines service level and system components of the water supply systems/facilities as shown in Table 4.1.1.

Table 4.1.1 Composition of Water Supply System/Facility by Service Level

Description	Level I (Point Source Facility)	Level II (Communal Faucet System)	Level III (Individual House Connection)
1. Water Source	Drilled/driven shallow well Drilled/driven deep well Dug well Spring Rain collector	Drilled shallow/deep well Spring Infiltration gallery	Drilled deep well Spring Infiltration gallery Surface water intake
2. Water Treatment	Generally none. Disinfection of wells is conducted periodically by local health authorities. Iron removal facilities are provided in problem areas.	Generally none. Disinfection facility is sometimes provided.	Disinfection is provided. Systems with a surface water source have a series of water treatment facilities.
3. Distribution	None	Piped system provided with reservoir/s.	Piped system provided with reservoir/s and pumping facilities.
4. Delivery & Service Level	At point (within 250 m radius)	Communal faucet (within 25 m radius)	Individual house connection/ household tap
5. Consumption Rate (adequately served)	at least 20 lpcd	at least 60 lpcd	at least 100 lpcd

(2) Safe and unsafe classification of water sources

DOH has classified Level I water source facilities as safe (reliable water source) and unsafe sources/facilities under the drinking water quality standard.

Safe source: Protected deep well, protected shallow well, improved/covered dug well and developed spring

Unsafe source: Unprotected deep well, unprotected shallow well, open dug well, undeveloped/unprotected spring and rain collector

Water sources other than the above, such as untreated surface water of rivers, lakes and ponds are among unsafe sources. Level II and III water supply systems are, on the other hand, regarded to have safe/reliable sources in a provision of adequate treatment.

(3) Service level standard

The National Sector Master Plan defines "adequate service level" by different water supply system. Improvement in the number of households per system may be expected for Level I services in the future. On the contrary, the number of households served by a unit of private/public source is sometimes beyond the standard on a current basis.

Level III: 1 household/connection

Level II: 5 (4 to 6) households/communal faucet

Level I: 15 households/point source
1 household/private well

4.1.3 Level III Systems

Level III systems (individual house connection system) at municipal level are usually established and operated by WD under technical and financial assistance of LWUA. Some LGUs also implement and operate Level III systems commonly at barangay level.

There are 6 Level III systems in the province operated under different kinds of ownership (authority or association) as shown in Table 4.1.2. These are;

- Water Districts in the municipalities of San Jose and Sablayan,
- Municipal waterworks in Abra de Ilog, Lubang and Mamburao, and
- Barangay waterworks for Tilik in Lubang municipality.

Table 4.1.2 Information on Existing Level III Systems

Municipality	Name of System (Operating Body)	Water Source and Consumption			Service Coverage						
		Type of Water Source[1]	Water Consumption (cu. m/day)	Domestic Supply (%)	Number of Barangays Served			HH Pop.	Number of HHs/ Pop. Served		
					Urban	Rural	Total		Urban	Rural	Total
Abra de Ilog	Abra de Ilog WW	SP	99.00	57.29	1	1	2	HHs	282	25	307
								Pop.	1,354	118	1,472
Lubang	Lubang RWSA	DgW	282.30	27.81	7	1	8	HHs	529	346	875
								Pop.	2,328	1,695	4,023
	Tilik RWSA	Surf	102.90	33.63	1	0	1	HHs	319	0	319
								Pop.	1,403	0	1,403
	Municipal Total		385.20	29.16	8	1	9	HHs	848	346	1,194
								Pop.	3,731	1,695	5,426
Magsaysay	San Jose WD	DgW	226.40	26.20	1	1	2	HHs	258	60	318
								Pop.	1,316	324	1,640
Mamburao (Capital)	Mamburao RWSA	SW	738.80	78.60	9	0	9	HHs	1,511	0	1,511
								Pop.	7,404	0	7,404
Sablayan	Sablayan WD	SW	567.58	55.43	3	1	4	HHs	1,000	35	1,035
								Pop.	5,300	178	5,478
San Jose	San Jose WD	DgW	1,462.59	21.70	13	0	13	HHs	2,021	0	2,021
								Pop.	10,509	0	10,509
Provincial Total			3,479.57	31.46	35	4	39	HHs	5,920	466	6,386
								Pop.	29,614	2,315	31,929

Note: 1. Type of Water Source; *DW* - Deep Well, *Surf.* - Surface Water (River), *SP* - Spring, *IG* - Infiltration Gallery.

The largest system in the province is the San Jose WD covering 15 urban barangays of San Jose and an urban and a rural barangay of Magsaysay in provision of 7 dug well sources. WDs in the two municipalities serve mainly for urban barangays extended to their neighboring rural barangays, while small scale systems operated by municipality or barangay are catering to a limited number of barangays.

Different kind of water sources are availed including deep well, shallow well, dug well, spring, and surface water (details are referred to in Table 4.1.1, Supporting Report).

Information on Water Districts shown in Table 4.1.3 revealed that 95% of service connections are provided for domestic use. Per capita consumption rate ranges from 65 liters/day in Abra de Ilog to 140 liters/day in San Jose WD.

Table 4.1.3 Information on Water District

Name of W.D.	Number of Connections						Consump. (cu.m/ month)	Accounted-for Water (cu.m/ month)
	Domestic	Comm.	Inst.	Others	Total	Metered		
Sablayan W.D.	1,035	0	5	15	1,055	1,055	30,720	17,608
San Jose W.D.	2,349	165	0	0	2,514	2,195	202,170	52,567

4.1.4 Level II Systems

Level II systems (communal faucet system) are designed to cater to barangay level water supply with a limited service coverage and supply capacity. These systems have been implemented by different agencies (DPWH, LWUA, DILG, DENR, LGUs) encouraging the use of spring sources and are operated by LGUs, RWSAs or NGOs.

There are 6 Level II systems as enumerated below and shown in Table 4.1.4 (details are referred to in Table 4.1.2, Supporting Report).

- Missionaries (NGO) for 1 rural barangay in Abra de Ilog
- Old Poso RWSA for 6 urban barangays in Paluan
- Municipal Waterworks for 6 urban barangays in Paluan
- Barangay Yapan RWSA (resettlement established for migrants from Mt. Pinatubo area Zambales) in Sablayan
- Municipal Waterworks for 3 rural barangays in San Jose
- Barangay Bunlao RWSA in San Jose

Table 4.1.4 Information on Existing Level II Systems

Municipality	Name of System (Operating Body)	Type and No. of Water Source[1]		Number of Barangays Served			Number of Households Served			Number of Population Served		
				Urban	Rural	Total	Urban	Rural	Total	Urban	Rural	Total
Abra de Ilog	Missionaries (NGO)	SP	1	0	1	1	0	25	25	0	118	118
Paluan	Old poso	DW	1	6	0	6	210	0	210	1,008	0	1,008
	Paluan Waterworks	SP	1	6	0	6	175	0	175	840	0	840
Municipal Total			2	12	0	12	385	0	385	1,848	0	1,848
Sablayan	Yapang Waterworks	DW	1	0	1	1	0	110	110	0	561	561
San Jose	Municipal Gov't.	SP	1	0	3	3	0	50	50	0	265	265
	Bunlao Waterworks	SP	1	0	1	1	0	15	15	0	80	80
Municipal Total			2	0	4	4	0	65	65	0	345	345
Provincial Total			6	12	6	18	385	200	585	1,848	1,024	2,872

Note: 1. Type of Water Source; *DW* - Deep Well, *Surf.* - Surface Water (River), *SP* - Spring, *IG* - Infiltration Gallery.

Majority of Level II systems use spring source, while Old Poso RWSA and Barangay Yapan RWSA utilize deep well sources. All these systems are reported to have been providing potable water throughout the day, although no disinfection is provided. Barangay Yapan RWSA serves 12 hours a day. The collection efficiency of water bill is not answered by any system to the questionnaires.

Problem areas identified on existing Level II systems and necessary countermeasures for the improvement are discussed both in managerial and technical aspects.

(1) Management practice

Insufficient management practices are common to almost all Level II systems. Questionnaire survey on financial performance and managerial set-up revealed the status without answering thereto. It is anticipated that any Level II systems may become non-operational due to managerial incapability and lack of sustainability to operate the systems. To attain financial and managerial sustainability, reinforcement of the RWSA shall be promoted with reference to the institutional development.

(2) Technical skill for O&M of facilities

Several original systems have been expanded to increase service coverage without appropriate technical study on the capacities of water sources and distribution facilities. An appropriate technical guidance and skills training shall be arranged by concerned agencies/LGUs.

4.1.5 Level I Facilities

Level I facilities (point source) are common in rural barangays, majority of which are owned privately. Major facilities are different types of wells equipped with handpumps or developed spring with transmission line and one communal faucet. A rain collector is also used in some areas.

Level I facilities are classified in terms of safe and unsafe sources referring to the water quality examination results conducted by PHO as presented in Table 4.1.5. (details are referred to in Supporting Report)

Table 4.1.5 Information on Existing Level I Facilities

Municipality	Number of Safe Water Sources					Number of Unsafe Water Sources					Served by Safe Sources					
											Number of Households			Number of Population		
	Deep Wells	Shallow Wells	Covered/ Improved Dug Wells	Developed Springs	Total	Shallow Wells	Open Dug Wells	Un-developed Spring	Rain Water Collectors	Total	Urban	Rural	Total	Urban	Rural	Total
Abra de Ilog	5	0	0	1	6	510	0	5	0	515	10	30	40	49	140	189
Calintaan	15	1,410	0	0	1,425	353	0	2	0	355	874	1,882	2,756	4,806	9,786	14,592
Looc	0	0	0	1	1	904	0	0	0	904	4	0	4	17	0	17
Lubang	0	0	0	0	0	2,485	0	0	0	2,485	0	0	0	0	0	0
Magsaysay	15	145	0	4	164	822	0	0	0	822	180	544	724	917	2,939	3,856
Mamburao (Capital)	5	136	0	0	141	2,119	0	0	0	2,119	60	131	191	292	669	961
Paluan	14	133	0	1	148	401	0	3	0	404	111	162	273	534	747	1,281
Rizal	10	968	0	0	978	243	0	3	0	246	0	3,840	3,840	0	19,970	19,970
Sablayan	10	3,187	0	0	3,197	1,240	0	3	0	1,243	993	4,627	5,620	5,263	23,598	28,861
San Jose	2	5,143	0	0	5,145	4,747	0	0	0	4,747	2,348	5,538	7,886	12,211	29,350	41,561
Sta. Cruz	27	313	0	0	340	667	0	6	0	673	193	937	1,130	1,081	4,964	6,045
Provincial Total	103	11,435	0	7	11,545	14,491	0	22	0	14,513	4,773	17,691	22,464	25,170	92,163	117,333

Of the operational Level I facilities (total of 26,058 facilities), more than 99% is shallow wells. According to the PHO water quality analysis results, about 51% of Level I facilities is determined to be unsafe as the provincial average of random samples (20 to 100% on a municipal level). All deep wells were regarded as safe water sources. In application of the unsafe percentage to shallow wells for each municipality, 11,545 Level I facilities are classified as safe sources, while 14,513 facilities are under unsafe sources.

Problem areas observed on Level I facilities and necessary countermeasures for the improvement are summarized in terms of potable condition and functioning.

(1) Unsafe water sources

Most of the cases declared as unsafe sources are driven shallow wells which are unprotected against seepage of surface water and usually located nearby potential pollution sources, such as septic tank and piggery. (The Code on Sanitation of DOH requires a minimum 25m distance between water source and pollution sources.)

These shallow wells shall be provided with concrete apron on the ground surface and proper drainage facility at the surrounding area. Relocation of wells or pollution sources may be another countermeasure. For new construction of shallow wells, proper site selection and appropriate construction method shall be applied together with periodic monitoring of water quality.

(2) Non-functioning/abandoned wells

There are a lot of non-functioning public wells in the province as shown in Table 4.1.6, while information on private wells is not available.

Table 4.1.6 Operating Status of Existing Wells in the Province

Operating Status	Unit	Public Wells		Private	Total
		Deep Well	Shallow Well	Shallow Well	
Functioning	No.	103	175	25,751	26,029
	Percent	20	31	-	97
Non-Functioning	No.	424	397	N/A	821
	Percent	80	69	-	3
Total Number		527	572	25,751	26,850

Note: Number of non-functioning wells includes abandoned wells, but details in number and reasons are not available.

Among others, deep wells usually necessitate repair/replacement of mechanical parts and redevelopment of the well itself. Aside from the same problems as deep wells, shallow wells have principal disadvantages in use of shallow aquifer easily affected by surrounding environmental conditions and caused by a simple construction method (driving well point) making it difficult to rehabilitate.

To prolong the service life of public deep wells, periodic check-up entailing preventive maintenance and redevelopment of wells are to be performed. Meanwhile, a proper site selection and protection of well sources are requisites for shallow wells.

4.1.6 Water Supply Service Coverage

According to the definition of DOH in terms of safe and unsafe sources, service coverage was studied under "served", "underserved" and "unserved" categories.

The present population of the municipalities as of 1994, base year for planning purpose, was estimated using 1990 population census data and annual growth rate between 1990 and 2000 employed by NSO. However, population distribution in 1990 by urban and rural barangay prepared by NSO was adjusted to meet actual conditions in the classification of barangays. Details are referred to section 8.3 1 Population Projection.

Water supply service coverage by service level is estimated for urban and rural areas covering all municipalities under the following conditions and assumptions:

- Service percentage/population by Level III and Level II systems was estimated based on the questionnaire survey results.
- Unserved population was estimated using the percentages of unserved households to the total number of households by urban and rural area based on the 1990 population census data; "Households by Main Source of Drinking Water and City/Municipality."
- The rest of the population was considered to be served by Level I facilities assuming that 50% of private facilities was shared by neighbors to supplement insufficiency of public facilities.

Average number of households sharing at each Level I public/private facility was calculated with a range of 2 to 18 households/facility under the above assumptions (details are referred to in Supporting Report).

Table 4.1.7 presents the profile of the service coverage in terms of served, underserved and unserved. As a provincial total, 49% of the population is adequately served (63% of urban population and 43% of rural population). The lower percentage of service coverage in the rural area is affected by a huge number of unsafe shallow wells (100 public and 14,391 private wells used by about 132,300 persons) and/or no provision of facilities. The provincial service coverage at present is exhibited in Figures 4.1.1 and 4.1.2 (details are referred to Supporting Report).

Table 4.1.7 Water Supply Service Coverage by Municipality

Municipality	Type	Population (1994)	Population Coverage							Percentage of Population Coverage						
			Served by Safe Source				Underserved/Unserved			Served by Safe Source				Underserved/Unserved		
			Level III	Level II	Level I	Total	Unsafe Source	Unserved	Total	Level III	Level II	Level I	Total	Unsafe Source	Unserved	Total
Abra de Ilog	Urban	1,733	1,354	0	49	1,403	310	20	330	78	0	3	81	18	1	19
	Rural	11,894	118	118	140	376	8,547	2,971	11,518	1	1	1	3	72	25	97
	Total	13,627	1,472	118	189	1,779	8,857	2,991	11,848	11	1	1	13	65	22	87
Calintaan	Urban	6,024	0	0	4,806	4,806	1,206	12	1,218	0	0	80	80	20	0	20
	Rural	13,763	0	0	9,786	9,786	2,424	1,553	3,977	0	0	71	71	18	11	29
	Total	19,787	0	0	14,592	14,592	3,630	1,565	5,195	0	0	74	74	18	8	26
Looc	Urban	2,511	0	0	17	17	2,494	0	2,494	0	0	1	1	99	0	99
	Rural	4,836	0	0	0	0	4,674	162	4,836	0	0	0	0	97	3	100
	Total	7,347	0	0	17	17	7,168	162	7,330	0	0	0	0	98	2	100
Lubang	Urban	6,245	3,731	0	0	3,731	2,509	5	2,514	60	0	0	60	40	0	40
	Rural	14,292	1,695	0	0	1,695	11,671	926	12,597	12	0	0	12	82	6	88
	Total	20,537	5,426	0	0	5,426	14,180	931	15,111	26	0	0	26	69	5	74
Magsaysay	Urban	7,346	1,316	102	917	2,335	4,988	23	5,011	18	1	12	32	68	0	68
	Rural	16,247	324	0	2,939	3,263	9,497	3,487	12,984	2	0	18	20	58	21	80
	Total	23,593	1,640	102	3,856	5,598	14,485	3,510	17,995	7	0	16	24	61	15	76
Mamburao (Capital)	Urban	12,287	7,404	235	292	7,931	4,351	5	4,356	60	2	2	65	35	0	35
	Rural	12,141	0	0	669	669	10,359	1,113	11,472	0	0	6	6	85	9	94
	Total	24,428	7,404	235	961	8,600	14,710	1,118	15,828	30	1	4	35	60	5	65
Paluan	Urban	3,866	0	1,848	534	2,382	1,472	12	1,484	0	48	14	62	38	0	38
	Rural	4,045	0	0	747	747	1,904	1,394	3,298	0	0	18	18	47	34	82
	Total	7,911	0	1,848	1,281	3,129	3,376	1,406	4,782	0	23	16	40	43	18	60
Rizal	Urban	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Rural	25,819	0	0	19,970	19,970	5,040	809	5,849	0	0	77	77	20	3	23
	Total	25,819	0	0	19,970	19,970	5,040	809	5,849	0	0	77	77	20	3	23
Sablayan	Urban	12,654	5,300	0	5,263	10,563	2,050	41	2,091	42	0	42	83	16	0	17
	Rural	38,874	178	561	23,598	24,337	9,168	5,369	14,537	0	1	61	63	24	14	37
	Total	51,528	5,478	561	28,861	34,900	11,218	5,410	16,628	11	1	56	68	22	10	32
San Jose	Urban	34,212	10,509	187	12,211	22,907	11,265	40	11,305	31	1	36	67	33	0	33
	Rural	63,208	0	345	29,350	29,695	27,079	6,434	33,513	0	1	46	47	43	10	53
	Total	97,420	10,509	532	41,561	52,602	38,344	6,474	44,818	11	1	43	54	39	7	46
Sta. Cruz	Urban	3,267	0	0	1,081	1,081	2,179	7	2,186	0	0	33	33	67	0	67
	Rural	15,183	0	0	4,964	4,964	9,277	942	10,219	0	0	33	33	61	6	67
	Total	18,450	0	0	6,045	6,045	11,456	949	12,405	0	0	33	33	62	5	67
Provincial Total	Urban	90,145	29,614	2,372	25,170	57,156	32,824	165	32,989	33	3	28	63	36	0	37
	Rural	220,302	2,315	1,024	92,163	95,502	99,640	25,160	124,800	1	0	42	43	45	11	57
	Total	310,447	31,929	3,396	117,333	152,658	132,464	25,325	157,789	10	1	38	49	43	8	51

Figure 4.1.1 Water Supply Coverage of the Province

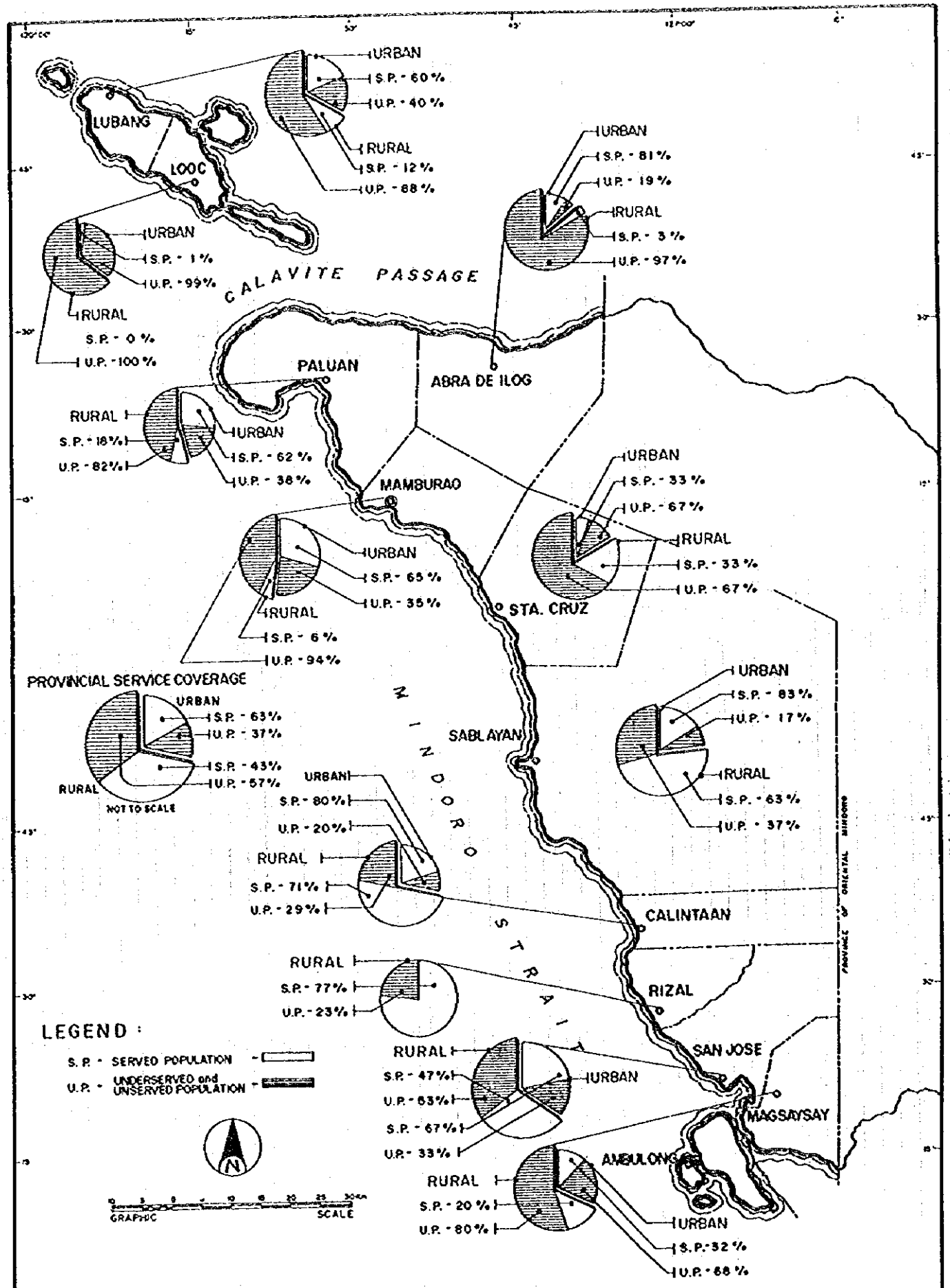


FIGURE 4.1.2
EXISTING WATER SUPPLY SERVICE COVERAGE MAP

4.2 Sanitation and Sewerage

4.2.1 General

The national strategy for sanitation and sewerage is demand-oriented. It aims to stimulate sustainable improvements in sanitation service coverage, public health, and environmental pollution abatement. To achieve this goal, the Government has made investment choices based on demand and the extent to which choices contribute to efficiency and cost-effectiveness.

This sub-sector focuses on household toilets, school toilets and public toilets (public markets and bus/jeepney terminals). The latest data from the PHO on household and public toilets as well as from DECS on school toilets were gathered by municipality. In case of household toilets, data were consolidated by urban and rural area. These facilities were classified into sanitary and unsanitary in terms of structure rather than the surrounding conditions.

The Code on Sanitation of the Philippines provides the minimum standards for services dealing with public health. Specificallly, Chapter XVII on Sewage Collection and Disposal, Excreta Disposal and Drainage defines alternatives for on-site sanitation and sewage collection and disposal. At present, the development of sewerage systems, even in the urban centers of the province is not given priority because of the huge investment cost it entails.

4.2.2 Types of Facilities and Definition of Service Level Standard

For this Master Plan, the types of household toilet facilities commonly used are categorized into: 1) sanitary toilets - approved types of toilet facilities include water-sealed pour flush or flush-type toilets either with receiving space/pit or septic tanks/vaults, and ventilated improved pit latrines and sanitary privy considering its low construction cost especially in rural areas; and 2) unsanitary facilities - these include the types of facilities used for receiving and disposing human waste which do not fall under the category of approved types of toilet facilities such as open pit privy and over-hung latrines (refer to Figure 4.2.1 DOH standard structure of a household toilet that meets the minimum requirements of a sanitary facility, Supporting Report).

In terms of service level, households are classified into: 1) served households - households with at least one (1) sanitary toilet; 2) underserved households - households with unsanitary toilets; and 3) unserved households - households without toilet. Coverage of adequately

served households (with sanitary toilets) was estimated by urban and rural area of municipalities. The remaining households were considered as underserved and/or unserved. The service coverage was determined using the estimated number of households in 1994.

Service level standard for both elementary and secondary school toilets is translated in terms of: 1) served students - students who are adequately covered by the DECS standard ratio of one (1) unit per 50 students with access to sanitary toilets (number of sanitary toilet units multiplied by 50); and (2) underserved and/or unserved students - those with unsanitary and without toilet facilities, and students unserved (based on the standard ratio) even though they have access to sanitary toilets. Service coverage of adequately served students was estimated both for public and private schools by municipality. Figure 4.2.2, Supporting Report shows a standard structure of a school toilet facility adopted by the DOH through the JICA-DPWH and DOH Rural Environmental Sanitation Project.

For public utilities toilets, the service level is classified into: 1) served - utilities that have at least one (1) sanitary toilet, and 2) underserved and/or unserved - utilities that have unsanitary or without toilet facilities. Service coverage of public utilities was estimated as a percentage of sanitary facilities to the total number of utilities.

4.2.3 Sanitation Facilities and Service Coverage

(1) Household Toilets

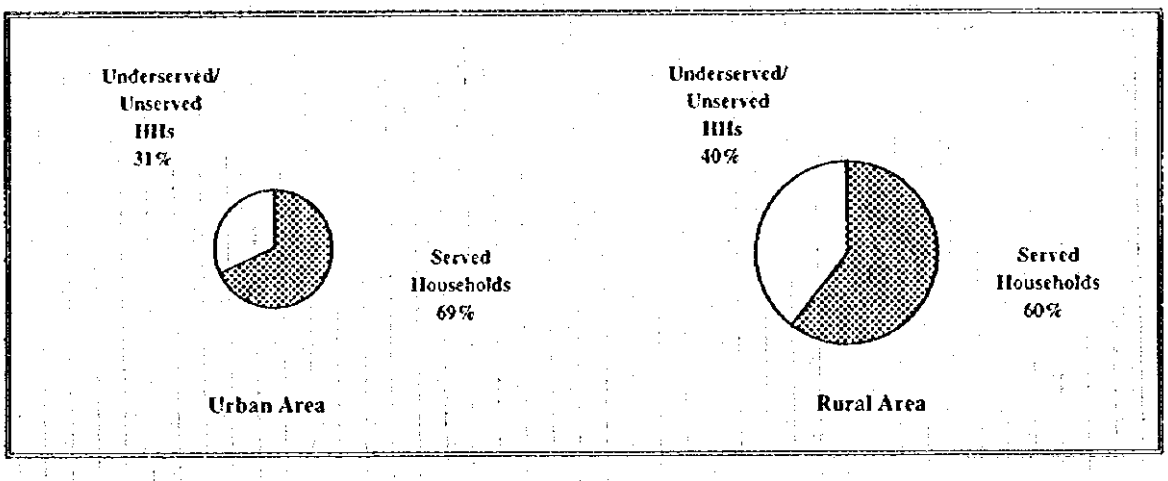
The service coverage of sanitary toilets in the province is 62% of the total number of households. The rest is underserved and/or unserved, of which almost half are without toilet facilities (refer to Table 4.2.1, Supporting Report and 4.2.3 Sanitation Facilities and Service Coverage, Data Report).

In urban areas, approximately 69% of the total households is served. A much lower served households of 60% exists in rural area comparing with urban area. Table 4.2.1 shows the municipal breakdown in the number of urban and rural household toilets by category, and service coverage. Figures 4.2.1 and 4.2.2 reflect the provincial service coverage of household toilet facilities for urban and rural areas.

Table 4.2.1 Sanitation Facilities and Service Coverage of Household Toilets, Urban and Rural, 1994

Municipality	Households 1994			Household Toilet Facilities and Service Coverage											
				Urban				Rural				Municipal Total			
	Urban	Rural	Total	Households Served by Sanitary Toilets		Underserved / Unserved HHs		Households Served by Sanitary Toilets		Underserved / Unserved HHs		Households Served by Sanitary Toilets		Underserved/ Unserved HHs	
				Number	% of HH	Number	% of HH	Number	% of HH	Number	% of HH	Number	% of HH	Number	% of HH
Abra de Ilog	361	2,531	2,892	285	79	76	21	851	34	1,680	66	1,136	39	1,756	61
Calintaan	1,095	2,647	3,742	711	65	384	35	1,880	71	767	29	2,591	69	1,151	31
Looc	584	1,008	1,592	335	57	249	43	789	78	219	22	1,124	71	468	29
Lubang	1,419	2,917	4,336	999	70	420	30	1,732	59	1,185	41	2,731	63	1,605	37
Magsaysay	1,440	3,009	4,449	1,287	89	153	11	1,688	56	1,321	44	2,975	67	1,474	33
Mamburao (Capital)	2,508	2,381	4,889	1,530	61	978	39	936	0	1,445	0	2,466	50	2,423	50
Paluan	805	879	1,684	433	54	372	46	141	0	738	0	574	34	1,110	66
Rizal	0	4,965	4,965	0	0	0	0	2,654	53	2,311	47	2,654	53	2,311	47
Sablayan	2,388	7,622	10,010	1,383	58	1,005	42	4,613	61	3,009	39	5,996	60	4,014	40
San Jose	6,579	11,926	18,505	4,874	74	1,705	26	8,598	72	3,328	28	13,472	73	5,033	27
Sta. Cruz	583	2,865	3,448	394	68	189	32	1,652	0	1,213	0	2,046	59	1,402	41
Provincial Total	17,762	42,750	60,512	12,231	69	5,531	31	25,534	60	17,216	40	37,765	62	22,747	38

Figure 4.2.1 Provincial Service Coverage of Household Toilet Facilities, 1994



(2) School and Public Toilets

Toilet facilities in elementary and secondary schools for both public and private schools were investigated. The province has a total of 600 toilet units found in 223 schools. Only 16% of the students is adequately served by sanitary toilets. The rest, 84% is underserved and/or unserved.

There are 7 public toilets located at public markets. There are no accounted toilets in bus/jeepney terminals and parks or plazas. About 25% is served, while the rest, 75% is underserved and/or unserved. Table 4.2.2 and Table 4.2.3 provide the number and service coverage of toilet facilities of schools and public utilities, respectively.

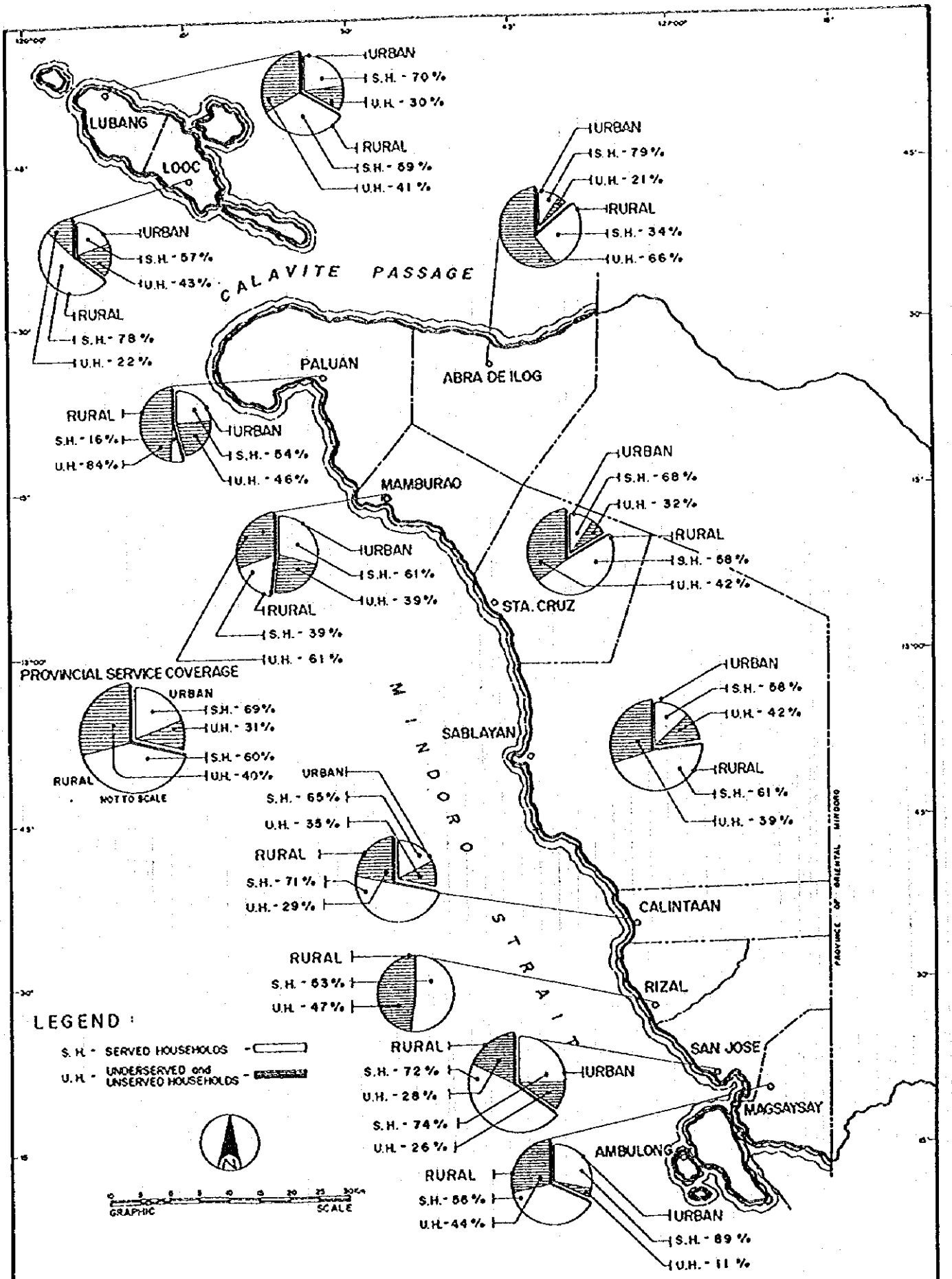


FIGURE 4.2.2
EXISTING HOUSEHOLD TOILETS SERVICE COVERAGE MAP

Table 4.2.2 School Toilet Facilities and Service Coverage in 1994

Municipality	Number of Schools			Number of Students			Number of Toilets							Service Coverage									
							Sanitary			Unsanitary				Served						Underserved /Unserved					
														Public		Private		Total		Public		Private		Total	
	Public	Private	Total	Public	Private	Total	Public	Private	Total	Public	Private	Total	Total Units	Number	%	Number	%	Number	%	Number	%	Number	%	Number	%
Abra de Ilog	18	0	18	2,207	625	2,832	16	1	17	18	0	18	35	800	28	50	2	850	30	1,407	50	575	20	1,982	70
Calintaan	14	1	15	4,194	1,200	5,394	18	1	19	3	0	3	22	900	17	50	1	950	18	3,294	61	1,150	21	4,444	82
Looc	8	0	8	1,596	0	1,596	9	0	9	2	0	2	11	450	28	0	0	450	28	1,146	72	0	0	1,146	72
Lubang	14	0	14	3,258	840	4,098	15	1	16	15	0	15	31	750	18	50	1	800	20	2,508	61	790	19	3,298	80
Magsaysay	28	0	28	6,663	0	6,663	30	0	30	57	0	57	87	1,500	23	0	0	1,500	23	5,163	77	0	0	5,163	77
Mamburao (Capital)	10	0	10	5,920	440	6,360	18	2	20	68	0	68	88	900	14	100	2	1,000	16	5,020	79	340	5	5,360	84
Paluan	9	0	9	2,120	0	2,120	12	0	12	5	0	5	17	600	28	0	0	600	28	1,520	72	0	0	1,520	72
Rizal	18	0	18	5,600	0	5,600	15	0	15	23	0	23	38	750	13	0	0	750	13	4,850	87	0	0	4,850	87
Sablayan	34	4	38	4,587	7,470	12,057	14	5	19	10	0	10	29	700	6	250	2	950	8	3,887	32	7,220	60	11,107	92
San Jose	45	2	47	14,421	7,600	22,021	54	4	58	144	0	144	202	2,700	12	200	1	2,900	13	11,721	53	7,400	34	19,121	87
Sta. Cruz	18	0	18	4,403	0	4,403	14	0	14	26	0	26	40	700	16	0	0	700	16	3,703	84	0	0	3,703	84
Provincial Total	216	7	223	54,969	18,175	73,144	215	14	229	371	0	371	600	10,750	15	700	1	11,450	16	44,219	60	17,475	24	61,694	84

Table 4.2.3 Public Toilet Facilities and Service Coverage in 1994

Municipality	Public Markets			Jeepney/Bus Terminals			Total Toilets	Served		Underserved	
	No. of Sanitary Toilets	Number of Unsanitary Toilets	Sub-total	Number of Sanitary Toilets	Number of Unsanitary Toilets	Sub-total		Number of Sanitary Toilets	%	Number of Underserved	%
Abra de Ilog	0	1	1	0	0	0	1	0	0	1	100
Calintaan	0	0	0	0	0	0	0	0	0	0	0
Looc	0	0	0	0	0	0	0	0	0	0	0
Lubang	0	0	0	1	0	1	1	1	100	0	0
Magsaysay	0	0	0	0	0	0	0	0	0	0	0
Mamburao (Capital)	0	2	2	0	0	0	2	0	0	2	100
Paluan	0	1	1	0	0	0	1	0	0	1	100
Rizal	0	0	0	0	0	0	0	0	0	0	0
Sablayan	1	0	1	0	0	0	1	1	100	0	0
San Jose	0	1	1	0	0	0	1	0	0	1	100
Sta. Cruz	0	1	1	0	0	0	1	0	0	1	100
Provincial Total	1	6	7	1	0	1	8	2	25	6	75

(3) On-going Projects

A total of 4,150 toilet bowls through the FW4SP is being distributed to each of the 4,150 households as follows:

Municipality	No. of HH	Municipality	No. of HH
Abra de Ilog	300	Paluan	200
Calintaan	200	Rizal	400
Looc	100	Sablayan	400
Lubang	400	San Jose	700
Magsaysay	300	Sta. Cruz	300
Mamburao	850		

The recipient households are providing the superstructure and the depository of the sanitary toilet. With the distribution, the coverage of served households will increase from 62% to 69%.

(4) Problem Areas

Compared to the national service coverage of sanitary household toilets of 77%, the province showed a lower sanitation level.

The number of sanitary school toilets is slightly low to meet the service level standard of 50 students per sanitary facility. At present, the average ratio is 319 students per sanitary toilet.

Public toilets at markets and bus/jeepney terminals, although culturally acceptable, are improperly used and maintained resulting in unsanitary conditions. In most cases, no specific arrangements are made for the operation and maintenance and for the collection of fees to cover such costs. Although it is considered as sanitary because of its structure, majority of these facilities have unsanitary conditions.

Even if in some municipalities a high percentage of sanitary toilet is revealed, problems arise from the unsatisfactory disposal of the effluent from the septic tanks, or the direct discharge of wastewater to the local drains. Generally, there is little concern about the unsatisfactory disposal of wastes once it is outside their dwelling units. Practically,

almost all the households dispose their wastes in the manner that poses risks to public health.

4.2.4 Sewerage Facilities

There are no existing sewerage facilities in the province. Most of the wastewater from the dwelling units with acceptable facilities finds its way to open drains and watercourses. These deficiencies are the major contributing factors to the poor condition of the water environment in some areas of the province.

Chapter 5

EXISTING SECTOR ARRANGEMENTS AND INSTITUTIONAL CAPACITY

5. EXISTING SECTOR ARRANGEMENTS AND INSTITUTIONAL CAPACITY

5.1 General

Much has happened in the sector since 1987 when the national master plan was initially prepared. The water supply, sewerage and sanitation sector today is in a transition stage. The Local Government Code (LGC) has essentially re-defined the role, relationship and linkages of central, provincial, municipal and barangay institutions in the provision of basic services, including water and sanitation. The responsibility for water supply and sanitation functions were lodged with various national agencies. The new direction mandates the LGUs to play a larger role in planning and implementing water supply and sanitation projects. This raises serious institutional capacity and resource reallocation issues.

Chapter Five provides an overview of existing sector policies and arrangements as a basis for formulating modifications and improvements. It identifies current capacity building issues which need to be addressed in the early stages of master plan implementation. Most importantly, it assesses the impact of the present centralized delivery system at the local levels.

5.2 Sector Reforms

The GOP has set the future agenda for sector reform. These initiatives followed the completion of the Water Supply Sector Reform Study and the National Urban Sewerage and Sanitation Strategy Study. The GOP has endorsed the major recommendations of these studies through the following NEDA resolutions:

(1) NEDA Resolution No. 4 (series of 1994): LGUs, in the context of the LGC and related decentralization efforts, now play a lead role in service delivery. The resolution allows LGUs to implement all levels of water supply projects and redefines the roles of other sector agencies. LWUA shall implement only financially viable Level III water supply projects in areas outside the MWSS jurisdiction. DILG's participation will consist of general administration and institution building, such as assistance to the LGUs in the formation of Rural and/or Barangay Waterworks and Sanitation Association and in the identification of water supply systems. *DPWH, together with DILG and DOH, will provide technical assistance (within a period of about 2 years) to LGUs in the planning, implementation and operation and maintenance of water supply facilities.*

(2) NEDA Resolution No. 5 reaffirms the principle of provision of sewerage and sanitation services on the basis of willingness-to-pay. The resolution mandates the establishment of a Central Project Support Office (CPSO) at LWUA to assist LGUs in the formulation, preparation and implementation of sewerage and sanitation projects.

5.3 Sector Institutions

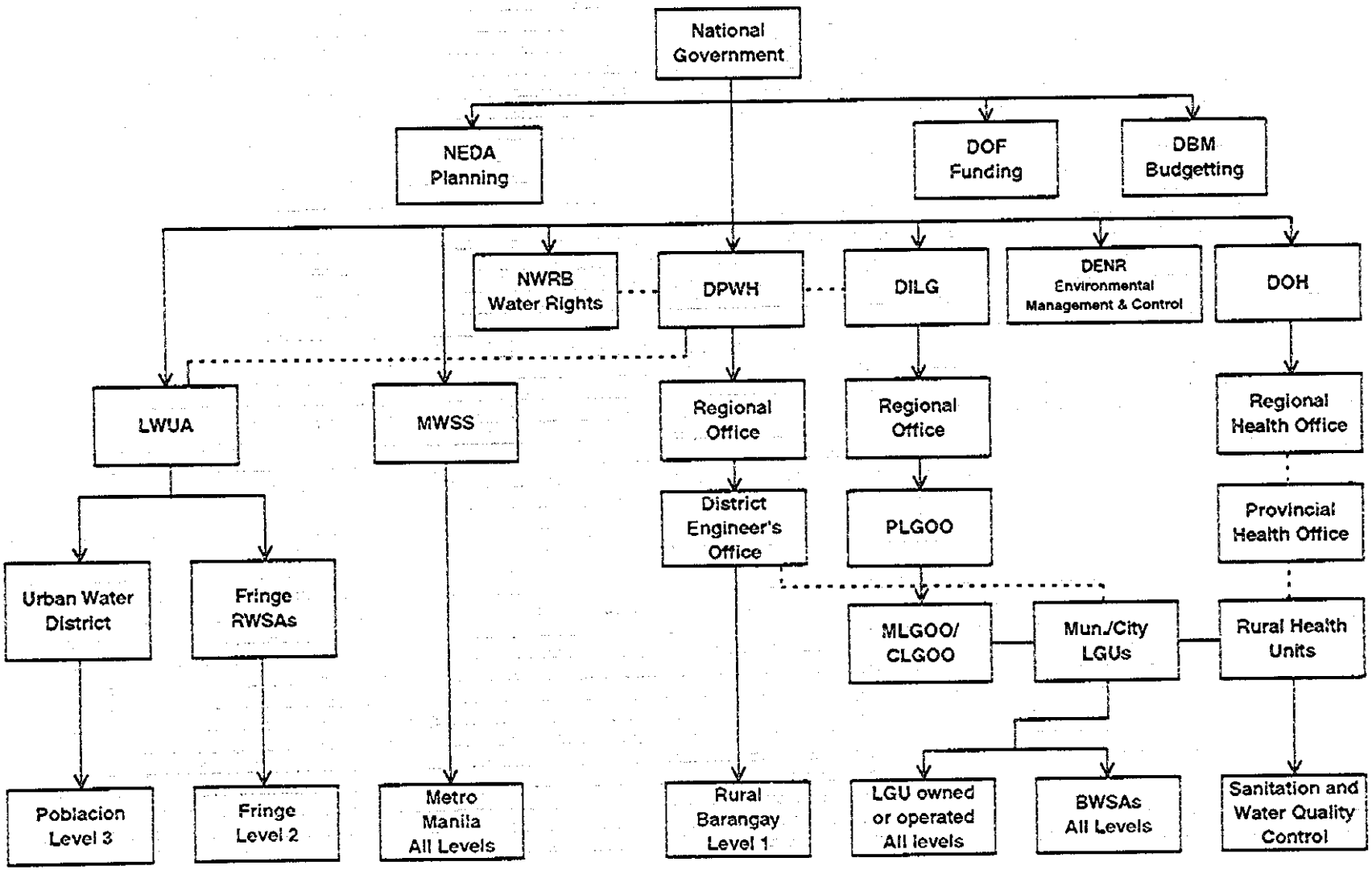
(1) Existing Institutional Arrangements

In the beginning of this chapter, it was noted that the sector is in transition. The LGC, however, mandates major changes on sector structure and performance in the future. New Implementing Rules and Regulations (IRR) reflecting the new sector role of the LGUs and national agencies are being prepared. Sector projects are still led generally by national agencies, in coordination with LGUs. The following discussion on institutional arrangements therefore presents the starting point of the transition (i.e., the existing set-up).

At the central level, there are three (3) line departments (DILG, DPWH and DOH) and two (2) government owned and controlled corporations (LWUA and MWSS) responsible for planning and implementation (refer to Figure 5.3.1, Functional Relationship). Other GOP departments are concerned with macro-planning, national resource allocation decisions, as well as exercise of regulatory powers for tariff setting, and environmental protection and management issues.

At the provincial and municipal levels, there are central agency field offices (of DPWH and DILG) and LGU offices working in the sector. DOH field offices have since been devolved and most of its resources are already under LGU supervision. Water districts, RWSAs and BWSAs have been organized to deal with the actual delivery of services. Some LGUs continue to operate municipal or provincial water and sanitation systems. As the LGC is gradually put into operation, many of the responsibilities and resources currently administered by central departments may be devolved to LGUs. Project management offices (PMOs, at the central level), *ad hoc* inter-agency committees and task forces have been organized to address coordination issues.

Figure 5.3.1 - Functional Relationships



There are many water and sanitation activities outside the government realm. The private sector, NGOs and community-based organizations (CBOs), out of necessity, are rehabilitating publicly-installed, non-operating facilities or constructing new ones.

The current major institutional issues are those of management of the transition process and of re-establishing leadership in the sector. Major resource realignments and capacity building initiatives are needed. The formulation of a new set of implementing rules and regulations will be started shortly.

(2) Sector finance

The water sector reform study reports that in order to increase nationwide water supply coverage to about 87% by 1998, new investments of about P39.3 B will be needed. Of this, only P12.8 B has been secured, i.e., carried over from existing projects. In addition, the level of public investment in water supply has declined in real terms in recent years. During the period 1988 through 1992, P17.268 B was allocated of which only P10.453 B was disbursed. Despite the declining trend in investments, the water sector fund utilization rate is only 60.5% - indicating serious institutional planning and implementation capacity issues. The delay in the institutional response to the policy shifts has invariably contributed to this decline in activity level.

If the new arrangements are to flourish, the issue of LGU access to external sources of capital development funds (backed by GOP guarantees) needs to be addressed.

5.4 Sector Agencies at the National Level

(1) Department of the Interior and Local Government (DILG)

Responsibility: The Department has the mandate of strengthening local capacity for delivery of basic services, including water and sanitation. It is responsible for providing general administration and institution-building support to LGUs including assistance in the formation and training of BWSAs; coordination of master plan preparation; sourcing of external funds; formulation and installation of sector management systems, including O&M and BWSA financial management systems. Ultimately, DILG is geared to provide a range of support activities to develop the capability of LGUs to provide, manage, operate and maintain water supply projects either directly or through community-based organizations, like BWSAs.

Current Activities: On a transitory basis, interagency provincial and municipal water task forces have been established in some provinces. These task forces (TFs) are the current sector entry point of DILG. Through the TFs, barangays needing improved water supply and households needing sanitation improvements are identified and organizations are formed. Training activities are also done with the TFs. Conferences are held regularly to assess performance and review sector experiences. Training generally follows the cascade approach from the national up to the barangay level.

Resources: The PMO for Rural Water Supply and Sanitation is established under the Assistant Secretary for Plans and Programs. About sixty (60) staff members comprise the PMO. It has four (4) operating divisions (Administration; Finance and Procurement; Project Planning; and Field Operations). Its Work Program is integrated with the DILG Annual Plan of Implementation. Like other line Departments, DILG's annual budget allocation goes through the general appropriations review and approval process in Congress which usually requires a one-year lead time. Action officers are assigned for every active province. Monitoring and evaluation of project implementation are done by the provincial (and municipal) local government operations officers (PLGOOs/ MLGOOs). Funds for sector training and BWSA formation are channeled through the regional and provincial DILG offices.

(2) Local Water Utilities Administration (LWUA)

Responsibility: LWUA is a specialized lending institution mandated to promote and oversee the development of provincial water utilities based on financial viability of projects. Most water utilities were under the LGUs until 1973, when some LGUs opted to waive their control over the utility and organize water districts (WDs) to qualify under the LWUA program. In 1987, LWUA responsibilities were expanded to include assistance to Level II Rural Waterworks and Sanitation Associations (RWSAs). The provision of Level II and III services and of wastewater disposal systems in communities outside Metropolitan Manila are largely coordinated through the LWUA. The WDs currently serve about 18.43 M consumers in about 703 cities and municipalities. NEDA Resolution No. 4 directs LWUA to focus on its development banking role and to fund only financially viable WDs. Since its establishment in 1972, LWUA has formed 544 WDs (486 of which have availed of loans totaling P 4.0 B). It has completed over 880 water supply projects.

Activities: LWUA has since developed a wide array of support services for WD development.

Institutional development services for WDs and RWSAs include: formation, management advisory services, training programs, management audits and operations reviews, installation of uniform commercial practices systems; information and marketing support.

Financial services include: economic and financial analysis, tariff analysis and fund sourcing. Various types of loans are available to finance the construction of water systems; reactivation of non-operating systems, rehabilitation and expansion of facilities; and training. Special loans finance watershed management projects; construction of administration buildings; purchase of service vehicles, communication and computer facilities; restoration of facilities damaged by calamities; initial or emergency operational needs. Commodity loans support generation of additional service connections.

Technical services: LWUA oversees the planning, design, construction, and control of quality standards to improve the water system facilities of WDs and RWSAs. LWUA formulates uniform standards for design, materials and construction to lower project costs and disseminates periodic water supply industry performance indicators.

LWUA consults with interested LGUs on the formation of WDs and RWSAs. Public hearings are held prior to the formation of WDs and tariff adjustments. Where tariff increases are not accepted, improvement projects are either reviewed or shelved altogether. LWUA collaborates with LGUs and consumers on all phases of WD improvement programs especially during the construction of water supply facilities.

Resources: LWUA maintains and fields a pool of management advisors, trainers, engineers and other professionals to give WDs and RWSAs proper guidance in their operation and administration. In addition, the Central Sewerage and Sanitation Program Support Office (CPSO) was recently established at LWUA to coordinate the implementation of sewerage and sanitation projects at the national level and to assist LGUs and WDs plan and manage sewerage and sanitation projects and programs at the local level.

LWUA training programs embrace efforts directed at the training and education needs of those who manage and operate water supply systems and those who provide assistance

from the national level so that the water systems will succeed. Training for the water districts comprise about 20 technical and 20 management courses, while in-house courses cover cadetship training for fresh engineering graduates, management advisors, and supervisors courses on construction project management, and computer education are also conducted.

(3) Department of Public Works and Highways (DPWH)

Responsibility: The Department is responsible for the construction and major repair/rehabilitation of rural water supply systems (Level 1) and for the planning and execution of sewerage projects in some cities and larger poblaciones in the country with participation of LGUs.

Activities: The actual construction of the projects are done through contract or force account by the regional and district offices of the Department or other designated agencies under supervision of the PMO and in accordance with approved work programs. The following describes the current project planning and programming process for water supply projects. The central office advises regional office that funding will be available and requests for proposals for a specified number of projects. The regional office allocates the total number of projects among the district offices and directs preparation of a Program of Work (PoW) with a listing of sites. A draft PoW is submitted to the PPDO for comments. In most instances, this is reviewed by the Provincial Board. PPDO endorses the PoW to the DPWH Regional Office. The PoW is sent to the PMO-RWS at the central office which authorizes the release of budget allotment. DEO is now cleared to start construction. Reporting is done based on accomplishments.

Resources: The PMO for Rural Water Supply was established in 1981 (Ministry Order 14) to "manage and direct the planning, design, construction, organization and maintenance of foreign-assisted rural water supply projects" of the Department. It consists of a 44 technical and 26 administrative staff (regular). In addition, as the loan project packages may require, project staff are recruited on contract. At the field level, the Department maintains about 92 District Engineering offices. Most of the DEOs are staffed with a water engineer, drilling crews and equipment. In some DEOs, staff have been assigned to oversee BWSA formation and training activities.

(4) Department of Health (DOH)

Responsibility: The Department is the principal health policy-making and implementing agency. Its main function is to develop and implement sanitation programs nationwide and administer health education aimed at reducing morbidity due to, among others, waterborne and sanitation related illness specifically diarrhea diseases which ranked second leading cause of morbidity among the population in the past years. Its role in the water supply program is in the promotion of safe water supplies through water quality surveillance.

Activities: A major program of DOH (Environmental Health Service) is the improvement of the environmental sanitation conditions to make it more conducive to promotion and maintenance of the health of the people. The priority program components include water supply and sanitation (water treatment and disinfection, quality monitoring and surveillance), excreta and sewage disposal, wastewater collection and disposal. DOH also implements *Water for Life* project which calls for spring development for use in Level I systems and for organizing BWSAs. DOH is also responsible for the provision of sanitation facilities in rural areas.

Operating budgets come from general appropriations in the national budget. Capital expenditure funds to support construction of excreta and waste disposal systems come from project funds. Under the First Water Supply and Sanitation Project, DOH administered a project subsidy of P105.00 (cost of the bowl) per toilet. Similar arrangements are ongoing with the IBRD-assisted FW4SP. In addition, it supervises the construction of public school toilets, sullage removal units and the distribution of household toilet bowls.

Resources: The health care system is delivered through five organizational levels: Central headquarters; Regional Health Offices and general and special hospitals; Provincial Health Offices, including provincial and district hospitals; Municipal Health Offices; and, Rural Health Units/Barangay Health Stations. Its unique structure enables the Department to reach up to the barangay level through its grassroots network of barangay health workers and volunteers. DOH manages regional and provincial laboratories with technicians who carry out water quality tests. It should be noted that substantial segments of its institutional structure (from the provincial level downwards) have been devolved and are now supervised by the respective LGU.

Through its far-reaching network, DOH conducts health education campaigns which focus on women and children health in rural communities. The program is supported by centrally-produced information, education and communication materials. Enrichment of hygiene education lesson plans for the school curricula is undertaken by DECS and DOH. Together with UNICEF, CIDA and other bilateral agencies, DOH has produced and distributed IEC materials with key messages on water supply, sanitation and hygiene behavior.

DOH provides training focused on skills development of its health workers, volunteers and community artisans. Its training programs are either conducted by in-house staff or commissioned through non-government organizations (NGOs). Provincial and district sanitary engineers and inspectors are trained on skills development and planning. Chemists and laboratory technicians are trained on tools and techniques to support on-going drinking water quality programs. BWSAs are instructed, among others, on protection and disinfection of water supply sources, constructing and maintaining toilets.

(5) Other National Agencies

Other national agencies provide macro-planning, funding and support, and regulatory guidelines for the water supply and sanitation sector.

The National Economic Development and Authority (NEDA), as the central planning office, ensures that all agency plans and programs are consistent with national priorities in the Medium-Term Public Investment Program and the Priority Sub-Sector Activity Layout. External grants and loan proposals are reviewed and approved at NEDA. It also coordinates the establishment of a system for national sector master planning and the monitoring system (with DILG).

The Department of Finance (DOF) is responsible for the generation and management of the financial resources of the government. It reviews and approves all public sector debt; oversees the fiscal soundness of public investments based on equity, cost recovery and economic growth, and sets the fiscal deficit of major government corporations, as part of the public sector borrowing program.

The Department of Budget and Management (DBM) plans the budget allocations for the government agencies, including capital and operating expenditures, equity infusion to public corporations, grants and subsidies for Congressional approval. DBM also ensures that budget releases conform with approved plans and programs.