JAPAN INTERNATIONAL COOPERATION AGENCY

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

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

VOLUME II - 2

MAIN REPORT

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

RIZAL

FEBRUARY 1996

NIPPON JOGESUIDO SEKKEI CO., LTD.

EXCHANGE RATE (As of 1 August 1995)

US$ 1.0 = Peso 25.7 = Yen 88.3

JAPAN INTERNATIONAL COOPERATION AGENCY

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

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

VOLUME II - 2

MAIN REPORT

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

RIZAL

FEBRUARY 1996

NIPPON JOGESUIDO SEKKEI CO., LTD.

Republic of the Philippines
RIZAL PROVINCIAL GOVERNMENT
Pasig, City

OFFICE OF THE GOVERNOR

MESSAGE

Some few months back, a national daily featured a grim scenario for our country's water supply in the future. A bleak water situation awaits our people and it looks like we are doomed. The unabated and wanton waste of such essential human need would prove fatal in the long run as it would likely cause adverse repercussions of unimaginable proportions.

It is thus a must that we weather promptly the forecasted storm before its full impact falls heavily on us. Conservation and wise consumption of this resource comprise the initial preparations while the comprehensive approach lies in the Provincial Water Supply, Sewerage and Sanitation Sector Plan (PW4SP).

The PW4SP is certainly a welcome solution to the water problem in Rizal. With inadequate facilities and service coverage aggravated by rapid urbanization, migration, and population growth as major areas of concern, it is with more reason and urgency now to seriously consider and adopt the Plan which had been completed in a thorough six-month-long study. The tapping of potential water sources is an important feature in the said Plan.

I congratulate and thank the Provincial Sector Planning Team (PSPT) and the Japan International Cooperation Agency (JICA) for their valuable assistance in the Plan's preparation. I likewise enjoin the LGUs and others concerned to extend their support to the Plan upon its implementation.

Lest we suffer the dire consequences of inaction, we must move with dispatch regardless of the imminence or inevitability of the danger for preparedness is never a losing proposition.

CASIMIRO M. YNARES,JR.
Governor

PROVINCIAL WATER SUPPLY, SEWERAGE AND SANITATION SECTOR PLAN

VOLUME II - 2 MAIN REPORT

TABLE OF CONTENTS

CHAPTER PAGE NO.

PROVINCIAL WATER SUPPLY, SEWERAGE AND SANITATION SECTOR PLAN

LIST OF TABLES

PROVINCIAL WATER SUPPLY, SEWERAGE AND SANITATION SECTOR PLAN

LIST OF FIGURES

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

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 services. However, of the rural population, it was estimated that only 72% (23.9 M) was served by the existing facilities because some facilities were damaged or non-functioning. Furthermore, population served adequately by safe sources may be discounted.

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

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 Discussions between DILG and JICA, and Figure 1.3.1 Organization Chart, 1.3.1 Preparation of the Plan, Supporting Report).

The PW4SP covers 11 of the 14 municipalities in the province excluding areas under the MWSS service area. In Binangonan, only the barangays in Talim Island are covered. The Plan has been prepared at municipal level covering all sub-sectors for each municipality of the study area.

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

1.3.2 Outline of the Report

The PW4SP is a framework plan that would serve as the basis for future implementation work in the sector. It will be carried out either as large scale projects funded by international agencies or as a small size project carried out by local parties. It should be noted that the PW4SP is a sector development plan for the entire province and that it does not include detailed planning of the 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.

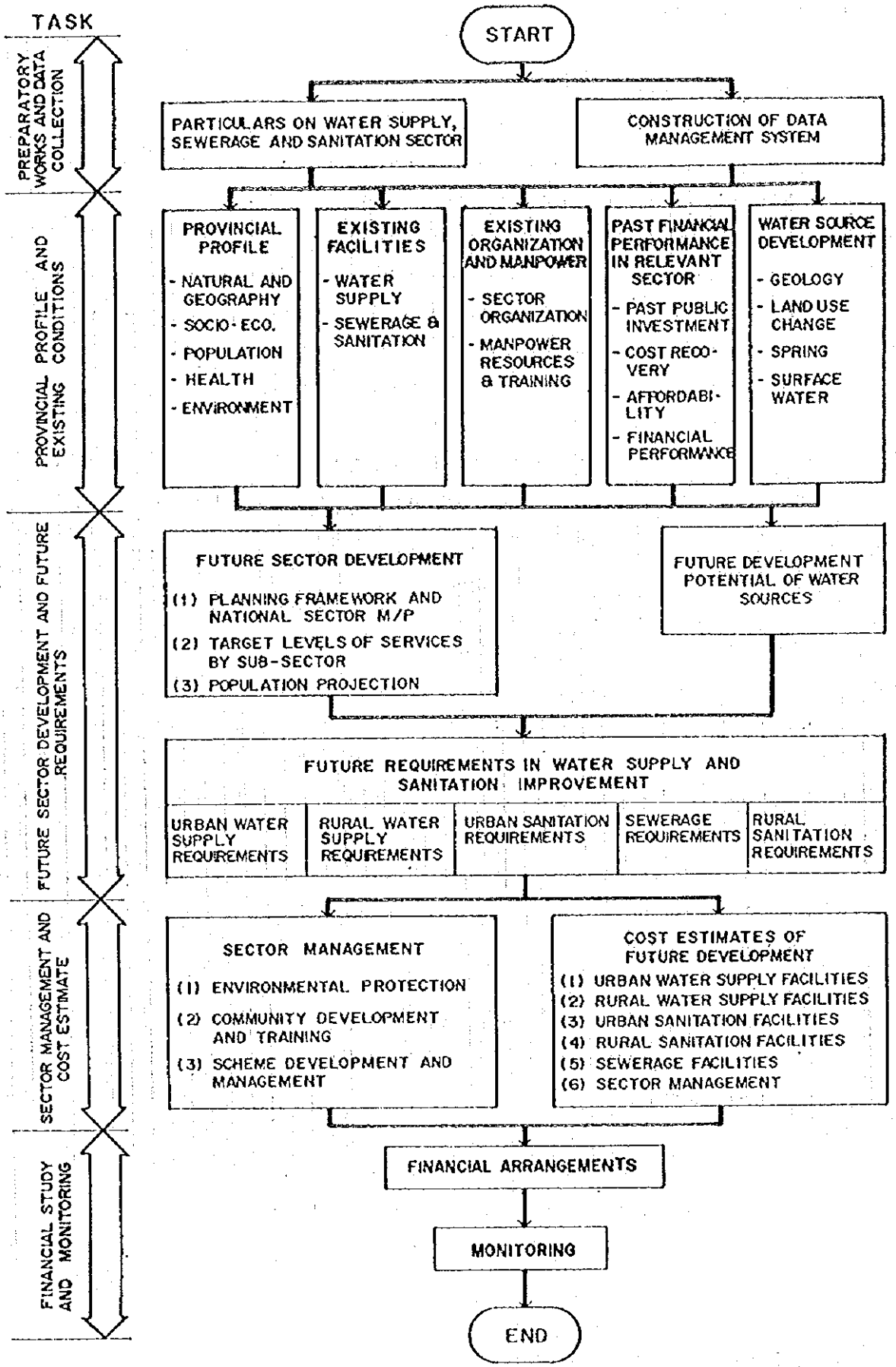
Chapter 4, 5, and 6 provide existing sector conditions in physical, managerial and financial aspects: existing water supply and sanitation facilities by service level and service coverage; sector institutions, community development, training and monitoring systems; and financial performances entailing 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 costs 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: [1]Based on the 1998 MTPDP targets.
[2]Based on the long-term targets set in the previous National Sector Master Plan.

2.3 Sector Objectives

The objectives of the sector are:

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

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

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

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

2.4 Current Sector Policies and Strategies

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

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

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

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

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

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

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

2.5 Major Legislation and Regulations Affecting the Sector

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

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

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

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

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

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

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

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

2.6 Planning Principles and Data Management

2.6.1 Planning Principles

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

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

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

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

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

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

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

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

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

2.6.2 Data Management

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

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

(1) Computer-based system

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

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

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

(2) Key Parameters

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

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

Figure 2.6.1 Institutional Hierarchical System of the Philippines

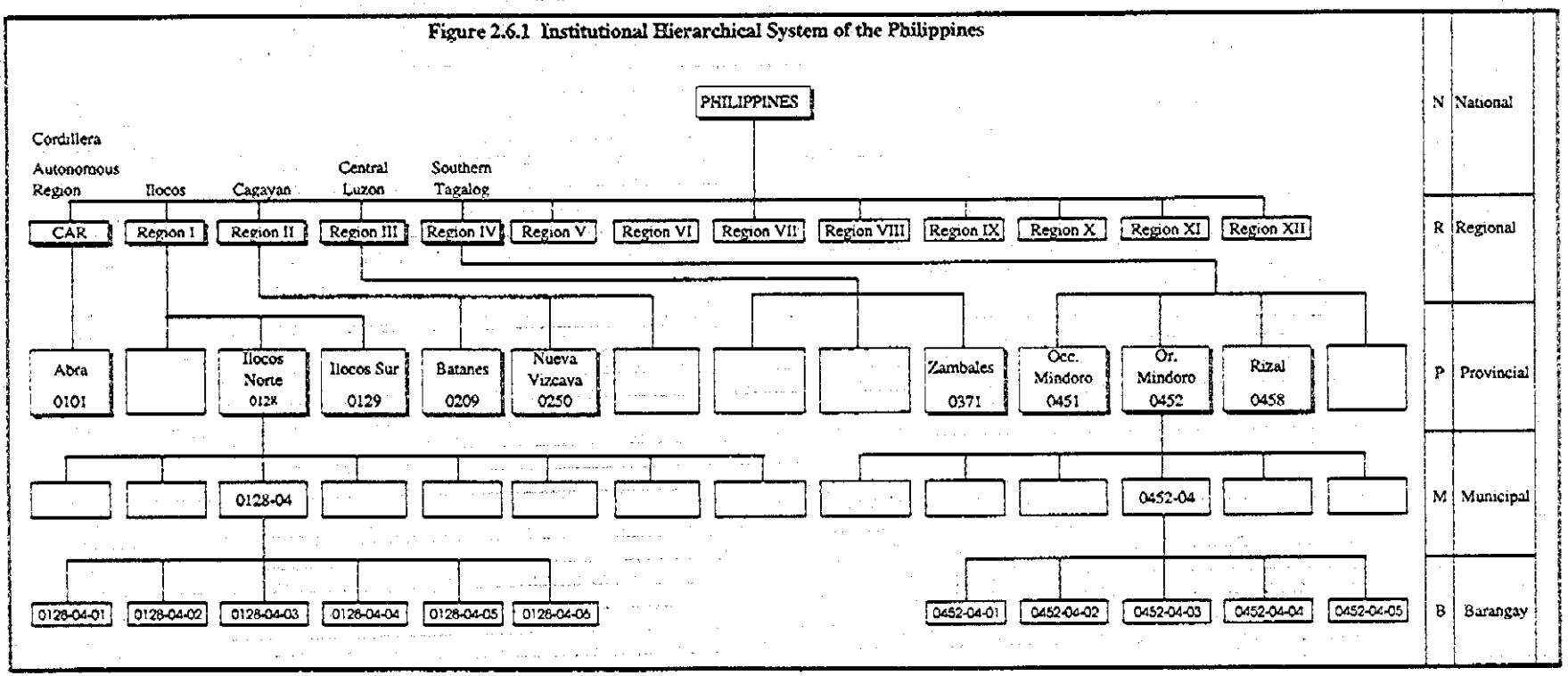


Figure 2.6.2 Structure of Questionnaire

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

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

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

(3) Data Processing

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

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

Chapter 3

PROVINCIAL PROFILE

3. PROVINCIAL PROFILE

3.1 General

Rizal province lies on the southwestern part of the island of Luzon and adjacent to Metro Manila. It is bounded on the north by Bulacan, on the east by Laguna and Quezon, on the west by Metro Manila and on the south by Laguna de Bay. Figure 3.1.1 presents the Location Map.

The province has a total land area of 1,303.83sq.km that is only 0.43% of the Philippine total land area of about 300,000sq.km. It is composed of 14 municipalities with Pasig (a former municipality of Rizal but now a part of Metro Manila) as the seat of the provincial government. There are 186 barangays, of which 148 are urban and 38 rural. Provincial total population was 980,194 in 1990. About 86% resided in urban areas, while the remaining 14% in rural areas. Six (6) municipalities are fully urbanized (100% urban barangays and accordingly urban population). At present, the province has three (3) water districts. In addition, MWSS covers portions of the seven municipalities. Table 3.1.1 presents the breakdown per municipality of the land area, population and its density, as well as administrative composition (NSO population census in 1990). Municipalities with asterisk mark (*) in tables and figures are not included in the study area.

Table 3.1.1 Outline of Municipalities

Municipality		Land Area (sq.km)	1990 Population		Number of Barangays		
Code	Name		Number	Density (persons/sq.km)	Urban	Rural	Total
045801	Angono*	26.00	46,014	1,770	10	0	10
045802	Antipolo	306.10	207,842	679	3	12	15
045803	Baras	23.40	16,880	721	8	2	10
045804	Binangonan**	72.70	127,561	1,755	39	0	39
045805	Cainta*	10.19	126,839	12,447	7	0	7
045806	Cardona	31.20	32,962	1,056	18	0	18
045807	Jala-jala	49.30	16,318	331	3	8	11
045808	Morong	37.60	32,165	855	4	4	8
045809	Pililla	73.90	32,771	443	9	0	9
045810	Rodriguez	312.80	67,074	214	7	4	11
045811	San Mateo	64.90	82,310	1,268	15	0	15
045812	Tanay	243.40	58,410	240	11	8	19
045813	Taytay*	33.74	112,403	3,331	5	0	5
045814	Teresa	18.60	20,645	1,110	9	0	9
Provincial Total		1,303.83	980,194	752	148	38	186

Note : Municipal Code corresponds to NEDA Geographic Coding System.
*Municipalities not included in the study area.
**Only those barangays in Talim Island are covered by the PW4SP.

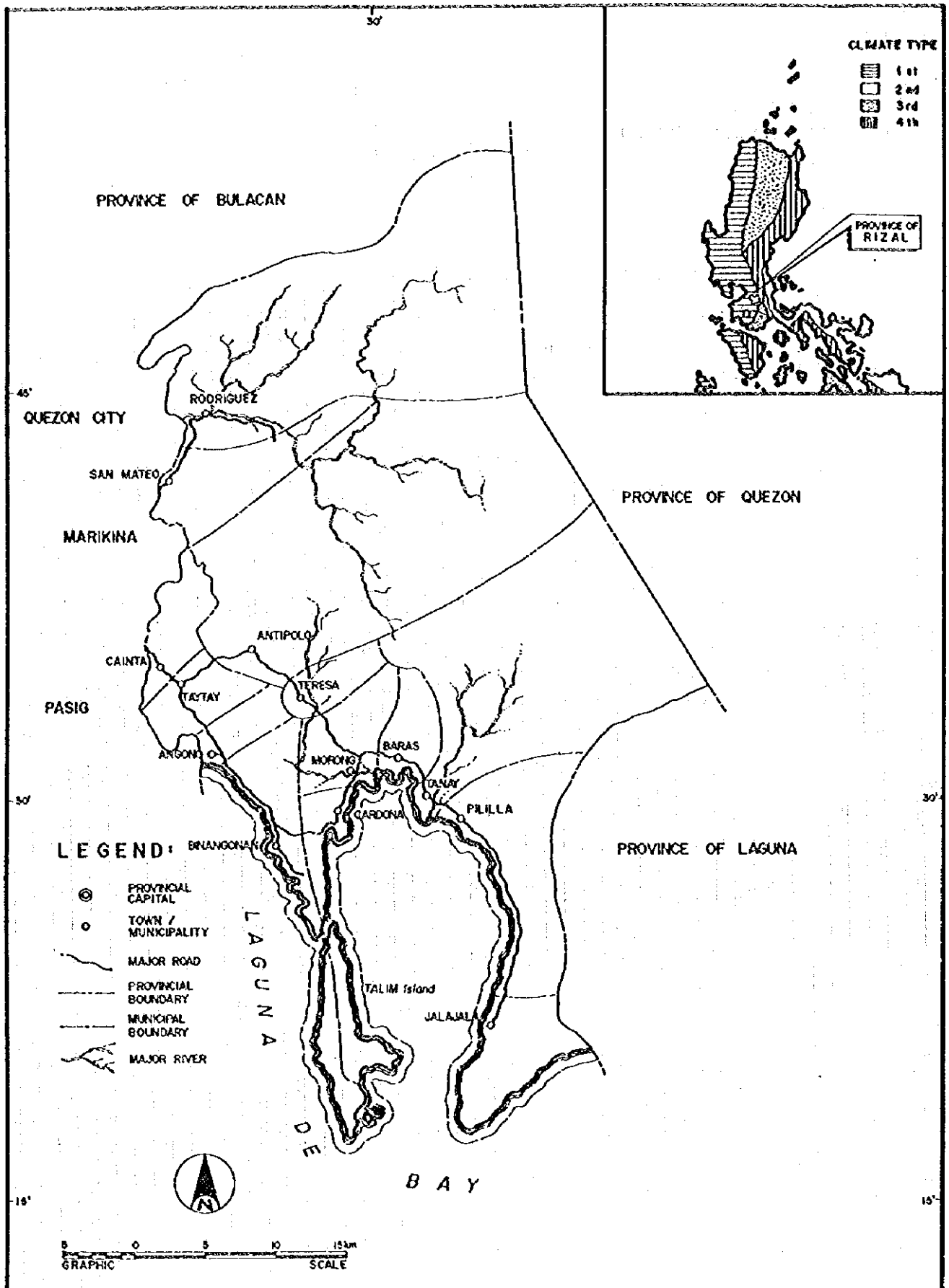


FIGURE 3.1.1

LOCATION MAP

PROVINCE OF RIZAL

3.2 Natural Conditions and Geographical Features

3.2.1 Meteorology

The province has Type I climate under the Coronas classification and is characterized by pronounced dry and wet seasons as reflected in Figure 3.1.1, Location Map. It is normally wet during the months of May to November and dry the rest of the year. Using the 17-year records of the Antipolo Station, the annual average rainfall was registered at 1,745mm. Average maximum rainfall of 425mm was recorded during the month of August, while the average minimum of 5mm was in February.

The annual average temperature is 26.97°C with a range of 29 °C in May to 25.1 °C in January. The prevailing wind is southeasterly with wind speed varying by the month.

3.2.2 Land Use

Forest area constitutes about 31% of the total land of the province located mostly in the Sierra Madre Mountain ranges. Agricultural land comprises 26%, while the aggregate area of Grassland and Shrubland including Openland, Wetland and Fishponds represents 26% of the total. Built-up areas cover 17% and are situated in both low-lying and elevated areas of the province. The existing land use pattern as presented in Table 3.2.1 depicts a sustainable growth deserving and enhancing its present trend. The remaining forest cover 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. Correspondingly, a significant increase in agricultural and built-up areas will result in high demand of water uses.

Table 3.2.1 Current Land Use

Land Use	Area (sq.km)	Percentage Over Total Land Area
Forest Land	400.96	30.75%
Agricultural	333.03	25.54%
Built-up	224.68	17.23%
Mangrove, Fishponds, Inland Water Grassland and Openlands	345.16	26.47%
TOTAL	1,303.83	100.00%

3.2.3 Topography and Drainage

General topography of the province is characterized by hilly to mountainous and relatively flat areas. The flat low-lying areas are located on the western section, while the gently rolling hills and few rugged ridges which form parts of the southern foothills of the Sierra Madre Mountain ranges are found on the eastern portion. Elevation fluctuates from 30 to 1,000 meters above mean sea level. Mt.Matulid in Rodriquez is the highest (1,074m) among several mountains.

The natural drainage systems generally flow westward and southward directions. A principal river is Marikina that empties into Manila Bay. Other rivers such as Tanay, Morong, and Jala-Jala flow towards Laguna Lake that subsequently empties into Manila Bay. Figure 3.2.1 shows the drainage systems of Rizal. 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: Marikina and Tanay. Examined river water was turbid and showed some color.

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	
Marikina River	04SW144211PW009	282	0.111	16.75	418.51	NONE
Tanay River	No Flow Record	52	N.A.	*0.91	N.A.	NONE

Source: Philippine Water Resources Summary Data Volume 1,2 (Department of Public Works and Highways, 1991)
*Estimated figure during water sampling in October 1994
N.A. - Not Available

3.3 Socio-economic Conditions

3.3.1 Economic Activities and Household Income

Rizal features a highly industrialized economy. Also, service as well as wholesale and retail trade sectors play vital economic roles in the province. Compared to other provinces in the region, it has smaller agricultural area limited to paddy fields. Rice remains as the major agricultural crop.

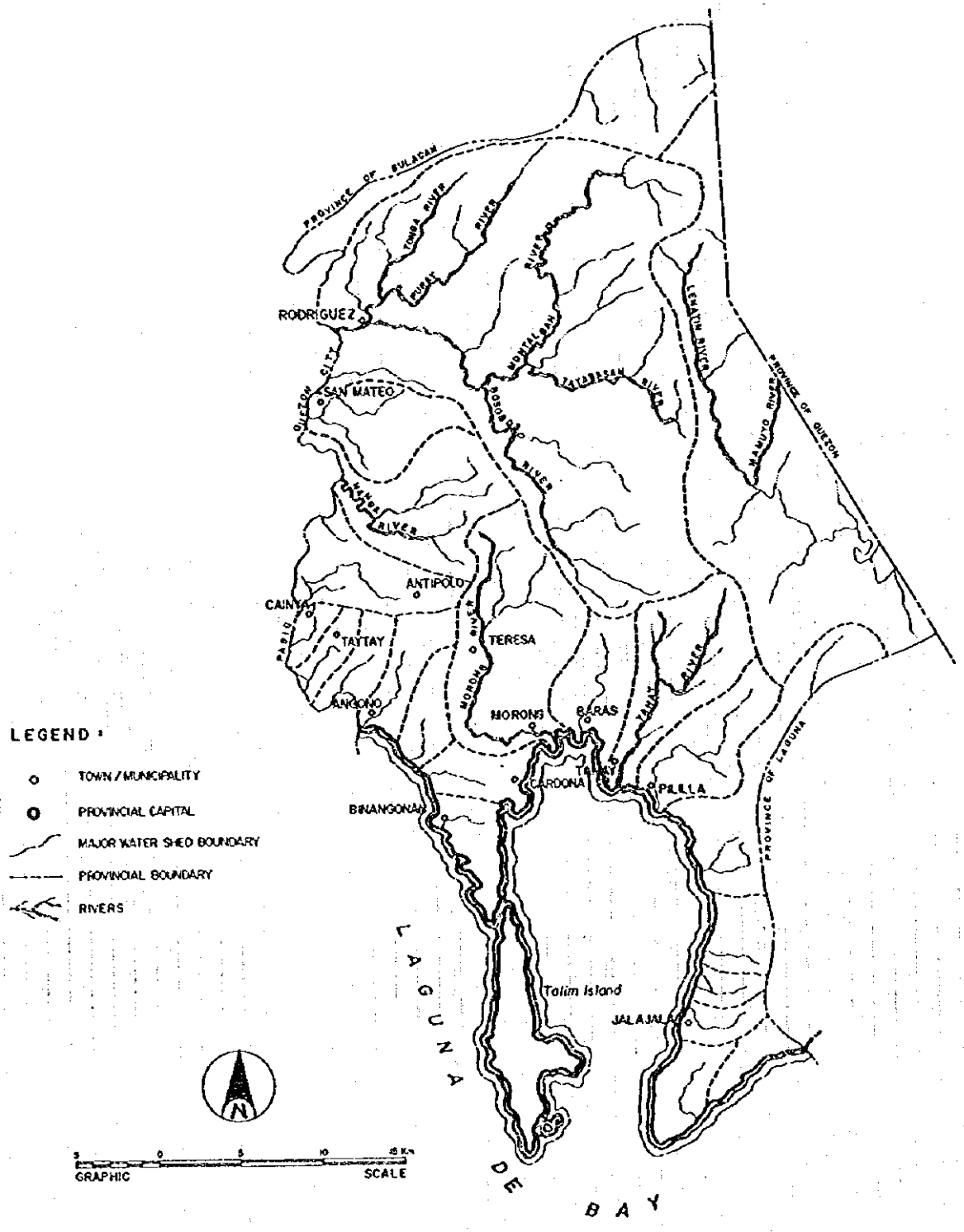


FIGURE 3.2.1

MAJOR RIVER NETWORKS

PROVINCE OF RIZAL

The National Statistics Office (NSO) Family Income and Expenditures Survey in 1991 showed that the average annual household income of the province was ₱ 93,046, while the median was at ₱ 64,800. 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 higher income levels were greater than the average figures in the region. Based on the established poverty threshold income of ₱ 51,486 in Region IV in 1991, approximately 31% of the total number of families lived within and below the poverty threshold.

As for number of workers by major industry group, manufacturing had the dominant share, followed by social and personal services, construction, agriculture, fishery and forestry, wholesale and retail trade, and transportation (refer to Table 3.3.2, Supporting Report). By major occupation group, craft and related workers recorded the largest number, followed by officials, professionals and technicians, and elementary occupations as shown in Figure 3.3.2.

3.3.2 Basic Infrastructure

All municipalities are energized and telephone service is widely distributed with 9 telegraph stations and 14 telephone exchanges. There are 14 post offices or stations in the province. Land transportation is available by means of jeepneys, minibuses and buses. There are 328 business establishments and 51 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 397 schools consisting of 323 elementary schools, 64 high schools and 10 colleges. The 1990 NSO census indicated that the province had a 98.5% literacy of household population 10 years old and over. A large part of the population had attained elementary or high school levels of education as indicated in Figure 3.3.3 (refer to Table 3.3.3, Supporting Report).

Figure 3.3.1 Distribution of Households by Income Class

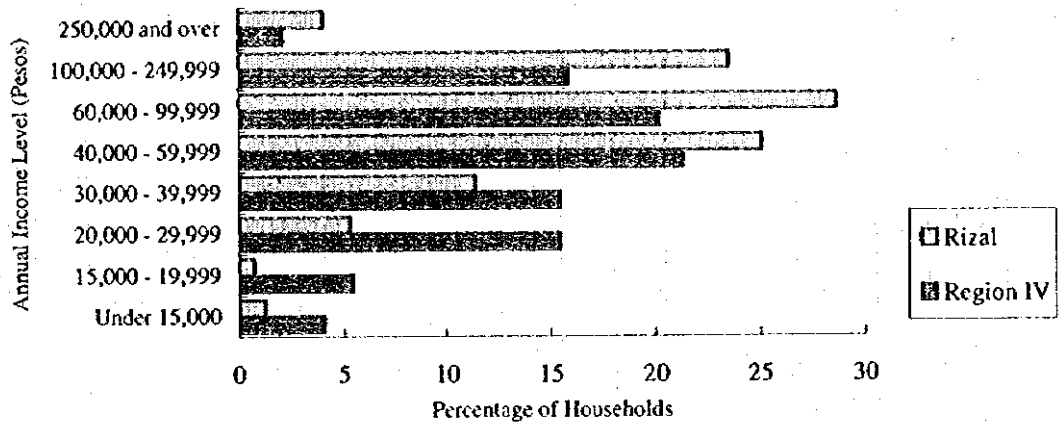


Figure 3.3.2 Population Distribution by Occupation

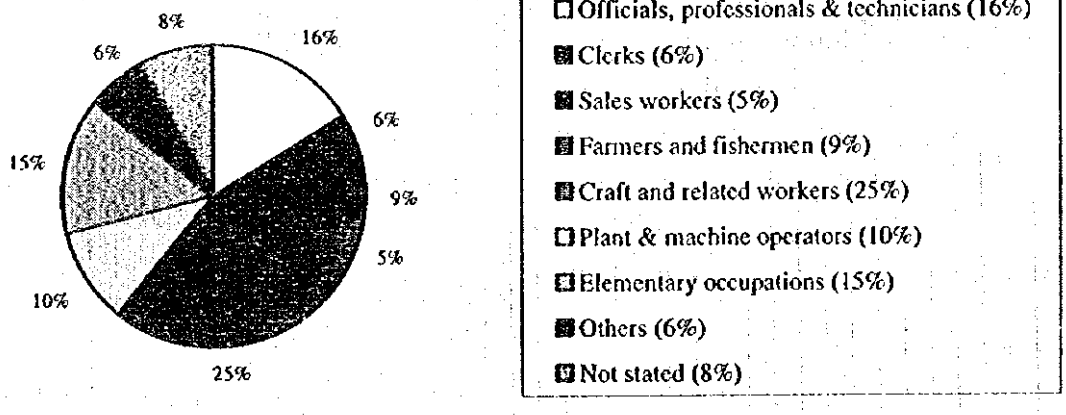


Figure 3.3.3 Population Distribution by Highest Attainment of Education

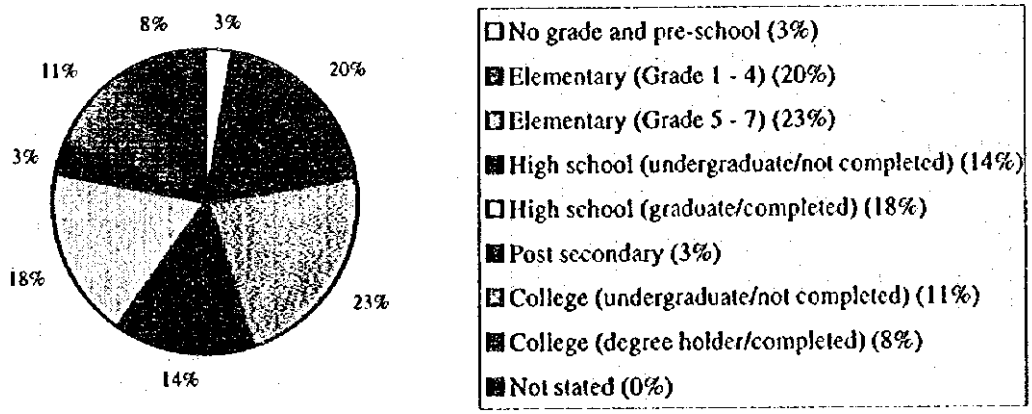


Table 3.3.1 Provincial Outline on Public Services

Items	Unit	Qty.	Items	Unit	Qty.
(1) Roads			(8) Tourism facilities	Number	51
a) Total Length	km	473.00	(Hotel resort, lodges, recreational		
b) Barangay roads	Percent	74.6	facilities, etc.)		
(2) Electricity service coverage			(9) Schools		
a) Municipality	Percent	100	a) Elementary level	Number	323
b) Barangay	Percent	95.7	b) Secondary level	Number	64
c) Household	Percent	91.4	c) Tertiary level	Number	10
(3) Telecommunication Services			(10) Health Facilities		
a) Availability in municipality	Percent	100	a) Hospital	Number	6
b) Telegraph station	Number	9	b) Main health centers, rural health	Number	184
c) Telephone station	Number	14	units, barangay health center, etc		
(4) Post Office	Number	14	(11) Labor		
			a) Labor force participation ratio	Percent	67.7
(5) Transportation services	Mode (ex. Bus, jeep, taxi,.)	All available	b) Employment rate	Percent	91.1
			(12) Average family income		
			a) Monthly income	Pesos/Month	7,754
(6) Banking Facilities			b) Monthly expenditure	Pesos/Month	5,786
a) Private bank	Number	87			
b) Public bank	Number	6			
(7) Industrial/business/commercial establishment	Number	328			

Sources:

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

Table 3.3.2 Public Facilities and Services by Municipality

Municipality	High School			College	Hospital	Public Market	Bank	Annual Growth Rate of Population (1980-1990)
	Public	Private	Total					
	nos.	nos.	nos.	nos.	nos.	nos.	nos.	Percent
Angono*	1	4	5	1	1	1	7	5.6
Antipolo	1	10	11	1	1	1	20	11.7
Baras	0	2	2	0	0	1	0	4.2
Binangonan**	3	1	4	0	0	1	4	4.6
Cainta*	6	6	12	1	0	1	20	7.9
Cardona	1	2	3	0	1	1	1	3.0
Jala-jala	2	2	4	0	1	0	0	3.2
Morong	1	2	3	2	1	1	5	2.6
Pililla	2	1	3	0	1	1	1	3.5
Rodriguez	1	3	4	0	0	1	5	4.8
San Mateo	1	2	3	0	0	1	6	4.7
Tanay	4	2	6	2	0	1	8	3.7
Taytay*	0	3	3	3	0	1	15	4.1
Teresa	0	1	1	0	0	1	1	3.4
TOTAL	23	41	64	10	6	13	93	5.8

* Municipalities not included in the study area.

** Only those barangays in Talim Island are covered by the PW4SP.

3.4 Population

3.4.1 Previous Population Development

Highly increasing population growth rates of the province 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 4.3% during the period 1948 to 1960, it increased to 5.8% (1980-1990). A summary of the average annual growth rates of the province is as follows:

Year	Population	Ave. Annual Growth Rate (%)	Period
1960	172,958	4.3	1948-1960
1970	307,238	5.9	1960-1970
1975	414,192	6.1	1970-1975
1980	555,533	6.0	1975-1980
1990	980,194	5.8	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 this Master Plan (refer to Section 8.3.1, Population Projection, Main Report). Table 3.4.1 shows a breakdown of the past population development by municipality including the 1994 projected 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.

Figure 3.4.1 Previous Population Development of the Province

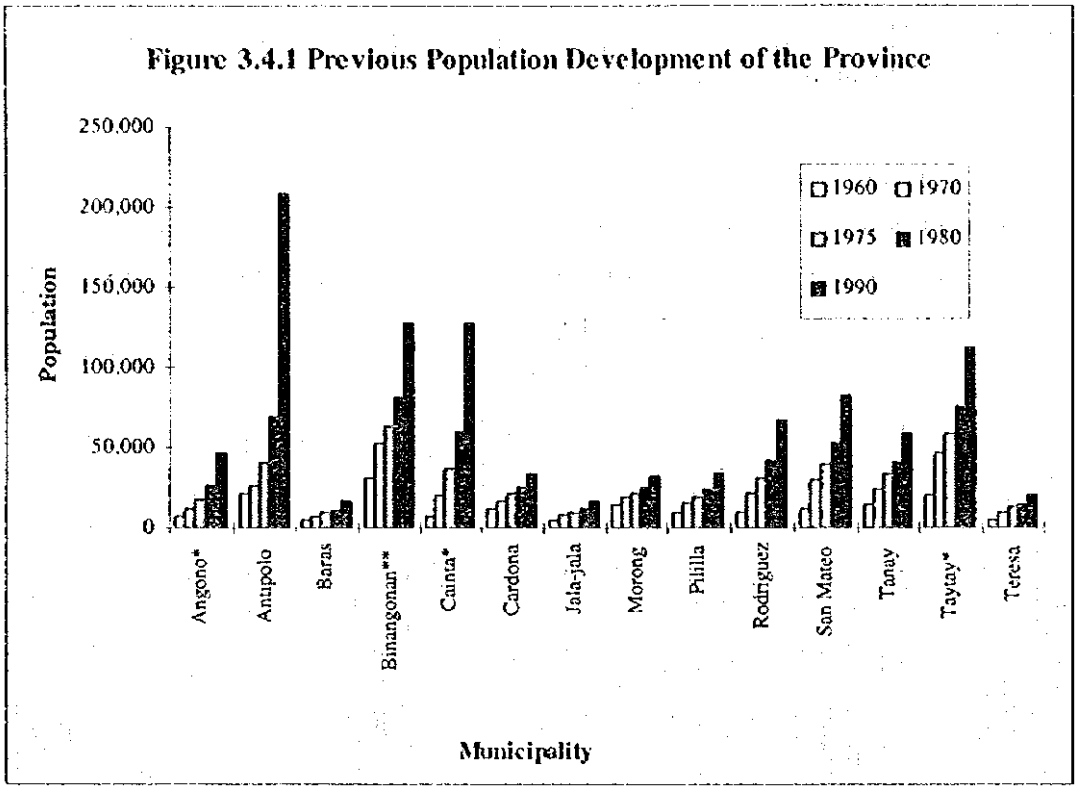


Table 3.4.1 Previous Population Development by Municipality

Municipality	Previous Population						Proj. Pop.
	1948	1960	1970	1975	1980	1990	1994
Angono*	5,255	7,093	12,127	17,574	26,571	46,014	54,949
Antipolo	7,604	21,598	26,508	40,944	68,912	207,842	264,731
Baras	2,745	4,454	7,166	9,722	11,196	16,880	19,682
Binangonan**	20,422	31,274	52,296	63,215	80,980	127,561	152,177
Cainta*	3,692	6,803	20,714	36,971	59,025	126,839	162,108
Cardona	8,134	12,476	16,880	21,266	24,503	32,962	34,196
Jala-jala	2,429	5,223	8,115	9,276	11,945	16,318	16,901
Morong	10,035	13,694	18,970	21,058	24,858	32,165	34,361
Pililla	6,067	9,021	15,052	18,985	23,222	32,771	35,092
Rodriguez	5,257	9,648	20,882	31,176	41,859	67,074	78,679
San Mateo	6,811	12,044	29,183	38,955	51,910	82,310	96,398
Tanay	8,627	13,955	23,247	33,382	40,433	58,410	66,862
Taytay*	14,144	20,747	46,717	58,274	75,328	112,403	129,433
Teresa	3,356	4,928	9,381	13,394	14,781	20,645	21,569
TOTAL	104,578	172,958	307,238	414,192	555,523	980,194	1,167,138

* Municipalities not included in the study area.

** Only those barangays in Talim Island are covered by the PW4SP.

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

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

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

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

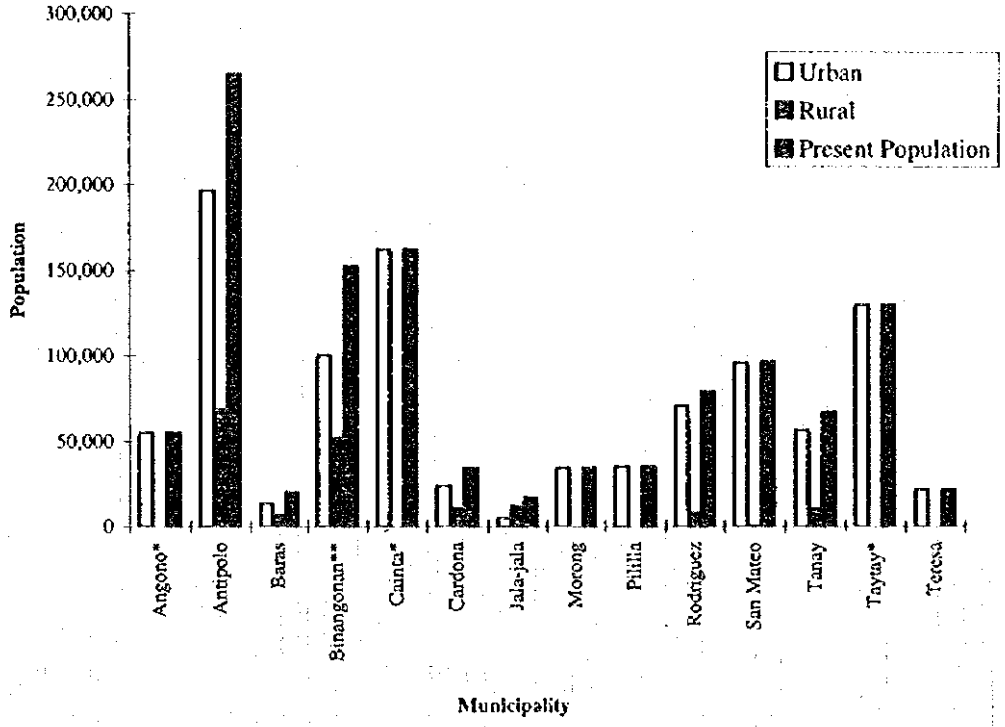
For this Master Plan, however, the 1990 NSO classification of urban and rural barangays was modified by the PPDO to reflect the actual conditions prevailing in the area. About 30 urban barangays, mainly in Binangonan and Cardona municipalities were re-classified as rural. With the re-classification, there are now 119 urban barangays and 67 rural barangays for a total of 186 barangays in Rizal.

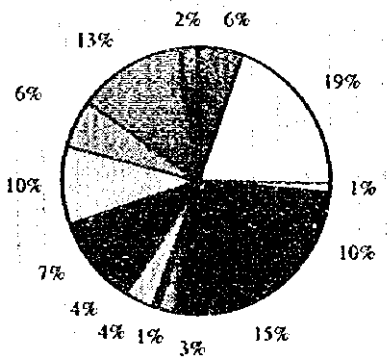
3.4.3 Present Population Distribution

Utilizing the modified classification of the barangays, urban-rural population was derived. Urban population accounts for 86% of the provincial total, while the remaining 14% is rural as reflected in Figure 3.4.2. Table 3.4.2 presents the breakdown of the modified number of urban and rural barangays by municipality and its corresponding present population.

There are 189,712 households with 162,543 residing in urban areas and 27,169 households in rural areas. The average provincial household size is 5.2 persons/household. Table 3.4.3 presents a breakdown per municipality on the number of households and household sizes by urban and rural area.

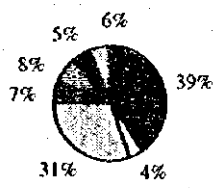
Figure 3.4.2 Present Population Distribution





Urban Population (86%)

Angono* (5%)	Antipolo (19 %)
Baras (1 %)	Binangonan** (10 %)
Cainta* (15 %)	Cardona (3 %)
Jala-jala (1 %)	Morong (4 %)
Pililla (4 %)	Rodriguez (7 %)
San Mateo (10 %)	Tanay (6 %)
Taytay* (13 %)	Teresa (2 %)



Rural Population (14%)

Angono* (0 %)	Antipolo (39 %)
Baras (4 %)	Binangonan** (31 %)
Cainta* (0 %)	Cardona (7 %)
Jala-jala (8 %)	Morong (0 %)
Pililla (0 %)	Rodriguez (5 %)
San Mateo (0 %)	Tanay (6 %)
Taytay* (0 %)	Teresa (0 %)

Table 3.4.2 Outline of Urban and Rural Areas in the Province

Municipality	Land Area (sq.km)	Number of Barangay			Population (1990)		
		Urban	Rural	Total	Urban	Rural	Total
Angono*	26.00	10	0	10	46,014	0	46,014
Antipolo	306.10	9	6	15	154,119	53,723	207,842
Baras	23.40	7	3	10	11,399	5,481	16,880
Binangonan**	72.70	12	27	39	84,699	42,862	127,561
Cainta*	10.19	7	0	7	126,839	0	126,839
Cardona	31.20	9	9	18	22,679	10,283	32,962
Jala-jala	49.30	3	8	11	4,693	11,625	16,318
Morong	37.60	8	0	8	32,165	0	32,165
Pililla	73.90	9	0	9	32,771	0	32,771
Rodriguez	312.80	7	4	11	60,192	6,882	67,074
San Mateo	64.90	14	1	15	81,693	617	82,310
Tanay	243.40	10	9	19	49,378	9,032	58,410
Taytay*	33.74	5	0	5	112,403	0	112,403
Teresa	18.60	9	0	9	20,645	0	20,645
Provincial Total	1,303.83	119	67	186	839,689	140,505	980,194

* Municipalities not included in the study area.
** Only those barangays in Talim Island are covered by the PW4SP.

Table 3.4.3 Household Numbers and Household Sizes

Municipality	Number of Households			Household Size (person / HH)		
	Urban	Rural	Total	Urban	Rural	Total
Angono*	8,941	0	8,941	5.1	0.0	5.1
Antipolo	29,965	10,887	40,852	5.1	4.9	5.1
Baras	2,119	1,044	3,163	5.4	5.3	5.3
Binangonan**	16,607	7,771	24,378	5.1	5.5	5.2
Cainta*	24,775	0	24,775	5.1	0.0	5.1
Cardona	4,333	1,931	6,264	5.2	5.3	5.3
Jala-jala	892	2,143	3,035	5.3	5.4	5.4
Morong	6,255	0	6,255	5.1	0.0	5.1
Pililla	6,131	0	6,131	5.3	0.0	5.3
Rodriguez	11,477	1,414	12,891	5.2	4.9	5.2
San Mateo	15,948	131	16,079	5.1	4.7	5.1
Tanay	9,241	1,848	11,089	5.3	4.9	5.3
Taytay*	21,881	0	21,881	5.1	0.0	5.1
Teresa	3,978	0	3,978	5.2	0.0	5.2
Provincial Total	162,543	27,169	189,712	5.2	5.2	5.2

* Municipalities not included in the study area.
** Only those barangays in Talim Island are covered by the PW4SP.

3.5 Health Status

3.5.1 Morbidity, Mortality and Infant Mortality

The number one cause of morbidity in 1990 was acute respiratory infection followed by nutritional deficiencies. Intestinal parasitism and anemias ranked 3rd and 4th, respectively. Other causes of morbidity in descending order were influenza, diarrhea, skin diseases and bronchitis. Regarding mortality, the number one cause was vascular diseases, followed by pneumonia. Tuberculosis and malignant neoplasm ranked third and fourth, respectively. Pneumonia, other prenatal causes and prematurity were the three (3) leading causes of infant mortality in the province (refer to Table 3.5.1, Data Report).

The general health status of the populace in the province was relatively fair compared with the national condition taking into account the incidence of diseases. Table 3.5.1 presents comparative statistics in 1990 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 in 1990

Rate: 1/1000,000

	Causes	Rizal		Philippines		
		Number	Rate	Number	Rate	Ranking
Morbidity	1. ARI	157,968	16,116	152,688	246.1	5
	2. Nutritional Deficiencies	27,749	2,831	-	-	-
	3. Intestinal Parasites	18,751	1,913	-	-	-
	4. Anemias	16,134	1,646	-		
	5. Influenza	11,605	1,184	544,768	878.0	3
	6. Diarrhea	10,949	1,117	943,580	1,520.7	2
	7. Skin Diseases	10,831	1,105	-	-	-
	8. Bronchitis	8,988	917	980,557	1,580.1	1
	9. Resp. Fetus/Newborn	3,244	331	-	-	-
	10. Other Accidents	3,048	311	133,737	215.5	6
Mortality	1. Vascular Diseases	804	82	33,729	54.2	3
	2. Pneumonia	581	59	41,240	66.5	2
	3. Tuberculosis	267	27	24,307	39.1	4
	4. Malignant Neoplasms	246	25	22,179	35.7	5
	5. Other Accidents	160	16	12,002	19.3	6
	6. Other Prenatal Causes	149	15	-	-	-
	7. Septicemia	79	8	5,835	9.4	8
	8. Diarrhea	71	7	7,493	12.0	7
	9. Prematurity	59	6	-	-	-
	10. Obstructive Pulmonary	28	3	-	-	-
Infant	1. Pneumonia	59	6	9,383	5.8	1
	2. Other Prenatal Causes	50	5	-	-	-
	3. Prematurity	25	3	-	-	-
	4. Septicemia	16	2	1,532	0.9	5
	5. Diarrhea	12	1	1,838	1.1	4

Water-related diseases in the ten leading causes of morbidity include intestinal parasitism (rank 3rd), diarrhea (rank 6th) and skin diseases (rank 7th). Diarrhea also ranked 8th and 5th 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, conjunctivities (sore eyes), and skin diseases; and 4) water-vector related diseases e.g., 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.

The reported water-related diseases in the province in 1990 were typhoid/paratyphoid, viral hepatitis, diarrhea, intestinal parasitism, conjunctivities and skin diseases. Table 3.5.2 presents the reported cases and deaths of notifiable water-related diseases in the province.

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

Rate: 1/100,000

Diseases	Morbidity		Mortality		Infant Mortality	
	Number	Rate	Number	Rate	Number	Rate
Water-borne						
1. Typhoid/Parathyphoid	451	46	0	0	0	0
2. Viral Hepatitis	0	0	0	0	0	0
3. Diarrhea	10949	1117	71	7.27	12	1.24
Water-washed						
1. Intestinal Parasitism	18751	1913	0	0	0	0
2. Conjunctivities	1774	181	267	27.2	0	0
3. Skin Diseases	10831	1105	0	0	0	0

3.5.3 Health Facilities and Practitioners

Present facilities serving the health care of the populace are 6 government-owned hospitals, 29 rural health units and 171 barangay health stations. The ratio of the population to these facilities and to the health practitioners are very well above the national average figures (refer to Table 3.5.1 Number and Ratio of Population to Health Facilities and/or Medical Practitioners, Supporting Report).

3.6 Environmental Conditions

3.6.1 General

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 (refer to Table 3.6.1, Data Report). The rivers and streams function as the drainage system. These rivers receive the domestic wastewater and storm water collected by the segmented drainage facilities in urban centers or poblacions.

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

As of 1994, except Jala-Jala, all the 13 municipalities have municipal refuse collection and disposal service. These municipalities have one (1) to 11 units of open dump truck. About 66% of the households is served, while the remaining 35% is unserved. Table 3.6.1 reflects the manner of solid waste collection and disposal, and service coverage by municipality in 1994.

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

Municipality	Number of Households 1994	With Service						Without Service				Percentage of Households Served	Percentage of Households Unserved
		Number of Collection Trucks			Disposal			Manner of Disposal (Number of Household)					
		Open Dump Trucks	Closed Type Trucks	Total Units	Number of Households Served by Open Dump Site	Number of Households Served by Sanitary Landfill	Total Households Served	Dumping (Land and Water)	Burying	Composting	Total Households Unserved		
Antipolo	49,131	9	0	9	20,455	9,992	30,447	16,648	2,036	0	18,684	62	38
Baras	3,752	1	0	1	1,870	0	1,870	999	883	0	1,882	50	50
Binangonan (Talim)	3,926	0	0	0	0	0	0	1,727	1,217	982	3,926	0	100
Cardona	7,505	1	0	1	4,215	0	4,215	1,627	1,663	0	3,290	56	44
Jala-jala	3,622	1	0	1	380	0	380	2,001	1,131	110	3,242	10	90
Morong	6,737	2	0	2	3,088	0	3,088	2,407	1,242	0	3,649	46	54
Pililla	6,621	2	0	2	2,388	0	2,388	3,227	1,006	0	4,233	36	64
Rodriguez	15,485	2	0	2	4,718	2,774	7,492	1,684	1,345	4,964	7,993	48	52
San Mateo	19,266	1	1	2	5,680	8,947	14,627	2,103	765	1,771	4,639	76	24
Tanay	13,313	5	0	5	10,063	0	10,063	760	2,490	0	3,250	76	24
Teresa	4,148	2	0	2	2,882	0	2,882	382	884	0	1,266	69	31
PW4SP Study Area	133,506	26	1	27	55,739	21,713	77,452	33,565	14,662	7,827	56,054	58	42
Angono*	10,763	2	0	2	4,059	5,232	9,291	1,307	165	0	1,472	86	14
Binangonan* (Others)	25,137	4	0	4	18,342	0	18,342	3,032	2,105	1,658	6,795	73	27
Cainta*	29,670	11	0	11	24,254	0	24,254	1,723	3,247	446	5,416	82	18
Taytay*	26,293	6	0	6	18,978	0	18,978	300	7,015	0	7,315	72	28
Provincial Total	225,369	49	1	50	121,372	26,945	148,317	39,927	27,194	9,931	77,052	66	34

Open dumping is practiced by most of the municipalities as disposal of solid waste except Angono, Antipolo, Rodriguez and San Mateo that use the sanitary landfill of the Metro Manila Commission located in San Mateo. The dumped refuse is usually burned or left unattended. Some significant negative effects associated with this unsanitary method are surface and groundwater pollution, air pollution, scattered solid waste, breeding grounds for insects, rodents and other disease vectors and fire hazard. At the household level, unserved households by the LGUs primarily depend on individual waste disposal such as dumping in vacant lots or body of water and burying.

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 69% of the present population (of which 90% in urban area and 10% in rural area) is considered as adequately served (refer to detailed study in Supporting Report). Under the area classification, 72% of urban population and 47% of rural population have access to safe water sources/facilities, while the rest is underserved and/or unserved. About 402,000 persons or 50% of the served population depend on Level I facilities, while almost the same population is 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	

(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 the 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.

Special attention should be paid to the numerous independent private water supply systems for subdivisions with a total of 65% to provincial served population as shown in Table 4.1.2 (details are referred to in Table 4.1.3, Data Report).

There are 16 Level III public systems in the province operated under different kind of ownership (authority or association) as enumerated in Table 4.1.2. Some of these systems entail Level II services, namely:

- Metropolitan Waterworks and Sewerage System (MWSS) extended to municipalities of Antipolo, Rodriguez and San Mateo
- Water Districts in respective municipalities of Morong, Pililla and Tanay
- Four municipal waterworks; for 6 urban barangays of Angono, 6 urban barangays of Baras, 7 urban barangays of Binangonan and 4 urban barangays of Cardona
- Barangay waterworks each for Darangan, Palangoy and Pantok in Binangonan; Boor, Calahan, Dalig, Looc and San Roque in Cardona

The largest public system in the province is the MWSS covering 24 barangays in the 3 municipalities. WDs in the 3 municipalities serve for 19 urban barangays, while small scale systems operated by municipality or barangay are catering for a total of 31 urban barangays.

All the Level III systems utilize deep wells with a range of the production capacity of a well between 1,000 m^3/d and 1,500 m^3/d. Additionally, MWSS avails surface water (details are referred to in Table 4.1.1, Supporting Report).

Information on Water Districts shown in Table 4.1.3 revealed that all service connections are metered and services are provided for domestic use. Per capita consumption rate ranges from 46 liters/day in Cardona to 160 liters/day in Morong WD.

Table 4.1.2 Information on Existing Level III Systems

Municipality	Name of System (Operating Body)	Water Source and Consumption			Service Coverage						
					Number of Barangays Served				Number of HHs/Pop. Served		
		Type of Water Source[1]	Water Consumption (cu. m/day)[2]	Domestic Supply (%)	Urban	Rural	Total	HHs Pop.	Urban	Rural	Total
Angono*	Brgy. Council	DW	336	N.A.	6	0	6	HHs	544	0	544
								Pop.	2,744	0	2,744
	Subdivision	DW	N.A.	N.A.	5	0	5	HHs	6,258	0	6,258
								Pop.	31,916	0	31,916
	Municipal Total		N.A.	N.A.	11	0	11	HHs	6,802	0	6,802
								Pop.	34,660	0	34,660
Antipolo	MWSS	DW	N.A.	N.A.	8	0	8	HHs	6,006	0	6,006
								Pop.	30,630	0	30,630
	Subdivision	DW	N.A.	N.A.	1	0	1	HHs	23,910	0	23,910
								Pop.	121,941	0	121,941
	Municipal Total		N.A.	N.A.	9	0	9	HHs	29,916	0	29,916
								Pop.	152,571	0	152,571
Baras	Baras WS	DW	70.00	N.A.	6	0	6	HHs	210	0	210
								Pop.	1,134	0	1,134
	Subdivision	DW	N.A.	N.A.	1	1	2	HHs	175	978	1,153
								Pop.	945	5,183	6,128
	Municipal Total		70.00	N.A.	7	1	8	HHs	385	978	1,363
								Pop.	2,079	5,183	7,262
Binangonan**	Brgy. Darangan Coop.	DW	676.33	N.A.	1	0	1	HHs	800	0	800
								Pop.	4,080	0	4,080
	Brgy. Palangoy Coop.	DW	28.00	N.A.	1	0	1	HHs	140	0	140
								Pop.	714	0	714
	Brgy. Pantok Coop.	DW	12.50	N.A.	1	0	1	HHs	235	0	235
								Pop.	1,199	0	1,199
	Mun. Gov't.	DW	1,328.26	N.A.	7	0	7	HHs	3,717	0	3,717
								Pop.	18,957	0	18,957
	Subdivision	DW	N.A.	N.A.	5	0	5	HHs	1,688	0	1,688
								Pop.	8,609	0	8,609
	Municipal Total		2,045.49	N.A.	10	0	10	HHs	4,892	0	4,892
								Pop.	24,949	0	24,949
Cardona	Brgy. Boor Assn.	DW	19.35	N.A.	1	0	1	HHs	32	0	32
								Pop.	166	0	166
	Brgy. Calahan Assn.	DW	171.33	N.A.	1	0	1	HHs	255	0	255
								Pop.	1,326	0	1,326
	Brgy. Dalig Assn.	DW	66.67	N.A.	1	0	1	HHs	139	0	139
								Pop.	723	0	723
	Brgy. Looc Assn.	DW	98.70	N.A.	1	0	1	HHs	430	0	430
								Pop.	2,236	0	2,236
	Brgy. San Roque Ass.	DW	75.56	N.A.	1	0	1	HHs	294	0	294
								Pop.	1,529	0	1,529
	Mun. Gov't.	DW	407.43	N.A.	4	0	4	HHs	490	0	490
								Pop.	2,548	0	2,548
	Municipal Total		839.04	N.A.	9	0	9	HHs	1,640	0	1,640
								Pop.	8,528	0	8,528
Cainta*	Subdivision	DW	N.A.	N.A.	14	0	14	HHs	5,124	0	5,124
								Pop.	26,132	0	26,132
Morong	Morong WD	DW	1,883.20	N.A.	4	0	4	HHs	2,465	0	2,465
								Pop.	12,572	0	12,572
Pililla	Pililla WD	DW	930.80	48	5	0	5	HHs	1,216	0	1,216
								Pop.	6,415	0	6,415
	Subdivision	DW	N.A.	N.A.	1	0	1	HHs	70	0	70
								Pop.	371	0	371
	Municipal Total		N.A.	N.A.	6	0	6	HHs	3,751	0	3,751
								Pop.	19,387	0	19,387
Rodriguez	MWSS	Surf	N.A.	N.A.	7	0	7	HHs	3,042	0	3,042
								Pop.	15,818	0	15,818
	Subdivision	DW	N.A.	N.A.	1	0	1	HHs	986	0	986
								Pop.	5,127	0	5,127
	Municipal Total		N.A.	N.A.	8	0	8	HHs	4,028	0	4,028
								Pop.	20,945	0	20,945
San Mateo	MWSS	Surf	N.A.	N.A.	9	0	9	HHs	3,514	0	3,514
								Pop.	17,921	0	17,921
	Subdivision	DW	N.A.	N.A.	2	0	2	HHs	6,309	0	6,309
								Pop.	32,176	0	32,176
	Municipal Total		N.A.	N.A.	11	0	11	HHs	9,823	0	9,823
								Pop.	50,097	0	50,097
Tanay*	Tanay Eastern Rizal WD	DW	4,183	60	10	0	10	HHs	5,060	0	5,060
								Pop.	26,818	0	26,818
	Subdivision	DW	N.A.	N.A.	1	0	1	HHs	311	0	311
								Pop.	1,648	0	1,648
	Municipal Total		N.A.	N.A.	11	0	11	HHs	5,371	0	5,371
								Pop.	28,466	0	28,466
Taytay	Subdivision	DW	N.A.	N.A.	7	0	7	HHs	5,429	0	5,429
								Pop.	27,642	0	27,642
Provincial Total			4,832.73	Not	107	1	108	HHs	77,152	978	78,130
								Pop.	395,457	5,183	400,640

Note 1 Type of Water Source; *DW* - Deep Well, *Surf* - Surface Water (River), *SP* - Spring, *IG* - Infiltration Gallery.
2 Water consumption in a provincial total does not include the amount used at MWSS and Subdivision.

Table 4.1.3 Information on Water District

Name of W.D.	Number of Connections						Consump. (cu.m/month)	Accounted-for Water (cu.m/month)
	Domestic	Comm.	Inst.	Others	Total	Metered		
Morong W.D.	2,354	108	3	0	2,465	2,465	N.A	1,883
Pililla W.D.	1,216	22	0	0	1,238	1,238	58,170	N.A.
Tanay Eastern Rizal W.D.	5,060	0	0	0	5,060	5,060	207,767	4,183

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 5 Level II systems, Barangay Rizal RWSA in Baras, Barangay Mambog RWSA in Binangonan, Barangay San Guilermo RWSA in Morong, Barangay Mascap RWSA in Rodriguez and Barangay Muzon RWSA in Taytay, 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 Systems (Operating Body)	Type and No. of Water Sources[1]		Number of Barangays Served			Number of Households Served			Number of Population Served		
				Urban	Rural	Total	Urban	Rural	Total	Urban	Rural	Total
Baras	Rizal Brgy. Council	DW	1	1	0	1	20	0	20	108	0	108
Binangonan**	Brgy. Mambog (Coop.)	DW	1	1	0	1	20	0	20	102	0	102
Morong	Brgy. San Guillermo Coop.	DW	1	1	0	1	10	0	10	51	0	51
Rodriguez	Mascap Brgy. Council	SP	1	0	1	1	0	20	20	0	98	98
Taytay*	Muzon Brgy. Council	DW	1	1	0	1	30	0	30	153	0	153
Provincial Total			5	4	1	5	80	20	100	414	98	512

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

Four Level II systems utilize deep well sources, while Mascap RWSA depends on spring source. Only Mascap RWSA and Muzon RWSA are serve with potable water throughout the day, although no disinfection is provided. The rest is supplying 8 to 12 hours a day.

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 redevelopment.

(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. According to the PHO water quality analysis results, about 30% of Level I facilities is determined to be unsafe as the provincial average of random samples (details are referred to in Supporting Report).

Population census in 1990 revealed that there are a lot of Level I facilities in the province. However, only about 10% of data on the point sources was collected through this planning period. Major data managed at the DEO are no longer available due to fire in 1994. Table 4.1.5 summarizes collected data of Level I facilities (about 850 sources) in application of abovementioned unsafe percentage. From the data, majority of the facilities are shallow wells.

Table 4.1.5 Information on Existing Level I Facilities

Municipality	Number of Safe Water Sources					Number of Unsafe Water Sources					Served by Safe Sources: Number of Households			Served by Safe Sources: Population		
	Deep Well	Shallow Well	Covered/ Improved Dug Well	Developed Spring	Total	Shallow Well	Undeveloped Spring	Open Dug Well	Rain Water Collectors	Total	Urban	Rural	Total	Urban	Rural	Total
Angono*	13	17	5	0	35	5	0	0	0	5	2,843	0	2,843	14,497	0	14,497
Antipolo	60	3	0	1	64	2	0	0	0	2	1,542	6,762	8,304	7,864	33,135	40,999
Baras	19	48	0	0	67	12	0	0	0	12	1,478	150	1,628	7,980	795	8,775
Binangonan**	40	1	0	0	41	1	0	0	0	1	10,130	6,766	16,896	51,662	37,214	88,876
Cainta*	16	12	0	0	28	5	0	0	0	5	17,137	0	17,137	87,399	0	87,399
Cardona	7	42	0	0	49	8	0	0	0	8	2,317	1,659	3,976	12,049	8,791	20,840
Jala-jala	0	40	0	0	40	30	0	0	0	30	519	1,287	1,806	2,753	6,951	9,704
Morong	37	6	0	0	43	4	0	0	0	4	2,427	0	2,427	12,376	0	12,376
Pililla	35	59	0	2	96	19	2	0	0	21	3,743	0	3,743	19,837	0	19,837
Rodriguez	9	17	0	1	27	3	0	0	0	3	7,379	991	8,370	38,372	4,857	43,229
San Mateo	9	26	0	0	35	4	0	0	0	4	7,396	8	7,404	37,721	38	37,759
Tanay	20	88	0	2	110	25	0	0	0	25	2,674	1,025	3,699	14,155	5,022	19,177
Taytay*	5	25	0	0	30	20	0	0	0	20	13,381	0	13,381	68,245	0	68,245
Teresa	10	24	0	2	36	7	0	0	0	7	2,998	0	2,998	15,587	0	15,587
Provincial Total	280	408	5	8	701	145	2	0	0	147	75,961	18,648	94,609	390,496	96,803	487,299

In addition to the above, there are a number of water vendors who sell water at the sites of well sources or deliver water by means of trucks, although details of these private activities are not available. A considerable number of households (about 10% of provincial population under the unserved category) is depending on their services as confirmed by the questionnaire survey of this study and NSO investigation in 1990.

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

(1) Unsafe water sources

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

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

All water vendors, either licensed or illegal, shall be subject to periodical monitoring of water quality and strict compliance to the Code on Sanitation.

(2) Non-functioning/abandoned wells

There is a considerable number of non-functioning public wells in the province as shown in Table 4.1.6, although these reported figures are considered insufficient in relation to the population assumed to be covered by Level I facilities.

Table 4.1.6 Operating Status of Existing Wells in the Province

Operating Status	Unit	Public Wells		Private Shallow Well	Total
		Deep Well	Shallow Well		
Functioning	No.	282	123	430	835
	Percent	79	69	97	86
Non-Functioning	No.	74	55	12	141
	Percent	21	31	3	14
Total Number		356	178	442	976

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 classification of barangays. Details are referred to section 8.3.1 Population Projection.

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

- Service percentage/population by Level III and Level II systems was estimated based on the questionnaire survey results (Subdivisions with their own water supply systems are included in Level III service areas).
- Unserved population was estimated based on the percentages of unserved households to the total number of households by urban and rural area based on the 1990 population census data (NSO); "Households by Main Source of Drinking Water and City/Municipality."
- The rest of population was considered to be covered by Level I facilities.

The population served by Level III systems was estimated at about 42% of the total population in PW4SP study area. Covered percentages by safe source and unsafe source under Level I facilities were also estimated in application of PHO water quality analysis results by municipality (unsafe percentage of provincial average is 30%). A total of these percentages arrived at 48% as Level I service coverage (35% by safe sources and 13% by unsafe sources).

Table 4.1.7 presents the profile of service coverage in terms of served, underserved and unserved. As a total in PW4SP study area, 77% of the population is adequately served (82% of urban population and 58% of rural population). The lower percentage of service coverage in the rural area is affected by the presence of unsafe sources and 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

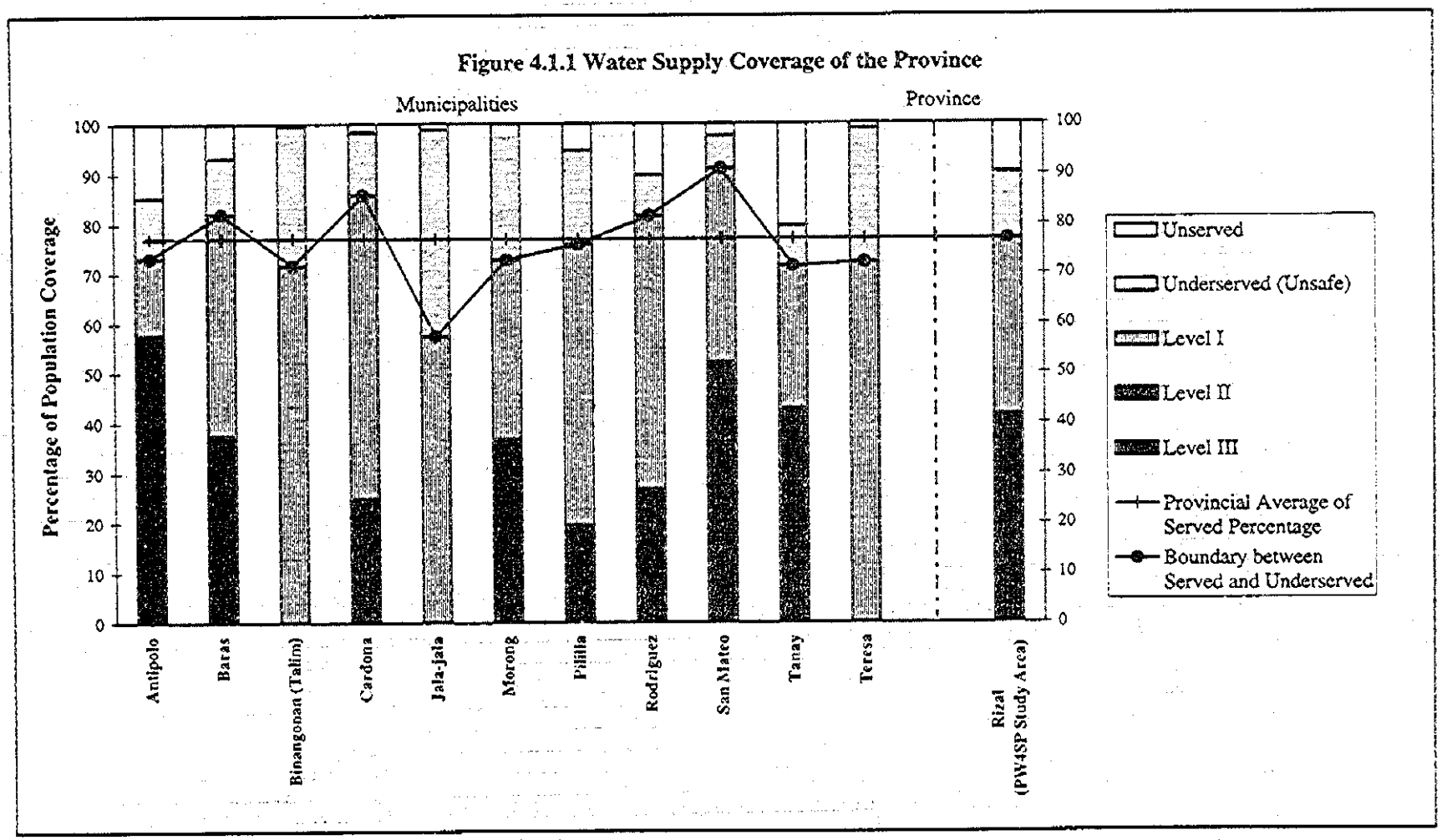
4.2.1 General

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/Unserved			Served by Safe Source				Underserved/Unserved		
			Level III	Level II	Level I	Total	Unsafe Source	Un-served	Total	Level III	Level II	Level I	Total	Unsafe Source	Un-served	Total
Antipolo	Urban	196,303	152,571	0	7,864	160,435	6,179	29,689	35,868	78	0	4	82	3	15	18
	Rural	68,428	0	0	33,135	33,135	26,035	9,258	35,293	0	0	48	48	38	14	52
	Total	264,731	152,571	0	40,999	193,570	32,214	38,947	71,161	58	0	15	73	12	15	27
Baras	Urban	13,291	2,079	108	7,980	10,167	1,995	1,129	3,124	16	1	60	76	15	9	24
	Rural	6,391	5,183	0	795	5,978	199	214	413	81	0	12	94	3	3	6
	Total	19,682	7,262	108	8,775	16,145	2,194	1,343	3,537	37	1	45	82	11	7	18
Binangonan (Talim)	Urban	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Rural	23,453	0	0	16,802	16,802	6,534	117	6,651	0	0	72	72	28	0	28
	Total	23,453	0	0	16,802	16,802	6,534	117	6,651	0	0	72	72	28	0	28
Cardona	Urban	23,528	8,528	0	12,049	20,577	2,468	483	2,951	36	0	51	87	10	2	13
	Rural	10,668	0	0	8,791	8,791	1,800	77	1,877	0	0	82	82	17	1	18
	Total	34,196	8,528	0	20,840	29,368	4,268	560	4,828	25	0	61	86	12	2	14
Jalajala	Urban	4,861	0	0	2,753	2,753	1,994	114	2,108	0	0	57	57	41	2	43
	Rural	12,040	0	0	6,951	6,951	5,033	56	5,089	0	0	58	58	42	0	42
	Total	16,901	0	0	9,704	9,704	7,027	170	7,197	0	0	57	57	42	1	43
Morong	Urban	34,361	12,572	77	12,376	25,024	9,337	0	9,337	37	0	36	73	27	0	27
	Rural	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Total	34,361	12,572	77	12,376	25,024	9,337	0	9,337	37	0	36	73	27	0	27
Pililla	Urban	35,092	6,816	0	19,837	26,653	6,613	1,826	8,439	19	0	57	76	19	5	24
	Rural	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Total	35,092	6,816	0	19,837	26,653	6,613	1,826	8,439	19	0	57	76	19	5	24
Rodriguez	Urban	20,606	20,945	0	38,372	59,317	5,734	5,555	11,289	30	0	54	84	8	8	16
	Rural	8,073	0	98	4,857	4,955	726	2,392	3,118	0	1	60	61	9	30	39
	Total	28,679	20,945	98	43,229	64,272	6,460	7,947	14,407	27	0	55	82	5	10	15
San Mateo	Urban	95,675	50,097	0	37,721	87,818	6,141	1,716	7,857	52	0	39	92	6	2	8
	Rural	723	0	0	38	38	6	679	685	0	0	5	5	1	94	95
	Total	96,398	50,097	0	37,759	87,856	6,147	2,395	8,542	52	0	39	91	6	2	9
Tanay	Urban	56,523	28,466	359	14,455	42,780	3,993	9,750	13,743	50	0	25	76	7	17	24
	Rural	10,339	0	0	5,022	5,022	1,417	3,900	5,317	0	0	49	49	14	38	51
	Total	66,862	28,466	159	19,177	47,802	5,410	13,650	19,060	43	0	29	71	8	20	29
Teresa	Urban	21,569	0	0	15,587	15,587	5,765	217	5,982	0	0	72	72	27	1	28
	Rural	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Total	21,569	0	0	15,587	15,587	5,765	217	5,982	0	0	72	72	27	1	28
PWSP Study Area	Urban	551,809	282,074	343	168,693	451,111	50,219	50,479	100,698	51	0	31	82	9	9	18
	Rural	140,115	5,183	98	76,391	81,672	41,750	16,693	58,443	4	0	55	58	30	12	42
	Total	691,924	287,257	442	245,084	532,783	91,969	67,172	159,141	42	0	35	77	13	10	23
Angono*	Urban	54,949	34,660	0	14,497	49,157	4,833	959	5,792	63	0	26	89	9	2	11
	Rural	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Total	54,949	34,660	0	14,497	49,157	4,833	959	5,792	63	0	26	89	9	2	11
Binangonan* Others)	Urban	100,210	24,939	153	51,662	76,764	20,091	3,355	23,446	25	0	52	77	20	3	23
	Rural	28,514	0	0	20,412	20,412	7,938	164	8,102	0	0	72	72	28	1	28
	Total	128,724	24,939	153	72,074	97,176	28,029	3,519	31,548	19	0	56	75	22	3	25
Cainta*	Urban	162,108	26,132	0	87,399	113,531	39,266	9,311	48,577	16	0	54	70	24	6	30
	Rural	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Total	162,108	26,132	0	87,399	113,531	39,266	9,311	48,577	16	0	54	70	24	6	30
Taytay*	Urban	129,433	27,642	153	68,245	96,040	21,551	11,842	33,393	21	0	53	74	17	9	26
	Rural	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Total	129,433	27,642	153	68,245	96,040	21,551	11,842	33,393	21	0	53	74	17	9	26
Provincial Total	Urban	998,509	395,457	650	300,496	786,603	135,960	75,946	211,906	40	0	39	79	14	8	21
	Rural	168,629	5,183	98	96,803	102,084	49,688	16,857	66,545	3	0	57	61	29	10	39
	Total	1,167,138	400,640	748	487,299	888,687	185,648	92,803	278,451	34	0	42	76	16	8	24

Figure 4.1.1 Water Supply Coverage of the Province



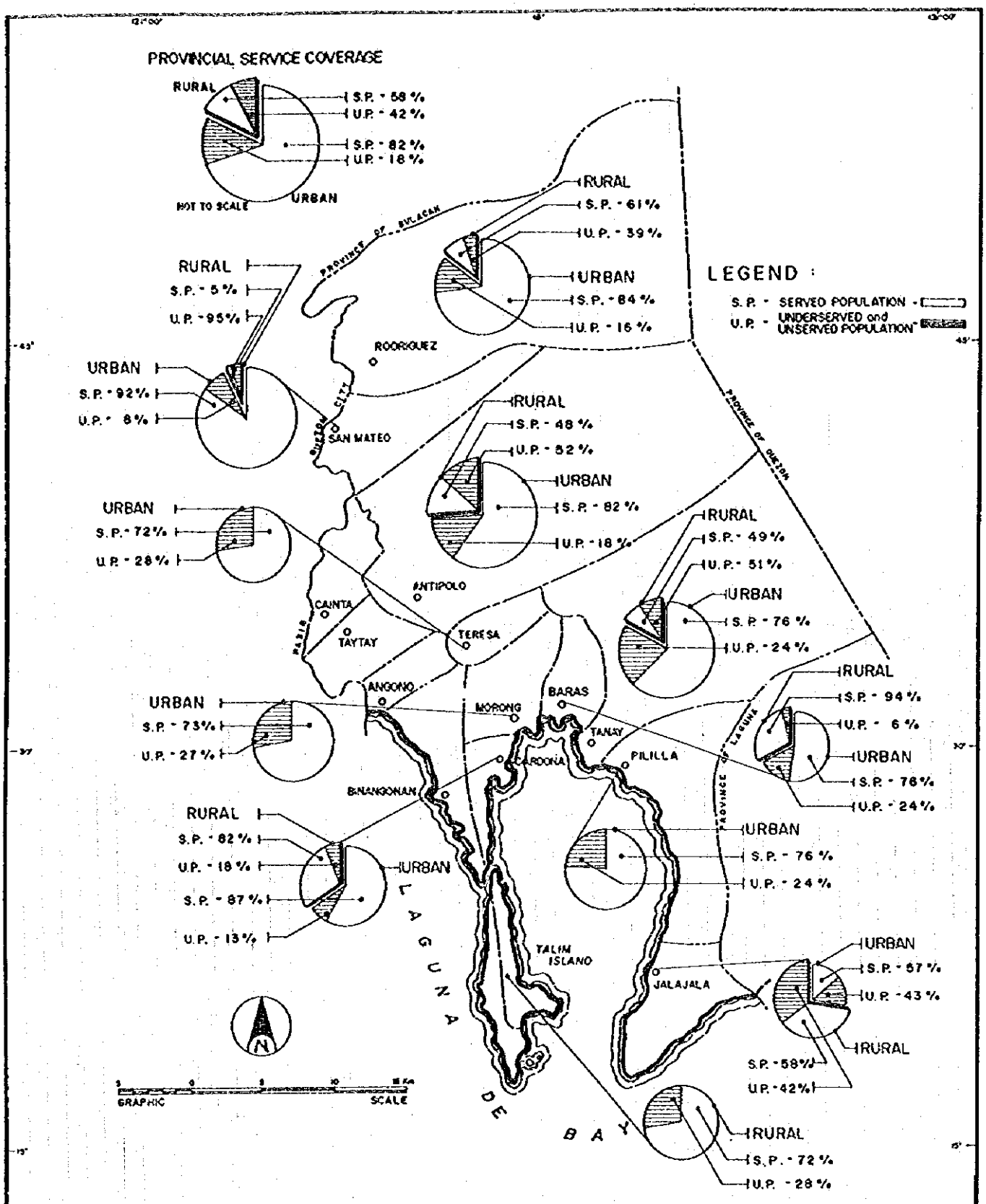


FIGURE 4.1.2
EXISTING WATER SUPPLY SERVICE COVERAGE MAP

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 sewerage 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 pit privy considering its low construction cost especially in rural areas; and 2) unsanitary toilets - 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; and 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/ 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 (Private) Toilets

The service coverage of sanitary toilets in the province is 74% of the total number of households. The rest is underserved and/or unserved, of which about 40% is without toilet facilities. In urban areas, approximately 77% of the total households is served, while the remaining 23% is underserved and/or unserved. Compared to urban areas, a much lower served households of 56% and a higher underserved and/or unserved households of 44% exist in rural areas (details are referred to 4.2.3 Sanitation Facilities and Service Coverage, Data Report).

In the PW4SP study area, the service coverage is 70% of the total number of households. About 50% of underserved and/or unserved households is without toilets (refer to Table 4.2.1 the number of households using sanitary and unsanitary facilities, and without facilities, Supporting Report). Urban areas of the PW4SP study area have a service coverage of 74%, while in rural areas, the service coverage is 52%. Table 4.2.1 shows the municipal breakdown in the number of urban and rural household toilets by category, and service coverage. Figures 4.2.1 and 4.2.2 reflect the service coverage of household toilet facilities by urban and rural area in the study area.

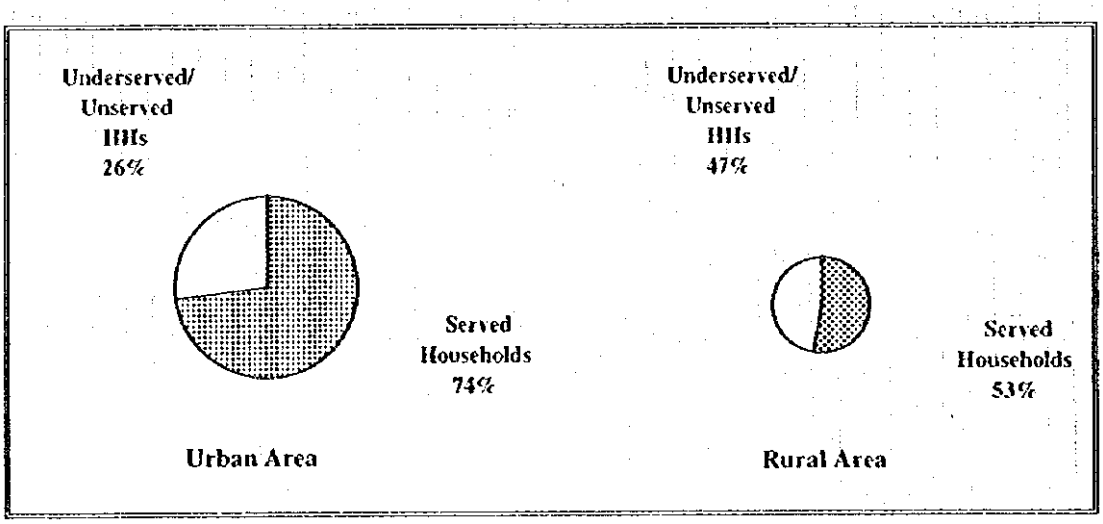
(2) School and Public Toilets

Only public school toilet facilities in elementary and secondary schools were investigated. There was no data available for private schools. The province has a total of 1,366 toilet units found in 219 public schools. Only 36% of the public school students is adequately served by sanitary toilets. The rest is underserved and/or unserved. In the PW4SP study area, 37% of the public school students is adequately served. The remaining 63% is underserved and/or unserved.

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

Municipality	Households 1994			Household Toilet Facilities and Service Coverage											
				Urban				Rural				Municipal Total			
	Urban	Rural	Total	Households Served by Sanitary Toilets		Underserved/ Unserved HHs		Households Served by Sanitary Toilets		Underserved/ Unserved HHs		Households Served by Sanitary Toilets		Underserved/ Unserved HHs	
				Number	% of HH	Number	% of HH	Number	% of HH	Number	% of HH	Number	% of HH	Number	% of HH
Antipolo	36,051	13,080	49,131	30,263	84	5,788	16	5,495	42	7,585	58	35,758	73	13,373	27
Baras	2,518	1,234	3,752	2,239	89	279	11	907	74	327	26	3,146	84	606	16
Binangonan (Talim)	0	3,926	3,926	0	0	0	0	2,504	64	1,422	36	2,504	64	1,422	36
Cardona	4,525	2,980	7,505	3,485	77	1,040	23	2,324	78	656	22	5,809	77	1,696	23
Jala-jala	917	2,705	3,622	349	38	568	62	1,326	49	1,379	51	1,675	46	1,947	54
Morong	6,737	0	6,737	6,131	91	606	9	0	0	0	0	6,131	91	606	9
Pililla	6,621	0	6,621	4,304	65	2,317	35	0	0	0	0	4,304	65	2,317	35
Rodriguez	13,809	1,676	15,485	8,634	63	5,175	37	1,089	65	587	35	9,723	63	5,762	37
San Mateo	19,109	157	19,266	10,407	54	8,702	46	23	15	134	85	10,430	54	8,836	46
Tanay	11,114	2,199	13,313	8,433	76	2,681	24	1,142	52	1,057	48	9,575	72	3,738	28
Teresa	4,148	0	4,148	3,774	91	374	9	0	0	0	0	3,774	91	374	9
PW4SP Study Area	105,549	27,957	133,506	78,019	74	27,530	26	14,810	53	13,147	47	92,829	70	40,677	30
Angono*	10,763	0	10,763	8,458	79	2,305	21	0	0	0	0	8,458	79	2,305	21
Binangonan* (Other)	19,813	5,324	25,137	14,296	72	5,517	0	3,675	69	1,649	31	17,971	71	7,166	29
Cainta*	29,670	0	29,670	23,015	78	6,655	22	0	0	0	0	23,015	78	6,655	22
Taytay*	26,293	0	26,293	23,408	89	2,885	11	0	0	0	0	23,408	89	2,885	11
Provincial Total	192,088	33,281	225,369	147,196	77	44,892	23	18,485	56	14,796	44	165,681	74	59,688	26

Figure 4.2.1 Provincial Service Coverage of Household Toilet Facilities, 1994 (PW4SP Study Area)



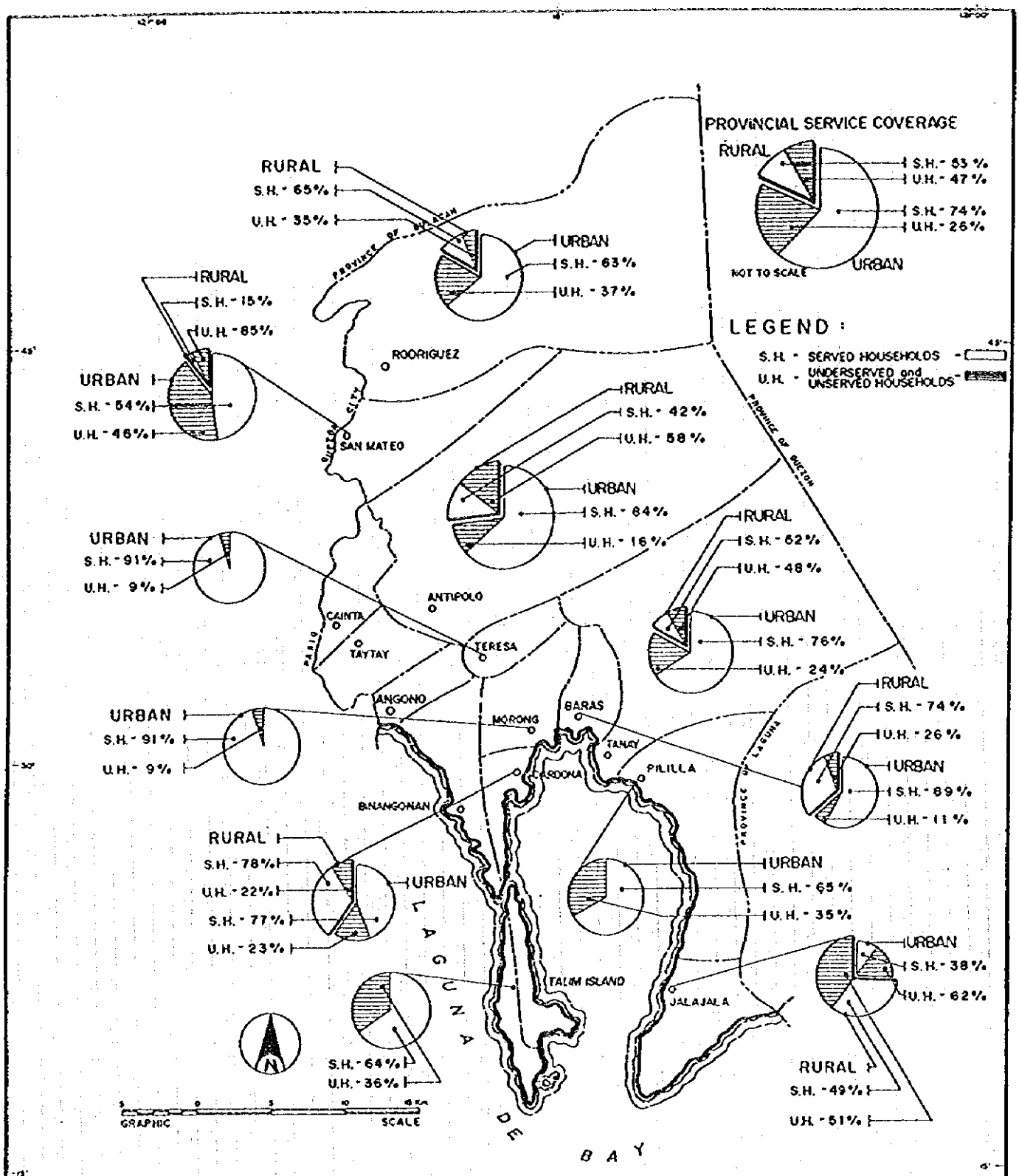


FIGURE 4.2.2
EXISTING HOUSEHOLD TOILETS SERVICE COVERAGE MAP

The province has a total of 18 public toilets located in public markets and bus/jeepney terminals. There are no accounted toilets in parks or plazas. About 89% is served. In the PW4SP study area, about 92% is served. Table 4.2.2 and Table 4.2.3 provide the number and service coverage of toilet facilities of schools and public utilities, respectively.

(3) On-going Projects

A total of 4,500 toilet bowls through the FW4SP is being distributed to each of the 4,500 households as follows:

Municipality	No. of HH	Municipality	No. of HH
Angono	231	Morong	47
Antipolo	842	Pililia	217
Baras	44	Rodriguez	170
Binangonan	900	San Mateo	467
Cainta	794	Tanay	289
Cardona	93	Taytay	236
Jalajala	125	Teresa	45

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 74% to 76%.

(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 139 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.

Table 4.2.2 School Toilet Facilities and Service Coverage in 1994

Municipality	Number of School			Number of Student			Number of Toilets							Service Coverage									
							Sanitary			Unsanitary			Total	Served						Underserved			
														Public		Private		Total		Public		Private		Total	
	Public	Private	Total	Public	Private	Total	Public	Private	Total	Public	Private	Total	Units	Number	%	Number	%	Number	%	Number	%	Number	%	Number	%
Antipolo	33	45	78	44,724	17,379	62,103	277	0	277	0	0	0	277	13,850	31	0	0	13,850	31	30,874	69	0	0	30,874	69
Baras	4	4	8	3,070	840	3,910	28	0	28	0	0	0	28	1,400	46	0	0	1,400	46	1,670	54	0	0	1,670	54
Binangonan (Talim)	14	0	14	4,771	0	4,771	21	0	21	0	0	0	21	1,050	22	0	0	1,050	22	3,721	78	1	0	3,722	78
Cardona	14	3	17	5,311	2,057	7,368	42	0	42	2	0	2	44	2,100	40	0	0	2,100	40	3,211	60	0	0	3,211	60
Jala-jala	11	1	12	3,952	494	4,446	20	0	20	0	0	0	20	1,000	25	0	0	1,000	25	2,952	75	0	0	2,952	75
Morong	10	3	13	3,229	1,398	4,627	35	0	35	0	0	0	35	1,750	54	0	0	1,750	54	1,479	46	0	0	1,479	46
Pililla	10	1	11	7,546	1,383	8,929	53	0	53	0	0	0	53	2,650	35	0	0	2,650	35	4,896	65	0	0	4,896	65
Rodriguez	17	8	25	13,158	3,003	16,161	147	0	147	0	0	0	147	7,350	56	0	0	7,350	56	5,808	44	0	0	5,808	44
San Mateo	15	14	29	15,401	7,430	22,831	140	0	140	0	0	0	140	7,000	45	0	0	7,000	45	8,401	55	0	0	8,401	55
Tanay	33	1	34	14,343	1,158	15,501	97	0	97	0	0	0	97	4,850	34	0	0	4,850	34	9,493	66	0	0	9,493	66
Teresa	7	4	11	3,617	438	4,055	27	0	27	0	0	0	27	1,350	37	0	0	1,350	37	2,267	63	0	0	2,267	63
PW4SP Study Area	168	84	252	119,122	35,580	154,702	887	0	887	2	0	2	889	44,350	37	0	0	44,350	37	74,772	63	0	0	74,772	63
Angono*	6	14	20	10,883	6,613	17,496	149	0	149	8	0	8	157	7,450	68	0	0	7,450	68	3,433	32	0	0	3,433	32
Binangonan* (Others)	20	6	26	19,787	4,767	24,554	111	0	111	7	0	7	118	5,550	28	0	0	5,550	28	14,237	72	0	0	14,237	72
Cainta*	12	27	39	23,183	14,554	37,737	93	0	93	0	0	0	93	4,650	20	0	0	4,650	20	18,533	80	0	0	18,533	80
Taytay*	13	19	32	16,501	10,040	26,541	109	0	109	0	0	0	109	5,450	33	0	0	5,450	33	11,051	67	0	0	11,051	67
Provincial Total	219	150	369	189,476	71,554	261,030	1,349	0	1,349	17	0	17	1,366	67,450	36	0	0	67,450	36	122,026	64	0	0	122,026	64

Table 4.2.3 Public Toilet Facilities and Service Coverage in 1994

Municipality	Public Markets			Jeepney/Bus Terminals			Total Toilets	Served		Underserved	
	No. of Sanitary Toilets	Number of Unsanitary Toilets	Sub-total	No. of Sanitary Toilets	Number of Unsanitary Toilets	Sub-total		No. of Sanitary Toilets	%	No. of Under-served	%
Antipolo	1	0	1	0	0	0	1	1	100	0	0
Baras	1	0	1	0	0	0	1	1	100	0	0
Binangonan (Talim)	0	0	0	0	0	0	0	0	0	0	0
Cardona	1	0	1	0	0	0	1	1	100	0	0
Jala-jala	1	0	1	0	0	0	1	1	100	0	0
Morong	1	0	1	0	0	0	1	1	100	0	0
Pililla	1	0	1	0	0	0	1	1	100	0	0
Rodriguez	1	0	1	0	0	0	1	1	100	0	0
San Mateo	2	0	2	0	0	0	2	2	100	0	0
Tanay	1	0	1	0	1	1	2	1	50	1	50
Teresa	1	0	1	0	0	0	1	1	100	0	0
PW4SP Study Area	11	0	11	0	1	1	12	11	92	1	8
Anyono*	1	0	1	0	0	0	1	1	100	0	0
Binangonan* (Others)	1	0	1	0	0	0	1	1	100	0	0
Cainta*	2	0	2	0	0	0	2	2	100	0	0
Taytay*	1	0	1	0	1	1	2	1	50	1	50
Provincial Total	16	0	16	0	2	2	18	16	89	2	11

Even if in some municipalities a high percentage of sanitary toilets is revealed, problems arise from the unsatisfactory disposal of the effluent from the septic tanks, or the direct discharge of wastewater to the local drains. Generally, there is little concern about the unsatisfactory disposal of wastes once it is outside their dwelling units. Practically almost all the households dispose their wastes in the manner that poses risks to public health.

4.2.4 Sewerage Facilities

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

Chapter 5

EXISTING SECTOR ARRANGEMENTS AND INSTITUTIONAL CAPACITY

5. EXISTING SECTOR ARRANGEMENTS AND INSTITUTIONAL CAPACITY

5.1 General

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

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

5.2 Sector Reforms

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

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

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

5.3 Sector Institutions

(1) Existing Institutional Arrangements

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

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

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

Figure 5.3.1 - Functional Relationships