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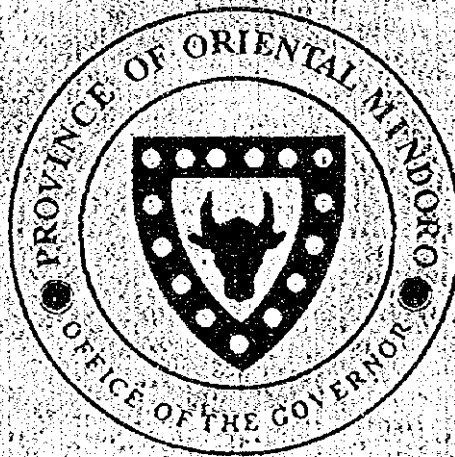
DEPARTMENT OF THE INTERIOR AND LOCAL GOVERNMENT
THE REPUBLIC OF THE PHILIPPINES

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

VOLUME II - 3

MAIN REPORT

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



FEBRUARY 1996

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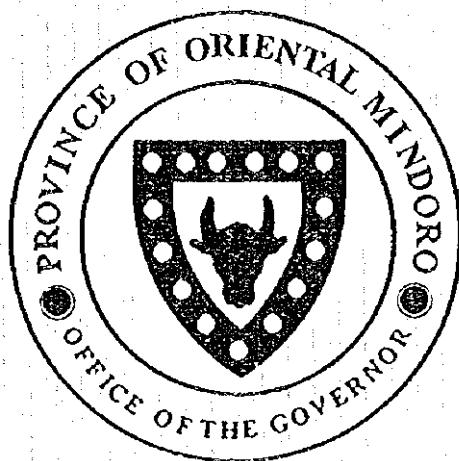
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PROVINCE OF ORIENTAL MINDORO
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MESSAGE

I take great pleasure in welcoming this document, the Provincial Water Supply, Sewerage and Sanitation Sector Plan (PW4SP) as it outlines the policies and strategies for the expansion and strengthening of the sector. It is likewise exhilarating to note that the task of formulating this plan was facilitated due to the enormous assistance extended by the Japan International Cooperation Agency (JICA) and the Department of the Interior and Local Government (DILG).

As we pursue our economic development efforts, my administration is also bent on improving the delivery and coverage of basic services to provide the maximum priority needs of our people -- water services and sanitation among others.

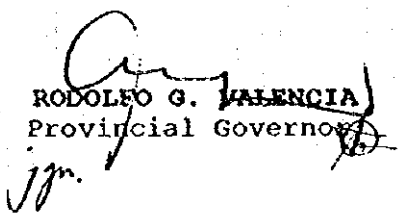
The PW4SP therefore, is not only a valuable compendium of significant data and information, but also a veritable basis for our planners and developers in the optimization of investments and financial resources despite water source availability and budget constraints.

Let this plan be the province's guide in providing assistance in the areas of community participation, financial sourcing, program management and monitoring. With this, the task of narrowing the gap between population demand and the provision of these basic services would be greatly enhanced.

I wish to enlist the support of each and everyone especially the municipal governments in the implementation of this plan. We must move with productive efforts to translate these principles into reality.

The active participation of each will strengthen our cooperation and lead us to doing more together-- towards Mindoro 2000.

We are all in this together.


RODOLFO G. VALENCIA
Provincial Governor

**PROVINCIAL WATER SUPPLY, SEWERAGE AND
SANITATION SECTOR PLAN**

VOLUME II - 3 MAIN REPORT

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PROVINCIAL WATER SUPPLY, SEWERAGE AND SANITATION SECTOR PLAN

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

List of Abbreviations

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 had 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) had access to safe water supply services, while in the rural areas, 80% (26.65 M) was covered by point water sources. 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 refuse 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 Oriental 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 Oriental 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 the 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 Discussion 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 four (4) volumes: I - Summary Report, II - Main Report, III - Supporting Report, and IV - 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.

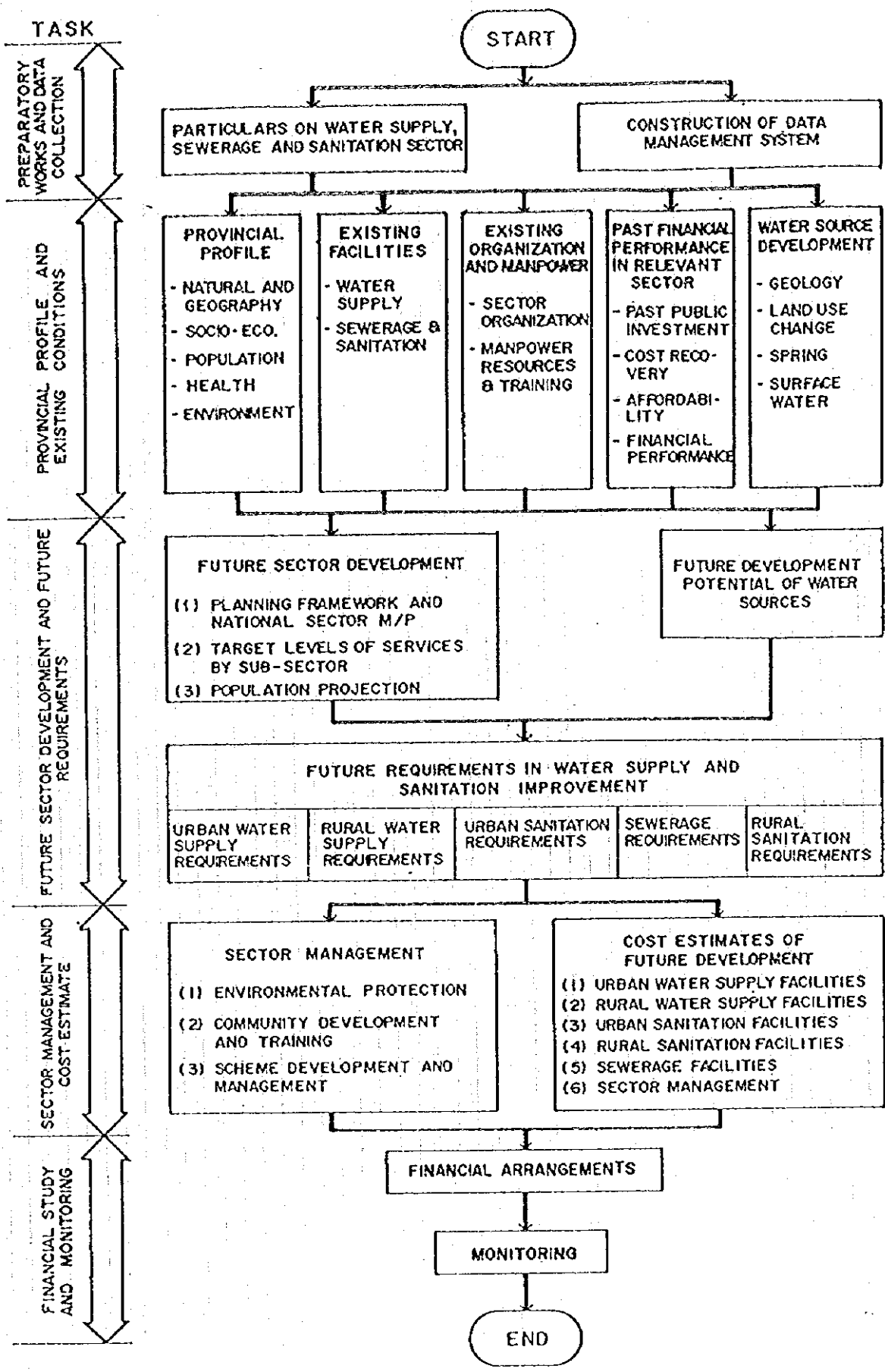
Chapter 3 provides provincial profile with reference to current sector conditions: natural conditions and geographical features, socio-economic conditions, demographics trends, health status and environmental conditions as the planning environment.

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,

FIGURE 1.3.1
FLOW DIAGRAM OF SECTOR PLANNING



training and project implementation needs. Required cost for physical and institutional elements are also presented according to the implementation arrangements.

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: ¹Based on the 1998 MTPDP targets.

²Based 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 is 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** requires 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

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 Practitioner			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			

- 13) Unit recurrent cost of different systems/facilities
- 14) Allocation factors/percentages of IRA
- 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

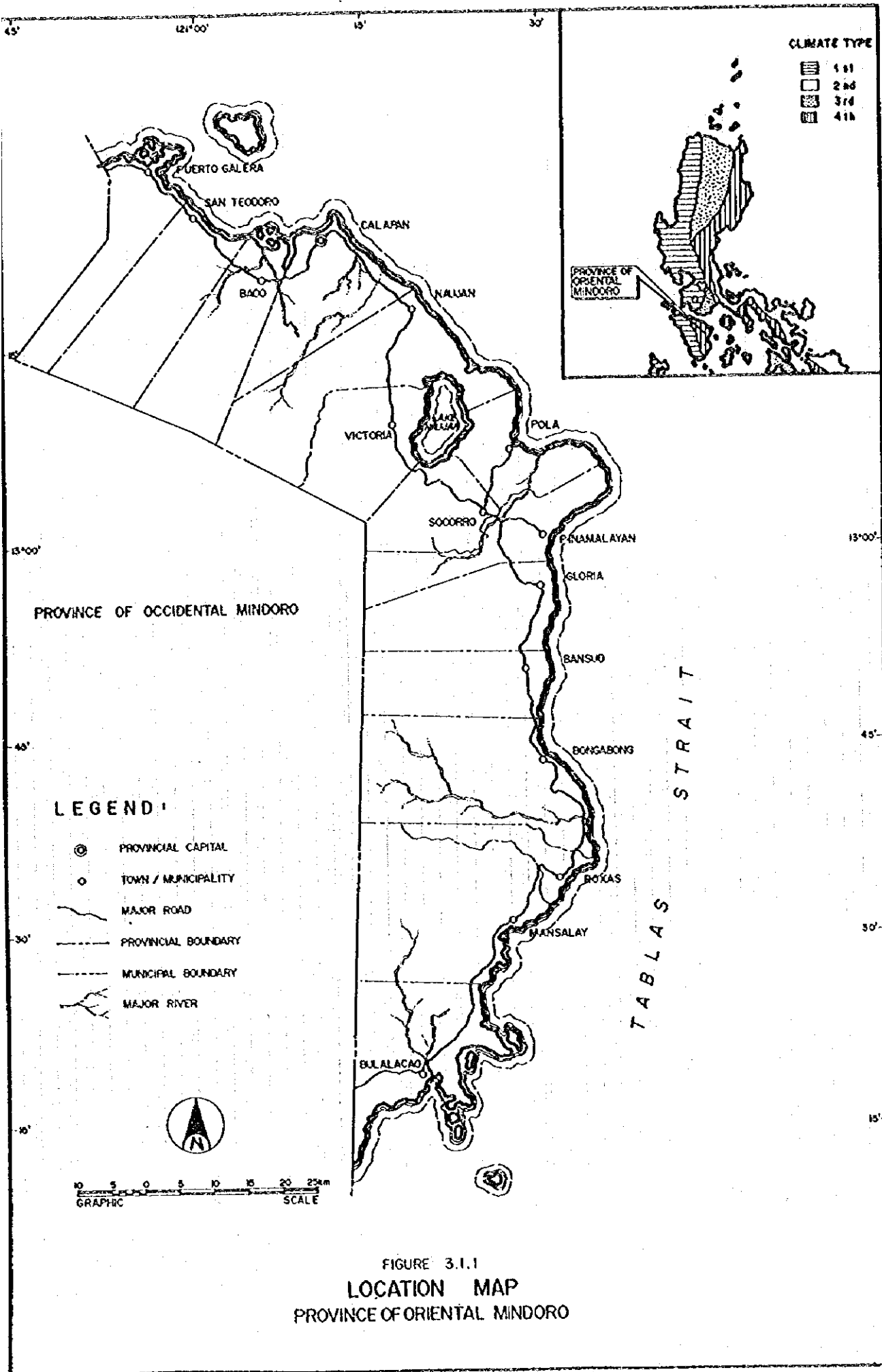
Oriental Mindoro, the nearest island province to Metro Manila lies 45km south of Batangas and 130km south of Manila with a latitude of 12 50' N and 14N and 121E and 121 10'E. It is bounded on the north by Verde Island Passage, on the east by Maestre de Campo Island and Tablas Strait, on the south by Semirara Island, and on the west by Occidental Mindoro. Figure 3.1.1 presents the Location Map.

The province has a total land area of 4,364.72sq.km that is 1.45% of the Philippine total land area of about 300,000sq.km. It is composed of 15 municipalities with Calapan as the provincial capital. There are 424 barangays of which 73 are urban and 351 rural. Provincial total population was 550,049 in 1990. About 74% of the population resided in rural areas, while the remaining 26% in urban areas. At present, there are five (5) water districts in the province. Table 3.1.1 presents the breakdown per municipality of the land area, population and its density, as well as administrative composition.

Table 3.1.1 Outline of Municipalities

Municipality		Land Area (sq.km)	1990 Population		Number of Barangays		
Code	Name		Number	Density (person/sq.km)	Urban	Rural	Total
045201	Baco	241.70	23,800	98	1	26	27
045202	Bansud	260.00	26,225	101	1	12	13
045203	Bongabong	498.20	50,213	101	9	26	35
045204	Bulalacao	305.12	21,316	70	3	12	15
045205	Calapan (Capital)	265.20	85,898	324	18	44	62
045206	Gloria	230.80	30,102	130	2	25	27
045207	Mansalay	513.10	27,515	54	3	14	17
045208	Naujan	528.00	72,203	137	4	66	70
045209	Pinamalayan	277.30	58,777	212	10	26	36
045210	Pola	130.20	26,833	206	2	21	23
045211	Puerto Galera	223.50	17,200	77	1	12	13
045212	Roxas	87.10	33,178	381	9	11	20
045213	San Teodoro	369.10	12,223	33	1	7	8
045214	Socorro	149.40	29,806	200	4	22	26
045215	Victoria	286.00	34,760	122	5	27	32
Provincial Total		4,364.72	550,049	126	73	351	424

Note: Municipal Code corresponds to NEDA Geographic Coding System.



3.2 Natural Conditions and Geographical Features

3.2.1 Meteorology

The province has Type IV climate under the Coronas classification and is characterized by unpronounced dry and wet seasons as reflected in Figure 3.1.1, Location Map. Rainfall is evenly distributed throughout the year. Using the 5-year records of the Pinamalayan, Mulawin and Tibanglin stations, the average annual rainfall is registered at 3,150mm. Average maximum rainfall of 468mm was recorded during the month of December, while the average minimum of 119mm was in March.

The average annual temperature is 27°C with a range of 25.4°C in January to 28.4°C in May. The prevailing wind is southeasterly with wind speed varying by the month.

3.2.2 Land Use

Forest area constitutes 49% of the total area of the province located mostly in the Mindoro range. Agricultural land comprises about 35%, while Built-up areas are limited to a mere 0.32%. These settlements are often concentrated along the coastal areas. Mangroves, Fishponds, Grassland, Wetland and Openland represent 16% 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 almost 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 lands 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 for agricultural use.

Table 3.2.1 Current Land Use

Land Use	Area (sq.km)	Percentage over Total Land Area
Forest Land	2,139.99	49.03
Agricultural	1,519.56	34.81
Built-up Area	14.18	0.33
Mangrove, Fishponds, Grassland and Openlands	690.99	15.83
TOTAL	4,364.72	100.00

3.2.3 Topography and Drainage

General topography of the province is characterized by hilly to mountainous and relatively flat areas. Fifty two percent of the total land area is within the hilly to mountainous sections, while the remaining 47% is plain. Broad plain areas are located in the municipalities of Calapan and Naujan. Elevation ranges from near sea level to 2,586m above mean sea level. Mt. Halcon in the municipality of Baco is the highest mountain with a peak elevation of 2,586m. Other mountains are the knob peak and different high relief along the Mindoro Mountain Range.

The natural drainage systems generally flow eastward and empty into Tablas Strait. Principal rivers are the Bongabong, Pola, Bucayao and Mag-asawang Tubig. Secondary rivers include Mansalay, Tangon, Balete, Bansud, Asahin, Malitbog and Basor. Figure 3.2.1 shows the drainage systems of Oriental 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: Bucayao and Mag-asawang Tubig. Examined river water was turbid and showed some color. In addition, there were high level of Iron (Fe) contents probably due to the highly mineralized rocks found in the Mindoro Mountain Range.

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	
Bucayao River	03SW131211PW055	339	13.61	59.27	517.24	NONE
Mag-Asawang Turbig River	04SW131211PW057	435	1.33	29.49	644.55	NONE
Pola River	04SW130212PW058	148	1.32	13.83	354.20	NONE
Pangalaan River	04SW131211PW056	280	9.02	45.86	383.45	NONE

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

3.3 Socio-economic Conditions

3.3.1 Economic Activities and Household Income

Agriculture is the major economic activity in the province. Major crops cultivated are rice, coconut, corn and fruits such as banana and citrus. Fishing is also an important activity.

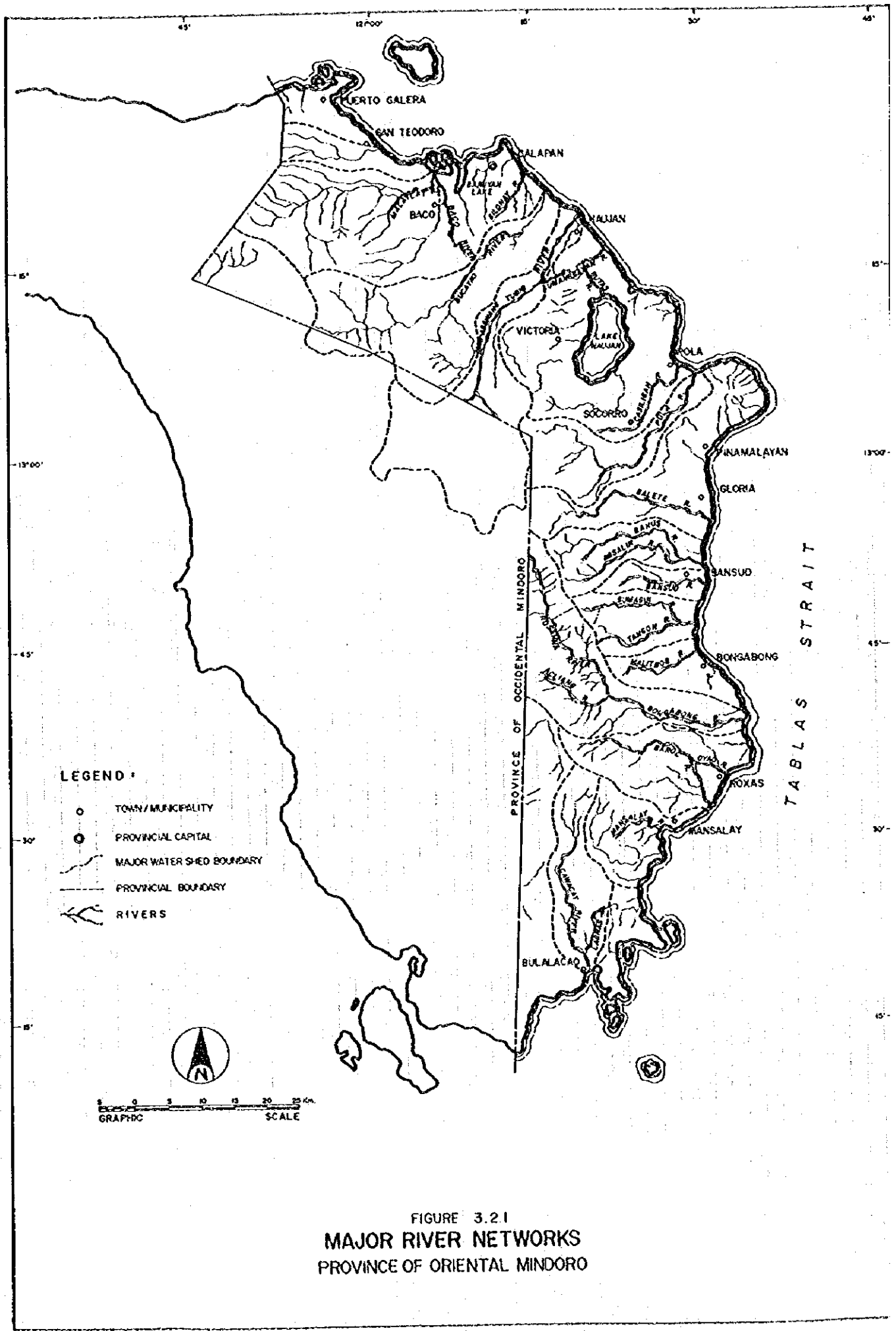


FIGURE 3.21
MAJOR RIVER NETWORKS
PROVINCE OF ORIENTAL MINDORO

Thirteen out of the 15 municipalities are located along the coastline. The greater bulk of commercial activities is seen in Calapan, Pinamalayan and Roxas. Tourism is also one of the promising economic activities in the province.

The National Statistics Office (NSO) Family Income and Expenditures Survey in 1991 showed that the average annual household income of the province was P 51,725, while the median was at P 31,636. 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 P 51,486 in Region IV for 1991, approximately 75% 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 indicated in Figure 3.3.2.

3.3.2 Basic Infrastructure

Electric supply and telephone service cover 93% and 100% of the municipalities, respectively. There are 21 post offices or stations in the province. Land transportation is available by means of jeepneys, minibuses and buses. The province has two secondary airports and 9 sea ports. There are 3,822 business establishments and 80 tourism facilities. 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 462 schools consisting of 397 elementary schools, 52 high schools and 13 colleges/vocational institutions. The 1990 NSO census indicated that the province had a 94.5% literacy of household population 10 years old and over. A large part of 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

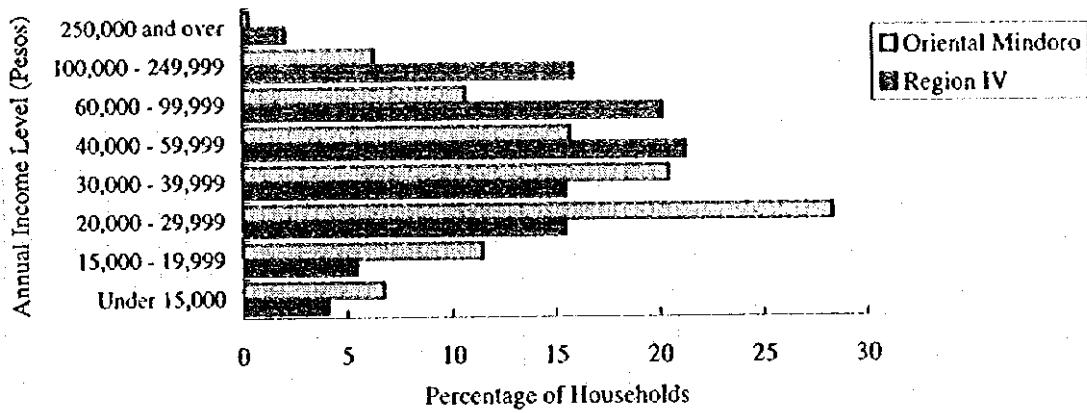


Figure 3.3.2 Population Distribution by Occupation

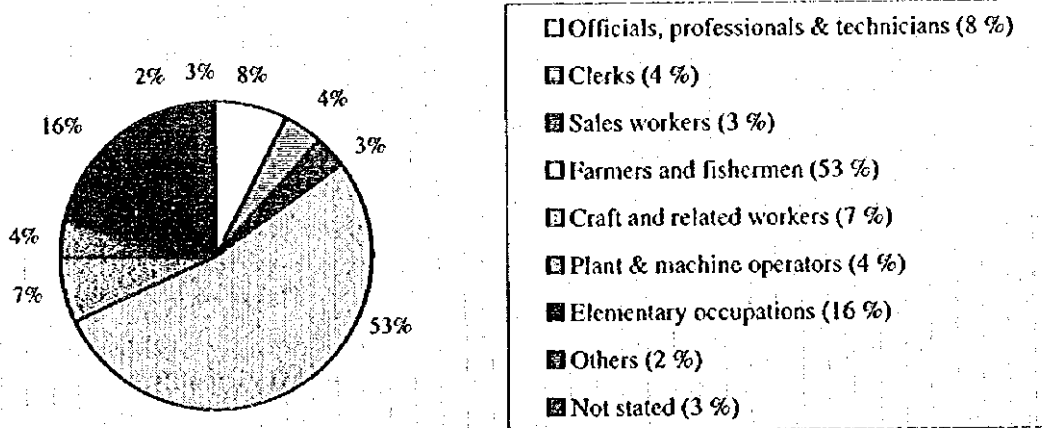


Figure 3.3.3 Population Distribution by Highest Attainment of Education

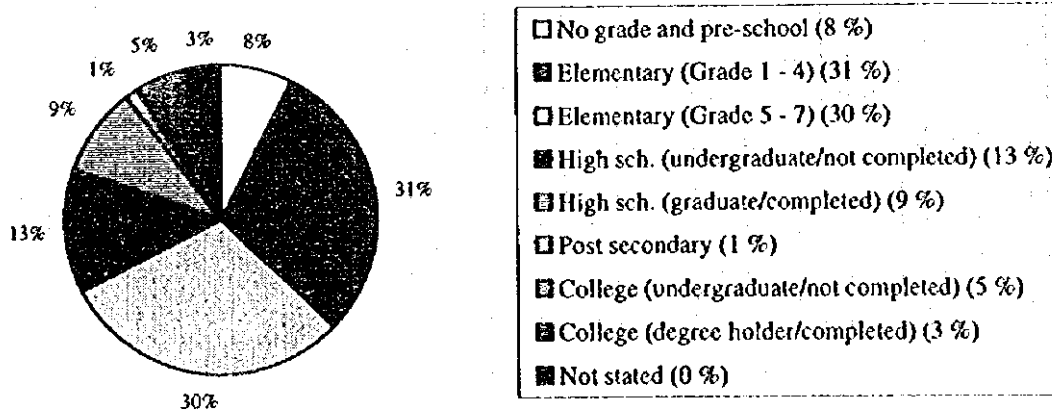


Table 3.3.1 Provincial Outline on Public Services

Service Items	Unit	Number/ Description	Service Items	Unit	Number/ Description
(1) Roads			(8) Tourism facilities		
a) Total Length	km	1,383.30	(Hotel resort, lodges, recreational facilities, etc.)	Number	80
b) Barangay roads	Percent	18.6			
(2) Electricity service coverage			(9) Schools		
a) Municipality	Percent	93	a) Elementary level	Number	397
b) Barangay	Percent	60	b) Secondary level	Number	52
c) Household	Percent	68	c) Tertiary level	Number	13
(3) Telecommunication Services			(10) Health Facilities		
a) Availability in municipality	Percent	100	a) Hospital/clinics	Number	41
b) Telegraph station	Number	17	b) Main health centers, rural health units	Number	19
c) Telephone station	Number	19	c) Barangay health centers	Number	316
d) Radio Comm. Station	Number	13			
(4) Post Office	Number	21	(11) Labor		
(5) Transportation services	Mode (ex. Bus, jeep, taxi.)	Bus, Jeep 9 Sea ports 2 Airports	a) Labor force participation ratio	Percent	55.3
			b) Employment rate	Percent	92.1
(6) Banking Facilities	Number	35	(12) Average family income		
a) Private bank		30	a) Monthly income	Pesos/Month	4,310
b) Public bank		5	b) Monthly expenditure	Pesos/Month	3,385
(7) Industrial/business/ commercial establishment	Number	3,822			

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/ Clinics	Public Market	Bank	Annual Growth Rate of Population (1980-1990) Percent
	Public	Private	Total					
	nos.	nos.	nos.					
Baco	0	1	1	0	0	1	1	2.5
Bansud	3	1	4	1	0	1	1	1.5
Bongabong	4	2	6	2	6	1	2	1.9
Bulalacao	1	0	1	0	0	1	0	2.3
Calapan (Capital)	4	4	8	5	7	1	12	2.5
Gloria	2	1	3	0	1	2	1	1.8
Mansalay	3	2	5	1	0	1	1	1.6
Naujan	4	2	6	0	1	3	2	1.7
Pinamalayan	3	3	6	1	6	1	5	2.0
Pola	0	1	1	0	2	1	1	1.5
Puerto Galera	1	1	2	0	3	1	2	3.4
Roxas	1	2	3	1	5	2	3	2.7
San Teodoro	0	1	1	0	1	1	1	2.3
Socorro	1	1	2	1	5	2	1	2.0
Victoria	1	2	3	1	4	1	2	2.9
TOTAL	28	24	52	13	41	20	35	2.1

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 5.2% during the period 1948 to 1960, it gradually decreased to 2.1% (1980-1990). A summary of the average annual growth rates is as follows:

<u>Year</u>	<u>Population</u>	<u>Ave. Annual Growth Rate (%)</u>	<u>Period</u>
1960	228,998	5.2	1948 - 1960
1970	328,364	3.7	1960 - 1970
1975	388,744	3.4	1970 - 1975
1980	446,938	2.8	1975 - 1980
1990	550,049	2.1	1980 - 1990

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 the 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.

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;

Figure 3.4.1 Previous Population Development of the Province

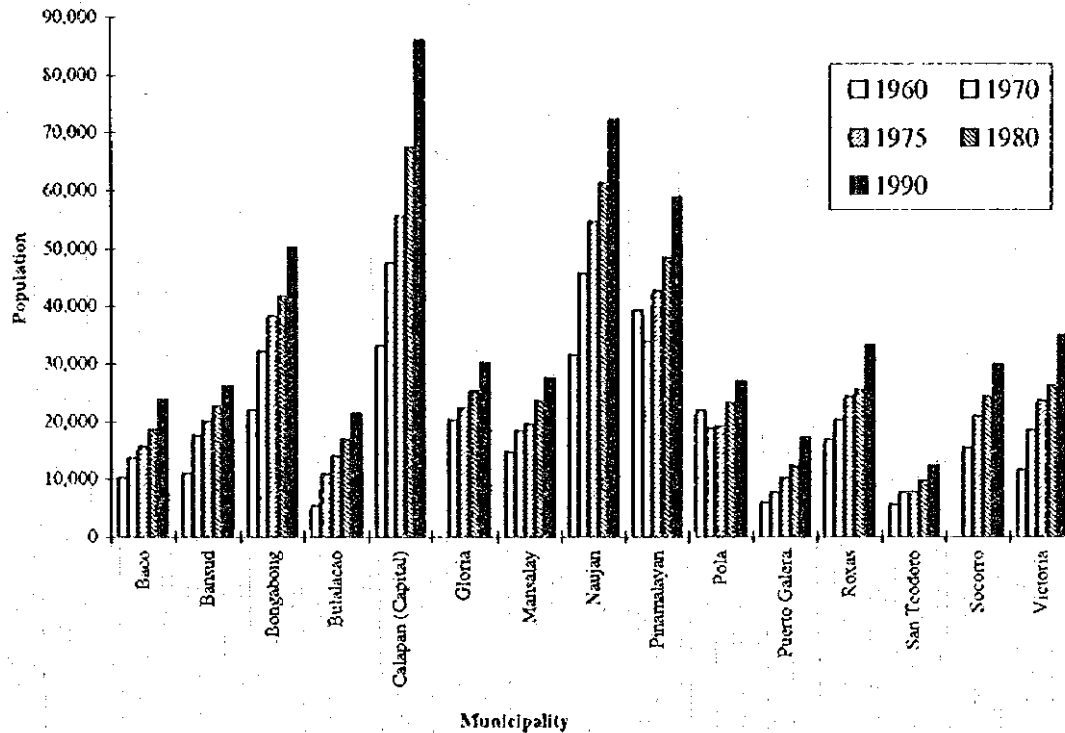


Table 3.4.1 Previous Population Development by Municipality

Municipality	Previous Population						Est. Pop. 1994
	1948	1960	1970	1975	1980	1990	
Baco	5,751	10,213	13,687	15,738	18,607	23,800	26,552
Bansud	-	10,935	17,492	20,095	22,614	26,225	28,070
Bongabong	17,800	22,018	32,167	38,358	41,719	50,213	55,599
Bulalacao	3,597	5,414	10,857	14,038	16,926	21,316	24,146
Calapan (Capital)	22,340	33,060	47,532	55,608	67,370	85,898	96,164
Gloria	-	-	20,147	22,249	25,291	30,102	32,759
Mansalay	11,223	14,669	18,395	19,544	23,548	27,515	30,268
Naujan	22,382	31,476	45,685	54,641	61,216	72,203	77,940
Pinamatayan	21,756	39,240	33,936	42,701	48,431	58,777	63,799
Pola	12,612	21,884	18,789	19,072	23,188	26,833	28,899
Puerto Galera	3,948	5,925	7,659	10,129	12,306	17,200	19,913
Roxas	-	16,940	20,324	24,273	25,458	33,178	37,311
San Teodoro	3,147	5,562	7,721	7,862	9,707	12,223	12,938
Socorro	-	-	15,456	20,868	24,332	29,806	32,834
Victoria	-	11,662	18,499	23,568	26,225	34,760	39,369
TOTAL	124,556	228,998	328,346	388,744	446,938	550,049	606,561

- 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 set forth 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 area is shown in Figure 3.4.1, Supporting Report.

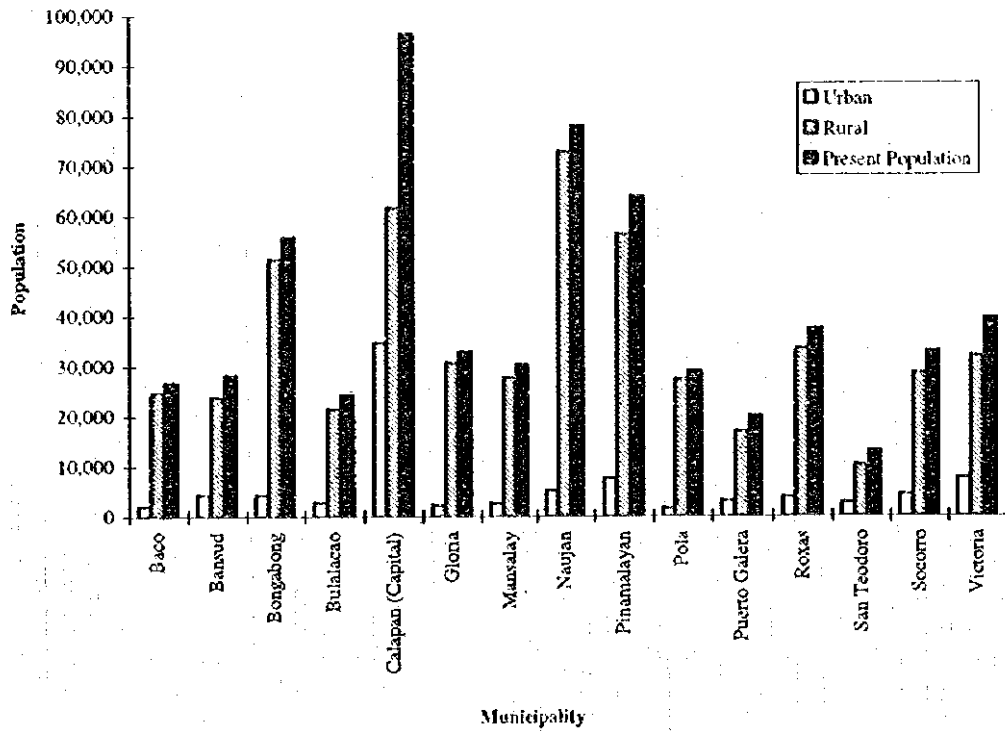
For this Master Plan, however, the 1990 NSO classification of urban and rural barangays was modified by the PPDO to reflect the actual conditions prevailing in the area. A total of 29 urban barangays was re-classified as rural, while three (3) rural barangays to urban. With the re-classification, there are 47 urban barangays and 377 rural barangays in a total of 424 barangays in Oriental Mindoro.

3.4.3 Present Population Distribution

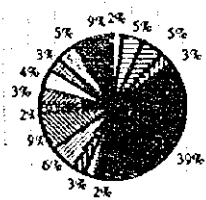
Utilizing the modified classification of the barangays, the urban-rural population was derived. Rural population accounts for 85% of the provincial total, while a mere 15% is urban as reflected in Figure 3.4.2. Table 3.4.2 presents the breakdown of the number of urban and rural barangays by municipality and its corresponding present population distribution.

There are 102,494 households with 87,241 residing in rural areas and 15,253 households in urban areas. The average provincial household size is 5.4 persons/household. Table 3.4.3 presents a breakdown per municipality in the number of households and household sizes by urban and rural area.

Figure 3.4.2 Present Population Distribution

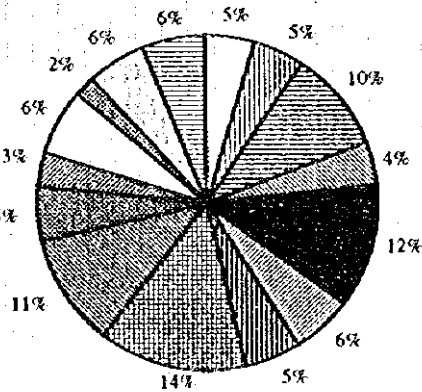


Urban Population (15%)



- Baco (2 %)
- ▨ Bansud (5 %)
- ▩ Bongabong (5 %)
- ▧ Bulalacao (3 %)
- ▦ Calapan (Capital) (39 %)
- ▥ Gloria (2 %)
- ▤ Mansalay (3 %)
- ▣ Naujan (6 %)
- ▢ Pinamalayan (9 %)
- Pola (2 %)
- Puerto Galera (3 %)
- ▧ Roxas (4 %)
- ▦ San Teodoro (3 %)
- ▥ Socorro (5 %)
- ▤ Victoria (9 %)

Rural Population (85%)



- Baco (5 %)
- ▨ Bansud (5 %)
- ▩ Bongabong (10 %)
- ▧ Bulalacao (4 %)
- ▦ Calapan (Capital) (12 %)
- ▥ Gloria (6 %)
- ▤ Mansalay (5 %)
- ▣ Naujan (14 %)
- ▢ Pinamalayan (11 %)
- Pola (5 %)
- Puerto Galera (3 %)
- ▧ Roxas (6 %)
- ▦ San Teodoro (2 %)
- ▥ Socorro (6 %)
- ▤ Victoria (6 %)

Table 3.4.2 Outline of Urban and Rural Areas in the Province

Municipality	Land Area (sq.km)	Number of Barangay			Estimated Population (1994)		
		Urban	Rural	Total	Urban	Rural	Total
Baco	241.70	1	26	27	1,898	24,654	26,552
Bansud	260.00	1	12	13	4,299	23,771	28,070
Bongabong	498.20	3	32	35	4,278	51,321	55,599
Bulalacao	305.12	1	14	15	2,829	21,317	24,146
Calapan (Capital)	265.15	17	45	62	34,616	61,548	96,164
Gloria	230.80	1	26	27	2,204	30,555	32,759
Mansalay	513.10	1	16	17	2,561	27,707	30,268
Naujan	528.00	4	66	70	5,143	72,797	77,940
Pinamalayan	277.30	4	32	36	7,582	56,217	63,799
Pola	130.20	2	21	23	1,637	27,262	28,899
Puerto Galera	223.50	1	12	13	3,024	16,889	19,913
Roxas	87.10	1	19	20	3,836	33,475	37,311
San Teodoro	369.10	2	6	8	2,685	10,253	12,938
Socorro	149.40	4	22	26	4,328	28,506	32,834
Victoria	286.00	4	28	32	7,569	31,800	39,369
Provincial Total	4,364.67	47	377	424	88,489	518,072	606,561

Table 3.4.3 Household Numbers and Household Sizes

Municipality	Number of Households			Household Size (person / HH)		
	Urban	Rural	Total	Urban	Rural	Total
Baco	380	4,483	4,863	5.0	5.5	5.5
Bansud	811	4,571	5,382	5.3	5.2	5.3
Bongabong	807	9,683	10,490	5.3	5.3	5.3
Bulalacao	479	3,948	4,427	5.9	5.4	5.5
Calapan (Capital)	6,410	11,191	17,601	5.2	5.6	5.5
Gloria	408	5,765	6,173	5.4	5.3	5.3
Mansalay	466	5,131	5,597	5.5	5.4	5.4
Naujan	1,050	13,481	14,531	4.9	5.4	5.3
Pinamalayan	1,431	10,411	11,842	5.3	5.4	5.4
Pola	341	5,345	5,686	4.8	5.1	5.1
Puerto Galera	605	3,187	3,792	5.0	5.3	5.2
Roxas	710	6,086	6,796	5.4	5.5	5.5
San Teodoro	488	1,831	2,319	5.5	5.6	5.6
Socorro	801	5,482	6,283	5.4	5.2	5.3
Victoria	1,352	5,782	7,134	5.6	5.5	5.5
Provincial Total	16,539	96,377	112,916	5.4	5.4	5.4

3.5 Health Status

3.5.1 Morbidity, Mortality and Infant Mortality

The number one cause of morbidity was acute respiratory infection followed by intestinal parasitism and diarrhea. Anemias and pneumonia ranked fourth and fifth, respectively. Other causes of morbidity in descending order were: influenza, malnutrition, skin diseases, bronchitis and other digestive diseases. Regarding mortality, the number one cause was pneumonia followed by heart diseases. Vascular diseases and malnutrition ranked third and fourth, respectively. Other causes include other accidents, septicemia, prematurity, tuberculosis, diarrhea and chronic liver disease. Diarrhea, pneumonia and prematurity were the three (3) leading causes of infant mortality in the province.

The general health status of the populace of the province was relatively fair as compared with the national condition. Except for water related diseases, the incidence of other diseases was lower in Oriental 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	Oriental Mindoro		Philippines			
	Number	Rate	Number	Rate	Ranking	
Morbidity	1. ARI	20,184	3,669.57	152,688	246.1	5
	2. Intestinal Parasites	5,740	1,043.49	-	-	-
	3. Diarrhea	4,493	816.83	943,580	1,520.7	2
	4. Anemias	4,351	791.00	-	-	-
	5. Pneumonia	4,214	766.09	235,947	380.3	4
	6. Influenza	3,871	703.75	544,768	878.0	3
	7. Nutritional Deficiencies	3,556	646.53	-	-	-
	8. Skin Diseases	3,003	545.91	-	-	-
	9. Bronchitis	1,790	325.40	980,557	1,580.1	1
	10. Other Diges. Diseases	1,582	287.65	-	-	-
Mortality	1. Pneumonia	212	38.60	41,240	66.5	2
	2. Heart Diseases	162	29.38	46,272	74.4	1
	3. Vascular Diseases	129	23.40	33,729	54.2	3
	4. Nutritional Deficiencies	87	15.88	-	-	-
	5. Other Accidents	63	11.44	12,002	19.3	6
	6. Septicemia	51	9.22	5,835	9.4	8
	7. Prematurity	40	7.34	-	-	-
	8. Tuberculosis	31	5.64	24,307	39.1	4
	9. Diarrhea	31	5.64	7,493	12.0	7
	10. Chronic Liver Disease	29	5.20	-	-	-
Infant Mortality	1. Diarrhea	1,836	333.86	1,838	-	4
	2. Pneumonia	16	2.90	9,383	-	1
	3. Prematurity	15	2.70	-	-	-
	4. Bronchitis	4	0.80	5,955	-	2
	5. Tetanus	1	0.20	-	-	-

Water-related diseases in the ten leading causes of morbidity include parasitism (rank 2nd), diarrhea (3rd) and skin diseases (8th). Diarrhea also ranked 9th and 1st 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 i.e., malaria, filariasis and dengue or H-fever, although the control of malaria and filariasis is beyond the scope of this Master Plan. A safe water supply, sanitary latrine and proper hygiene practices are conditions necessary for the control and prevention of these diseases.

Water-related diseases reported in the province were typhoid/paratyphoid, viral hepatitis, diarrhea, dysentery, schistosomiasis, intestinal parasitism, conjunctivitis, skin diseases and malaria. It is important to note that Oriental Mindoro is an identified endemic area for schistosomiasis, a water-based disease. 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

Rate: 1/100,000

Diseases	Morbidity		Mortality		Infant Mortality	
	Number	Rate	Number	Rate	Number	Rate
Water-borne						
1. Typhoid/Parathyphoid	238	43.28	0	0	0	0
2. Viral Hepatitis	59	10.76	0	0	0	0
3. Diarrhea	4493	816.83	31	5.64	1836	333.86
4. Dysentery	32	5.81	0	0	0	0
Water based						
1. Schistosomiasis	925	168.08	1	0.17	0	0
Water-washed						
1. Intestinal Parasites	5740	1043.49	0	0	0	0
2. Scabies	1388	252.29	0	0	0	0
3. Conjunctivitis	647	117.69	31	5.64	0	0
4. Skin Diseases	3003	545.91	0	0	0	0
Water vector						
1. Malaria	346	62.86	3	0.51	0	0

3.5.3 Health Facilities and Practitioners

Present facilities servicing the health care of the population are 41 hospitals/clinics, 19 rural health units, and 316 barangay health stations. The province being an endemic area of malaria and schistosomiasis, also has one (1) control unit for malaria and schistosomiasis. The number and ratio to population of health facilities and/or medical practitioners in the province as well as in the Philippines are presented in Table 3.5.1, Supporting Report.

3.6 Environmental Conditions

3.6.1 General

Environmental 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/cesspool 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 and seashores. In rural areas, natural assimilation may be expected to purify organic substances. However, pollution or contamination is anticipated caused by agricultural activities especially with reference to fertilizers and pesticides.

Only three (3) large-scale piggery establishments, public market and slaughterhouse in Calapan are identified as potential pollution sources in the province.

As of now, the rivers of 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 15 municipalities, three (3) have no municipal refuse collection and disposal service, namely; Bulalacao, Gloria and Mansalay. The 12 municipalities with service have 1 to 3 units of open dump trucks. In the province, only 11% of the households is served, while majority (88%) is unserved. Table 3.6.1 reflects the breakdown of the manner of solid waste collection and disposal, and service coverage by municipality.

Open dumping is commonly practiced by the LGUs as a disposal of solid wastes. The dumped garbage 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 disposal such as dumping 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	Number of Collection Trucks				With Service				Without Service				Percentage of Households Served	Percentage of Households Unserved		
		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	Manner of Disposal (Number of Household)			Total Households Unserved						
								Dumping (Land and Water)	Burying	Composting							
Baco	4,863	1	0	1	364	0	364	0	0	0	4449	0	0	0	4449	7.49	91.49
Bansud	5,382	1	0	1	917	0	917	0	0	0	4510	0	0	0	4510	17.04	83.80
Bongabong	10,490	3	0	3	1302	0	1302	0	0	0	8992	0	0	0	8992	12.41	85.72
Bulalacao	4,427	0	0	0	0	0	0	0	0	0	4462	0	0	0	4462	0.00	100.79
Calapan (Capital)	17,601	3	0	3	4008	0	4008	0	0	0	13263	0	0	0	13263	22.77	75.35
Glona	6,173	0	0	0	0	0	0	0	0	0	6181	0	0	0	6181	0.00	100.13
Mansalay	5,597	1	0	1	1010	0	1010	0	0	0	4563	0	0	0	4563	18.05	81.53
Naujan	14,531	2	0	2	460	0	460	0	0	0	13859	0	0	0	13859	3.17	95.38
Pinamalayan	11,842	2	0	2	1146	0	1146	0	0	0	10565	0	0	0	10565	9.68	89.22
Pola	5,686	0	0	0	0	0	0	0	0	0	5014	571	81	0	5666	0.00	99.65
Puerto Galera	3,792	1	0	1	351	0	351	0	0	0	3396	0	0	0	3396	9.26	89.56
Roxas	6,796	1	0	1	1320	0	1320	0	0	0	5505	0	0	0	5505	19.42	81.00
San Teodoro	2,319	1	0	1	398	0	398	0	0	0	1879	0	0	0	1879	17.16	81.03
Socorro	6,283	1	0	1	587	0	587	0	0	0	5611	0	0	0	5611	9.34	89.30
Victoria	7,134	2	0	2	714	0	714	0	0	0	6320	0	0	0	6320	10.01	88.59
Provincial Total	112,916	17	0	17	12577	0	12577	0	0	0	98,669	571	81	0	99221	11.14	87.87

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 65% of the present population (of which 18% in urban area and 82% in rural area) is considered as adequately served (refer to detailed study in Supporting Report). Under the area classification, 82% of urban population and 62% of rural population have access to safe water sources/facilities, while the rest is underserved and/or unserved. About 315,000 persons or 80% of the served population depend on Level I facilities, while 77,500 persons or 20% 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 levels 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 7 Level III systems in the province operated under different kind of ownership (authority or association) as shown in Table 4.1.2. These are:

- Water Districts in the municipalities of Naujan, Pinamalayan, Pola and Roxas,
- Calapan Waterworks System and Development Corporation (Calapan WSDC), a private enterprise officially franchised by NWRB since 1953,
- Municipal waterworks of Baco for Barangay Mangangan I, and
- Barangays waterworks for San Agustin I and San Agustin II in Naujan.

Table 4.1.2 Information on Existing Level III Systems

Municipality	Name of System	Water Source and Consumption			Service Coverage						
		Type of Water Source	Water Consumption (cu. m/day)	Domestic Supply (%)	Number of Barangays Served			Number of HHs/Pop. Served			
					Urban	Rural	Total	HHs Pop.	Urban	Rural	Total
Baco	Municipal Govt.	DW	24.00	20.83	0	1	1	HHs	0	265	265
								Pop.	0	1,431	1,431
Calapan (Capital)	Calapan WSS	DW	4,108.00	77.43	13	5	18	HHs	4,201	2,357	6,558
								Pop.	22,685	12,964	35,649
Naujan	Naujan WD	DW	336.00	86.61	3	0	3	HHs	410	0	410
	Brgy. San Agustin I	DW	172.80	74.65	0	1	1	HHs	0	90	90
								Pop.	0	486	486
	Brgy. San Agustin II	DW	14.40	0.00	0	1	1	HHs	0	50	50
								Pop.	0	270	270
Municipal Total			523.20	80.28	3	2	5	HHs	410	140	550
								Pop.	2,009	756	2,765
Pinamalayan	Pinamalayan WD	Surf.	1,190.00	88.49	4	11	15	HHs	1,586	4,497	6,083
								Pop.	7,420	24,284	31,704
Pola	Pola WD	SP	348.00	91.38	2	3	5	HHs	238	344	582
								Pop.	1,142	1,754	2,896
Roxas	Roxas WD	DW	199.00	82.41	1	0	1	HHs	293	0	293
								Pop.	1,582	0	1,582
Provincial Total			6,392.20	80.43	23	22	45	HHs	6,728	7,603	14,331
								Pop.	34,838	41,189	76,027

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 Calapan WSDC covering 13 urban and 5 rural barangays in provision of 5 deep well sources. WDs in the four municipalities serve mainly for urban barangays extended to their neighboring rural barangays, while small scale systems operated by the municipality or barangay are catering for a limited number of rural barangays.

Majority of the systems utilize deep wells, however, Pinamalayan WD and Pola WD avail surface water and spring, respectively (details are referred to in Table 4.1.1, Supporting Report.)

Information on Water Districts shown in Table 4.1.3 revealed that approximately 90% of service connections is provided for domestic services. Per capita consumption rate ranges from 40 liters/day in Baco to 151 liters/day in Calapan WSDC. The collection efficiencies of water bill are reported at 70% to 95%.

Table 4.1.3 Information on Water District

Name of W.D.	Number of Connections						Consump. (cu.m/ month)	Accounted-for Water	
	Domestic	Comm.	Inst.	Others	Total	Metered		Quantity (cu.m/ month)	Ave. Collect. Efficiency
Naujan W.D.	555	19	3	0	577	437	15,696	14,940	95%
Pinamalayan W.D.	1,695	152	0	69	1,916	1,915	62,190	35,700	93%
Pola W.D.	590	40	4	0	634	634	25,050	10,440	90%
Roxas W.D.	293	23	0	0	316	316	7,530	5,970	70%

4.1.4 Level II Systems

Level II systems (communal faucet system) are designed to cater for 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 2 Level II systems; Barangay Poblacion RWSA in Bansud and Barangay San Antonio RWSA in Victoria, as shown in Table 4.1.4 (details are referred to in Table 4.1.2, Supporting Report).

Table 4.1.4 Information on Existing Level II Systems

Municipality	Name of System (Operating Body)	Type and No. of Water Source ¹	No. of Barangay Served			No. of Household Served			No. of Population Served			
			Urban	Rural	Total	Urban	Rural	Total	Urban	Rural	Total	
Bansud	Bansud BWSA	DW	1	1	0	1	60	0	60	318	0	318
Victoria	Brgy. San Antonio	SP	1	0	1	1	0	30	30	0	165	165
Provincial Total			2	1	1	2	60	30	90	318	165	483

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

The Bansud system utilizes a deep well source, while San Antonio system depends on spring source. Both systems usually deliver potable water throughout the day, although no disinfection is provided. However, Bansud system experiences supply interruption once a month caused by pump breakdown and pipe burst. The San Antonio system also encounters turbid water once a month. The collection efficiencies of water bill are reported at 100% in Bansud and 50% in San Antonio.

In addition to these systems, there are 2 non-operational Level II systems in Naujan; one in Barangay Melgar A & B and the other, in Barangay Estrella. These systems need a repair of motor pump and rehabilitation of distribution pipelines.

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. Water quality problem with turbid water has also been experienced without a provision of proper maintenance. 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 Source					Number of Unsafe Water Sources					Served by Safe Sources					
	Deep Wells	Shallow Wells	Covered/Improved Dog Wells	Developed Springs	Total	Shallow Wells	Open Dug Wells	Rain Collectors	Un-developed Spring	Total	Number of Households			Population		
											Urban	Rural	Total	Urban	Rural	Total
Baco	17	1,367	28	6	1,418	14	0	4	7	25	343	3,519	3,862	1,716	19,354	21,070
Bansud	18	1,455	18	3	1,494	337	16	2	0	405	556	2,982	3,538	2,946	15,504	18,450
Bongabong	34	716	0	6	756	477	51	0	0	528	475	4,853	5,328	2,516	25,719	28,234
Bulalacao	2	20	2	6	30	132	32	1	10	175	112	404	516	658	2,181	2,839
Calapan (Capital)	33	1,057	0	2	1,090	432	4	4	0	440	1,569	6,237	7,806	8,472	34,305	42,776
Gloria	25	3,043	0	0	3,068	2,203	23	0	0	2,226	231	3,217	3,448	1,243	17,050	18,293
Mansalay	22	353	1	8	384	224	14	12	8	258	212	2,517	2,729	1,163	13,590	14,753
Naujan	40	4,907	0	9	4,956	1,816	0	0	12	1,828	390	8,941	9,331	1,909	48,281	50,190
Panamalayan	31	1,258	6	5	1,298	94	102	33	19	248	141	3,394	3,535	0	18,326	18,326
Pola	17	76	0	4	97	28	90	14	72	204	4	1,031	1,035	0	5,257	5,257
Puerto Galera	10	301	9	7	327	12	11	9	0	32	556	2,360	2,916	2,779	12,506	15,285
Roxas	21	2,564	0	2	2,587	940	0	1	3	953	291	4,190	4,481	1,569	23,045	24,614
San Teodoro	21	112	0	8	141	16	5	0	41	62	359	673	1,032	1,971	3,767	5,738
Socorro	23	1,042	0	3	1,068	199	96	17	38	350	610	2,875	3,485	3,291	14,950	18,241
Victoria	24	1,576	0	8	1,608	119	38	0	4	161	1,216	4,388	5,604	6,804	24,136	30,949
Provincial Total	336	19,845	64	77	20,322	7,102	482	97	214	7,895	7,065	51,581	58,646	37,036	277,969	315,005

Of the operational Level I facilities (total of 28,217 facilities), 95% is shallow wells. According to the PHO water quality analysis results, about 24% of Level I facilities is determined to be unsafe as a provincial average of random samples. All deep wells are regarded as safe water sources. In application of the unsafe percentage to shallow wells for each municipality and considering open dug wells and rainwater collector as unsafe sources, 20,322 Level I facilities are classified as safe sources, while 7,895 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 at 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 periodical 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 there is no sufficient information on private wells.

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.	336	182	26,765	27,283
	Percent	82	77	100	99
Non-Functioning	No.	74	55	12	141
	Percent	18	23	0	1
Total Number		410	237	26,777	27,424

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 that is 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, periodical check-up entailing preventive maintenance and redevelopment of wells are to be performed. While 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.

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 were adjusted to meet actual conditions in the classification of barangays. Details are referred to Section 8.3 Projection of Frame Values.

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 covered by Level I facilities assuming that 50% of private Level I facilities is 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 1 to 34 households/facility under the above assumptions (details are referred to in Supporting Report).

Table 4.1.7 presents the profile of service coverage in terms of served, underserved and unserved. As a provincial total, 57% of the population is adequately served (74% of urban population and 54% of rural population). The lower percentage of service coverage in the rural area is affected by a huge number of unsafe shallow wells (47 public and 7,055 private wells used by about 109,700 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 in Supporting Report).

4.2 Sanitation and Sewerage

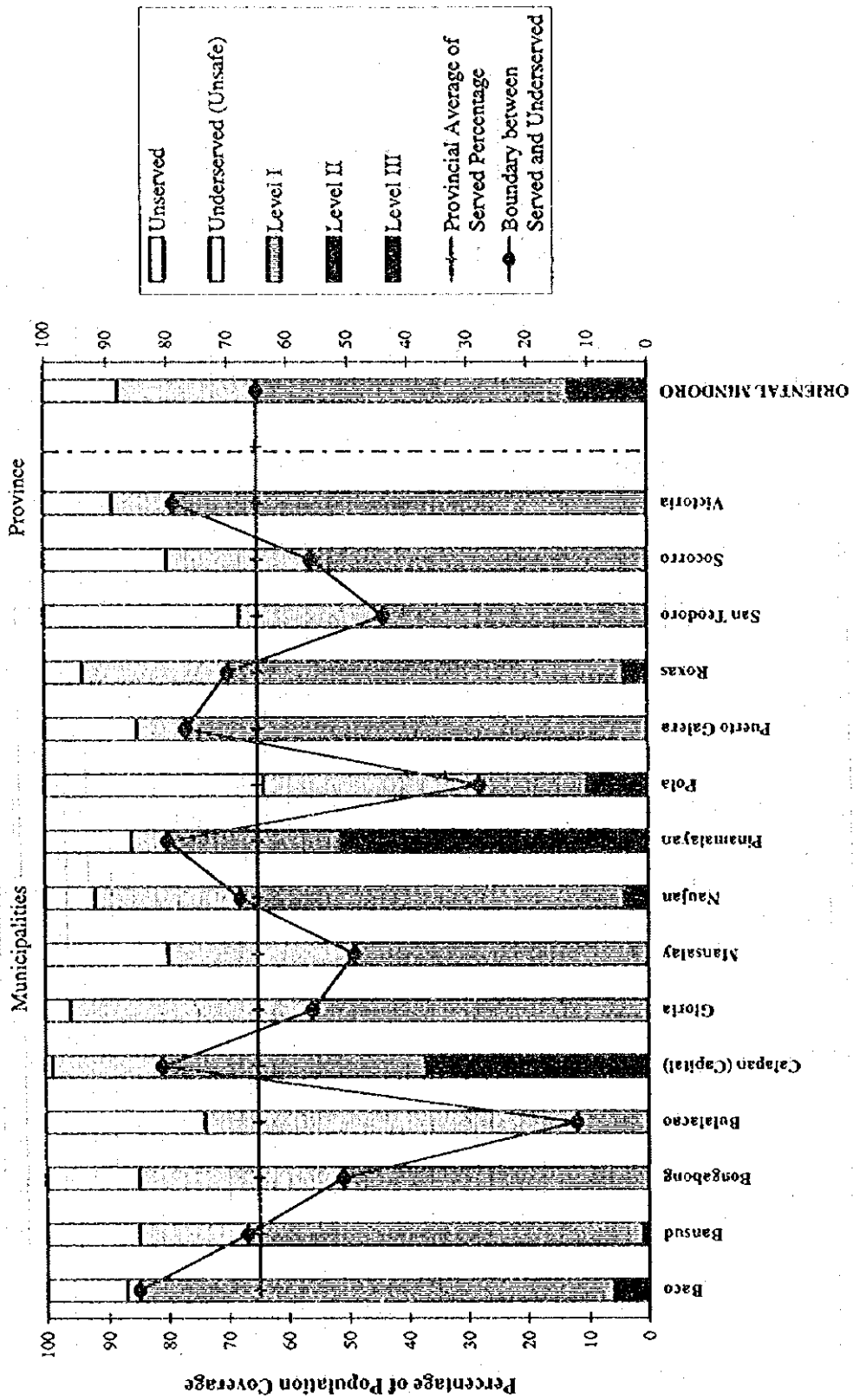
4.2.1 General

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.

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/Un-served		Served by Safe Source				Underserved/Un-served				
			Level III	Level II	Level I	Total	Unsafe Source	Un-served	Total	Level III	Level II	Level I	Total	Unsafe Source	Un-served	Total	
Baco	Urban	1,898	0	0	1,716	1,716	17	165	182	0	0	90	90	1	9	10	
	Rural	24,654	1,431	275	19,354	21,060	424	3,170	3,594	6	1	79	86	2	12	14	
	Total	26,552	1,431	275	21,070	22,716	441	3,335	3,776	5	1	79	85	2	13	15	
Bansud	Urban	4,299	0	318	2,946	3,264	797	238	1,035	0	7	69	76	19	5	24	
	Rural	23,771	0	0	15,504	15,504	4,202	4,065	8,267	0	0	65	65	18	17	35	
	Total	28,070	0	318	18,450	18,768	4,999	4,303	9,302	0	7	66	67	18	15	33	
Bongabong	Urban	4,278	0	0	2,516	2,516	1,362	400	1,762	0	0	59	59	32	9	41	
	Rural	51,321	0	0	25,719	25,719	17,470	8,112	25,602	0	0	50	50	34	16	50	
	Total	55,599	0	0	28,234	28,234	18,853	8,512	27,365	0	0	51	51	34	15	49	
Butalacao	Urban	2,829	0	0	658	658	1,813	358	2,171	0	0	23	23	64	13	77	
	Rural	21,317	0	0	2,181	2,181	13,063	6,073	19,136	0	0	10	10	61	29	90	
	Total	24,146	0	0	2,839	2,839	14,876	6,431	21,307	0	0	12	12	62	26	88	
Catapan (Capital)	Urban	34,616	22,685	0	8,472	31,157	3,417	42	3,459	66	0	24	90	10	0	10	
	Rural	61,548	12,964	0	34,305	47,269	13,558	722	14,280	21	0	56	77	22	1	23	
	Total	96,164	35,649	0	42,776	78,425	16,975	764	17,739	37	0	44	81	18	1	19	
Gloria	Urban	2,204	0	0	1,243	1,243	892	69	961	0	0	56	56	40	4	44	
	Rural	30,555	0	0	17,050	17,050	12,365	1,140	13,505	0	0	56	56	40	4	44	
	Total	32,759	0	0	18,293	18,293	13,257	1,209	14,466	0	0	56	56	40	4	44	
Mansalay	Urban	2,561	0	0	1,163	1,163	1,058	340	1,398	0	0	45	45	41	14	55	
	Rural	27,707	0	0	13,590	13,590	8,281	5,836	14,117	0	0	49	49	30	21	51	
	Total	30,268	0	0	14,753	14,753	9,339	6,176	15,515	0	0	49	49	31	20	51	
Naujan	Urban	5,143	2,009	221	1,909	4,139	684	320	1,004	39	4	37	80	13	7	20	
	Rural	72,797	756	0	48,281	49,037	17,799	5,961	23,760	1	0	66	67	24	9	33	
	Total	77,940	2,765	221	50,190	53,176	18,483	6,281	24,764	4	0	64	68	24	8	32	
Pinarolayan	Urban	7,582	7,420	0	0	7,420	0	162	162	98	0	0	98	0	2	2	
	Rural	56,217	24,284	540	18,326	43,150	3,840	9,227	13,067	43	1	33	77	7	16	23	
	Total	63,799	31,704	540	18,326	50,570	3,840	9,389	13,229	50	1	29	80	6	14	20	
Pola	Urban	1,637	1,142	0	0	1,142	0	495	495	70	0	0	70	0	30	30	
	Rural	27,262	1,754	0	5,257	7,011	10,497	9,755	20,252	6	0	19	25	39	36	75	
	Total	28,899	2,896	0	5,257	8,153	10,497	10,250	20,747	10	0	18	28	36	36	72	
Puerto Galera	Urban	3,024	0	0	2,779	2,779	72	174	246	0	0	92	92	2	6	8	
	Rural	16,889	0	0	12,506	12,506	1,480	2,903	4,383	0	0	74	74	9	17	26	
	Total	19,913	0	0	15,284	15,284	1,552	3,077	4,629	0	0	77	77	8	15	23	
Roxas	Urban	3,836	1,582	0	1,569	3,151	569	116	685	41	0	41	82	15	3	18	
	Rural	33,475	0	0	23,045	23,045	8,486	1,945	10,431	0	0	69	69	25	6	31	
	Total	37,311	1,582	0	24,614	26,196	9,054	2,061	11,115	4	0	66	70	24	6	30	
San Teodoro	Urban	2,685	0	0	1,971	1,971	495	219	714	0	0	73	73	18	9	27	
	Rural	10,233	0	0	3,767	3,767	2,663	3,823	6,486	0	0	37	37	26	37	63	
	Total	12,918	0	0	5,738	5,738	3,158	4,042	7,200	0	0	41	41	24	32	56	
Socorro	Urban	4,328	0	0	3,291	3,291	627	410	1,037	0	0	76	76	14	10	24	
	Rural	28,506	0	0	14,950	14,950	7,134	6,422	13,556	0	0	52	52	25	23	48	
	Total	32,834	0	0	18,241	18,241	7,761	6,832	14,593	0	0	56	56	24	20	44	
Victoria	Urban	7,569	0	0	6,804	6,804	515	250	765	0	0	90	90	7	3	10	
	Rural	31,800	0	163	24,136	24,301	3,227	4,272	7,499	0	1	76	77	10	13	23	
	Total	39,369	0	163	30,940	31,105	3,742	4,522	8,264	0	1	79	79	10	11	21	
Provincial Total	Urban	83,489	34,838	539	37,036	72,413	12,318	3,758	16,076	39	1	42	82	14	4	18	
	Rural	518,072	41,189	980	277,969	320,138	124,508	73,426	197,934	8	0	51	62	24	14	38	
	Total	606,561	76,027	1,519	315,005	392,551	136,826	77,184	214,010	13	0	52	65	23	12	35	

Figure 4.1.1 Water Supply Coverage of the Province



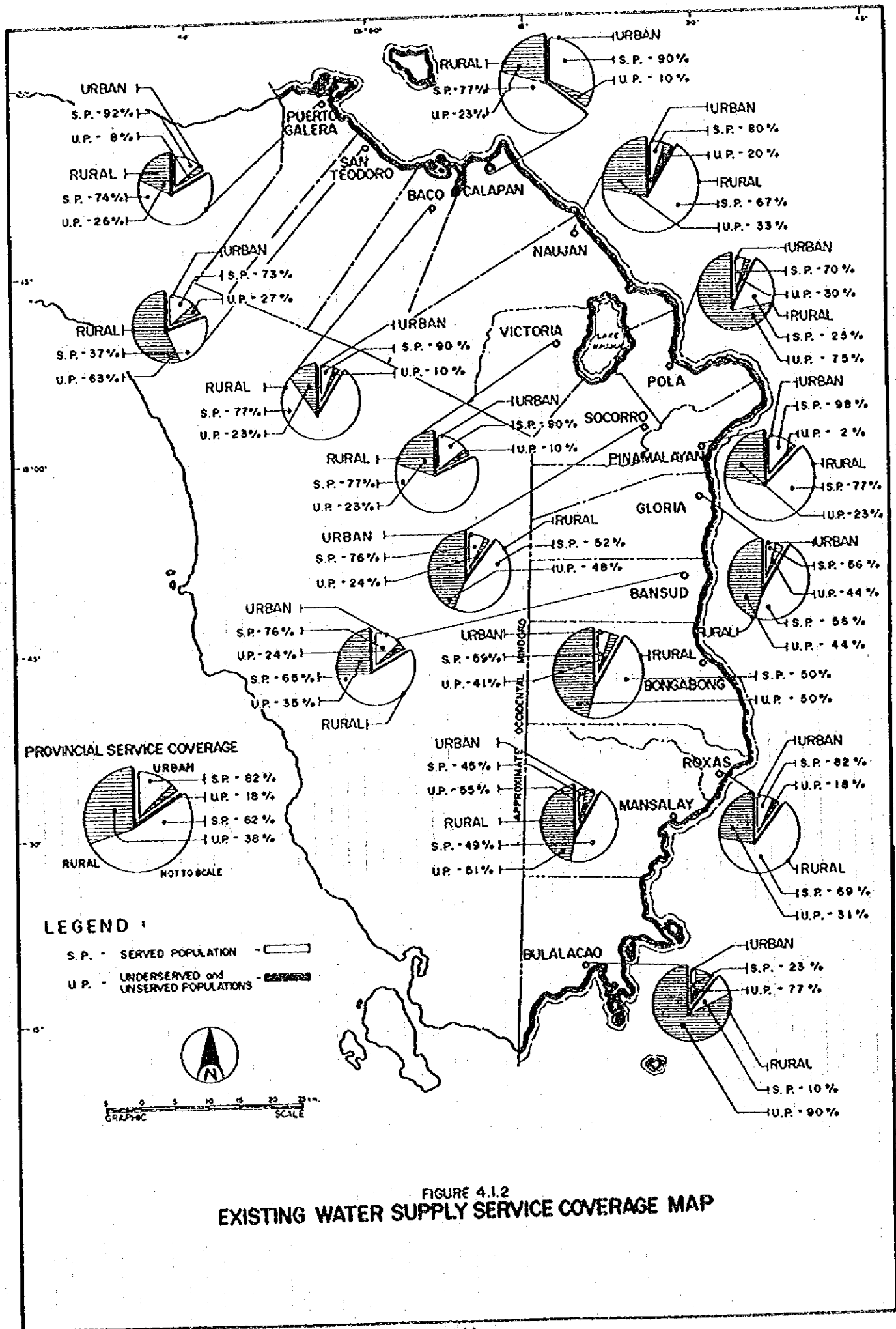


FIGURE 4.1.2
EXISTING WATER SUPPLY SERVICE COVERAGE MAP

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 the 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. Specifically, 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 urban centers of the province, is not given priority because of the huge investment costs 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 private 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 JICA-DPWH and DOH Rural Environmental Sanitation Project.

For public 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 50% 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 Number of households using sanitary and unsanitary facilities, and without facilities, Supporting Report).

In urban area, approximately 80% of the households is served, while in rural area, only 45% of the households is served. Table 4.2.1 shows the municipal breakdown in the number of urban and rural household toilets by category, and the level of service coverage. Figures 4.2.1 and 4.2.2 reflect the provincial service coverage of household toilet facilities by urban and rural area.

(2) School and Public Toilets

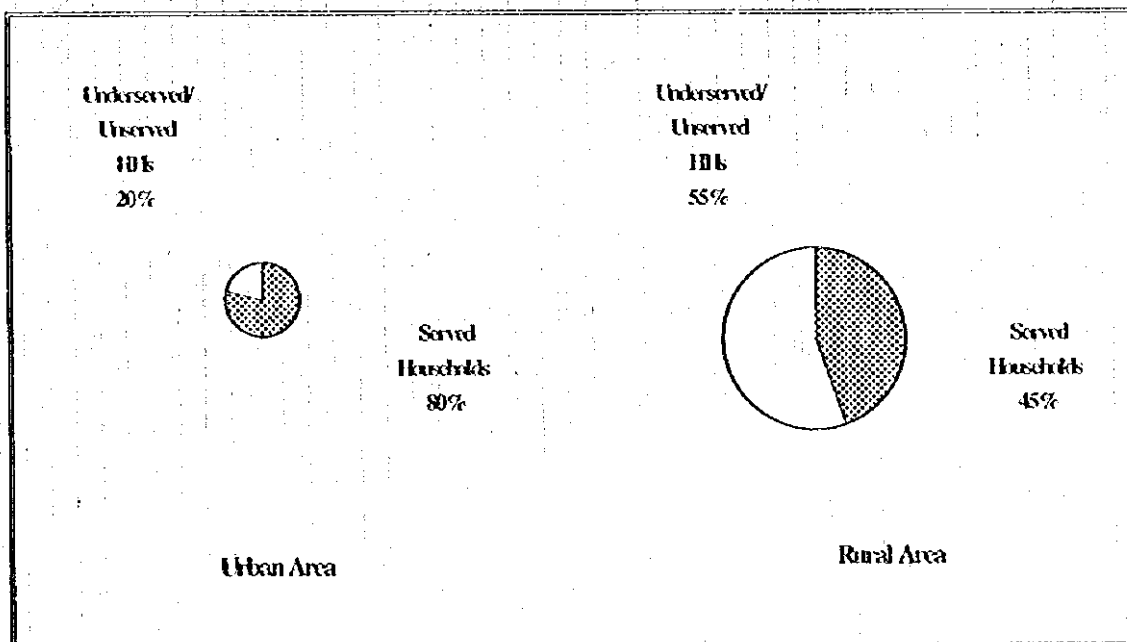
Toilet facilities in elementary and secondary schools for both public and private schools were investigated. The province has a total of 1,418 toilet units found in 449 schools. Only 36% of the students is adequately served by sanitary toilets, while the remaining 64% is underserved and/or unserved.

There are 21 public toilets located at public markets and bus/jecpney terminals. About 57% is served, while the remaining 43% 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.

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	Total	Urban				Rural				Municipal 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
Baco	380	4,483	4,863	326	86	54	14	3,138	70	1,345	30	3,464	71	1,399	29
Bansud	811	4,571	5,382	495	61	316	39	2,432	53	2,139	47	2,927	54	2,455	46
Bongabong	807	9,683	10,490	663	82	144	18	5,135	53	4,548	47	5,798	55	4,692	45
Buhayao	479	3,948	4,427	370	77	109	23	1,553	39	2,395	61	1,923	43	2,504	57
Calapan (Capital)	6,410	11,191	17,601	5,395	84	1,015	16	5,220	47	5,971	53	10,615	60	6,986	40
Gloria	408	5,765	6,173	254	62	154	38	2,707	0	3,058	0	2,961	48	3,212	52
Mansalay	456	5,131	5,597	372	80	94	20	2,692	0	2,439	0	3,064	55	2,533	45
Naujan	1,050	13,481	14,531	815	0	235	0	4,815	35	8,663	64	5,633	39	8,898	61
Panamalayan	1,431	10,411	11,842	1,250	87	181	13	4,159	40	6,252	60	5,409	46	6,433	54
Pala	341	5,345	5,686	306	90	35	10	1,655	31	3,690	69	1,961	34	3,725	66
Puerto Galera	605	3,187	3,792	594	98	11	2	2,030	0	1,157	0	2,624	69	1,168	31
Roxas	710	6,086	6,796	522	74	188	26	1,833	1	4,253	1	2,355	35	4,411	65
San Teodoro	488	1,831	2,319	328	67	160	33	921	2	910	2	1,249	54	1,070	46
Socorro	801	5,482	6,283	558	73	213	27	1,672	3	3,805	3	2,265	36	4,018	64
Victoria	1,352	5,782	7,134	993	73	359	27	3,193	4	2,584	4	4,191	59	2,943	41
Provincial Total	16,539	96,377	112,916	13,271	80	3,268	20	43,168	45	53,209	55	56,439	50	56,477	50

Figure 4.2.1 Provincial Service Coverage of Household Toilet Facilities, 1994



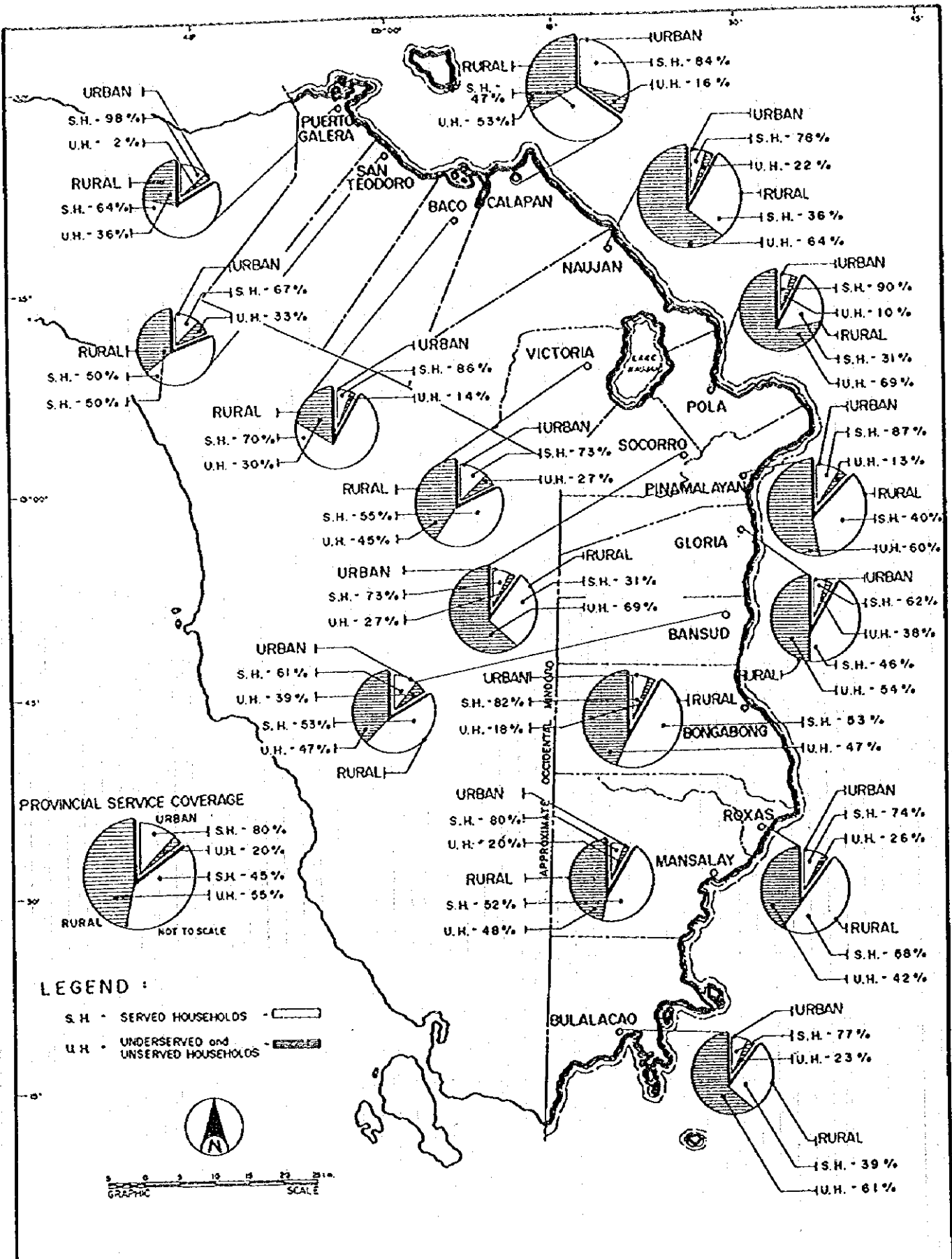


FIGURE 4.2.2
EXISTING HOUSEHOLD TOILETS SERVICE COVERAGE MAP

(3) On-going Projects

A total of 8,300 toilet bowls through the FW4SP is being distributed to each of the 8,300 households as follows:

<u>Municipality</u>	<u>No. of HH</u>	<u>Municipality</u>	<u>No. of HH</u>
Baco	594	Puerto Galera	205
Bansud	456	Roxas	321
Calapan	2,000	San Teodoro	306
Naujan	478	Socorro	466
Pinamalayan	1,890	Victoria	1,403
Pola	221		

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 50% to 57%.

(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 quite low to meet the service level standard of 50 students per sanitary facility. At present, the average ratio is 140 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 a manner that poses risks to public health.

Table 4.2.2 School Toilet Facilities and Service Coverage in 1994

Municipality	Number of School			Number of Students			Number of Toilet Units						Service Coverage												
	Public	Private	Total	Public	Private	Total	Sanitary			Unsanitary			Public	Private	Total	Public	Private	Total	%						
							No. of	Sanitary	Unsanitary	Total	No. of	Public								Private	Total	No. of	Public	Private	Total
Baco	27	1	28	4,541	847	5,388	30	8	38	15	0	15	53	1,500	28	400	7	1,900	35	3,041	56	447	8	3,488	65
Bansud	18	1	19	6,365	0	6,365	42	4	46	21	0	21	67	2,100	33	0	0	2,100	33	4,265	67	0	0	4,265	67
Bongabong	31	2	33	11,820	1,836	13,656	78	18	96	40	0	40	136	3,900	29	900	7	4,800	36	7,920	58	936	7	8,856	65
Bulabaco	21	0	21	4,644	0	4,644	30	0	30	16	0	16	46	1,500	32	0	0	1,500	32	3,144	68	0	0	3,144	68
Calapan (Capital)	50	9	59	16,994	3,511	20,505	113	35	148	56	0	56	204	5,650	28	1,750	9	7,400	37	11,344	55	1,761	9	13,105	64
Glenn	27	1	28	7,567	1,006	8,573	50	10	60	25	0	25	85	2,500	29	500	6	3,000	35	5,047	59	506	6	5,553	65
Mansalay	25	2	27	6,570	552	7,122	43	6	49	22	0	22	71	2,150	30	300	4	2,450	34	4,420	62	252	4	4,672	66
Nauyan	68	2	70	16,958	1,785	18,743	113	18	131	56	0	56	187	5,650	30	900	5	6,550	35	11,308	60	885	5	12,193	65
Pinamalayan	29	6	35	15,182	2,324	17,506	101	23	124	50	0	50	174	5,050	29	1,150	7	6,200	36	10,152	58	1,174	7	11,326	65
Pola	20	1	21	5,194	655	5,849	34	7	41	17	0	17	58	1,700	29	350	6	2,050	35	3,494	60	305	5	3,799	65
Puerto Galern	19	1	20	3,844	700	4,544	26	7	33	12	0	12	45	1,300	29	350	8	1,650	37	2,544	56	350	8	2,894	64
Roxas	24	2	26	7,529	2,409	9,938	50	24	74	25	0	25	99	2,500	25	1,200	12	3,700	37	5,029	51	1,209	12	6,238	63
San Teodoro	10	1	11	842	490	1,332	6	5	11	3	0	3	14	400	23	250	19	550	42	542	41	240	18	782	59
Socorro	21	2	23	8,580	1,135	9,715	57	11	68	29	0	29	97	2,850	29	550	6	3,400	35	5,730	59	585	6	6,315	65
Victoria	25	3	28	5,394	2,497	7,891	36	26	64	18	0	18	82	1,800	23	1,400	18	3,200	41	3,594	46	1,097	14	4,691	59
Provincial Total	415	34	449	122,004	19,747	141,751	809	204	1,013	405	0	405	1,418	40,450	29	10,200	7	50,650	36	81,554	58	9,547	7	91,101	64

Table 4.2.3 Public Toilet Facilities and Service Coverage in 1994

Municipality	Public Markets		Jeepney/Bus Terminals		Parks/Playgrounds		Served		Underserved	
	No. of Sanitary Toilets	Number of Unsanitary Toilets	No. of Sanitary Toilets	Number of Unsanitary Toilets	No. of Sanitary Toilets	Number of Unsanitary Toilets	No. of Sanitary Toilets	%	Number of Sanitary Toilets	%
Baco	1	0	1	0	0	0	1	100	0	0
Bansud	0	1	1	0	0	0	0	0	1	100
Bongabong	1	0	1	0	1	0	2	100	0	0
Bulabaco	0	1	1	0	0	0	1	100	0	0
Calapan (Capital)	0	1	1	0	1	0	2	100	0	0
Glenn	0	1	1	0	0	0	1	100	0	0
Mansalay	1	0	1	0	0	0	1	100	0	0
Nauyan	1	0	1	0	0	0	1	100	0	0
Pinamalayan	0	2	2	0	0	0	2	100	0	0
Pola	0	1	1	0	0	0	1	100	0	0
Puerto Galern	1	0	1	0	0	0	1	100	0	0
Roxas	1	0	1	0	1	0	2	100	1	50
San Teodoro	1	0	1	0	0	0	1	100	0	0
Socorro	1	0	1	0	0	0	1	100	0	0
Victoria	2	0	2	0	0	0	3	100	0	0
Provincial Total	10	7	17	2	4	0	21	57	9	43

4.2.4 Sewerage Facilities

There are no existing sewerage facilities in the province. Most of the wastewater from 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.

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.

Figure 5.3.1 - Functional Relationships

