
Chapter
INTRODUCTION

1

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. Development has covered physical and institutional framework nationwide.

Nevertheless, infrastructure service delivery including this sector during the period 1987 to 1997 has been insufficient to keep pace with the demand, which was magnified by natural calamities and economic status of the country.

About 68% (46.7 M) of the population nationwide enjoyed access to potable water supply in 1995 (66% in 1992). In urban areas outside Manila, 61% (11.6 M) had access to safe water supply services (47% in 1992), while in the rural areas, 70% (26.1 M) was covered by point water sources (80% in 1992). However, from the surveys conducted through the PW4SP, it was found out that about 20-30% of the existing water sources in the rural areas fall on the category of underserved or unserved in terms of safe or unsafe sources, damaged and non-functioning sources. Hence, of the rural population, it was estimated that only about 50-55% was served adequately by safe sources. This implies that around 60% of the total population enjoy water supply services at present.

Private sanitary toilets were available to 66% (45.3 M) of the total household nationwide in 1996 based on the DOH compiled reports. Communal toilet facilities are generally found only at schools, public markets and sometimes in 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 service trucks is limited to urban areas. In 1996, majority of the households (55%) practiced individual disposal, mostly dumping, while the remaining 45% relied on municipal refuse collection and disposal services.

The policies and strategies on the sector are generally guided by the "Updated Medium-Term Philippine Development Plan (MTPDP: 1996-1998) in 1996" and the recently published "Philippine National Development Plan (PNDP: 1999-2025)". Activities in the sector have been directly guided by the "Water Supply, Sewerage and Sanitation Master Plan of the Philippines 1988-2000" since its issuance in 1988. 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 Updated MTPDP revised the targets for water

supply services based on updated conditions in 1996. The PNDP further modified the targets this year to suit current sector status.

Development in the sector had previously been directed to a high degree by central government agencies. However, the GOP has been instituting devolution and full decentralization of responsibilities for implementation of infrastructure projects to Local Government Units (LGUs), in line with the Local Government Code of 1991. Major initiatives towards this direction in the sector are the current projects being implemented such as the World Bank-assisted Local Government Unit-Urban Water Supply and Sanitation Project and the ADB-funded Rural Water Supply and Sanitation Project. Both projects aim at building/enhancing local level capacity in planning, implementation and management of water and sanitation services.

The GOP has also recently approved the Implementing Rules and Regulations (IRR) of Clause (g) of NEDA Board Resolution No. 4 (series 1994) providing detailed arrangements in accordance with broad reforms aimed at streamlining sectoral activities. The institutional framework therefore, presented in this provincial sector plan considers the direction of the central government agencies and LGUs in the sector.

1.2 Provincial Sector Planning

1.2.1 Objectives of Sector Planning

The main objectives of the provincial sector plan are:

- (1) To formulate a Long-Term Provincial Development Plan with a target year of 2010 for the water supply, sewerage and sanitation sector;
- (2) To propose a Medium-Term Sector Investment Plan covering the years 2001-2005 to form the basis for implementing foreign and locally funded projects;
- (3) To recommend arrangements and logistics for implementation; and
- (4) To provide measures to strengthen operational framework and institutional capabilities including community development and gender responsiveness.

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, gender 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 meeting target services
- 2) Identification of priority projects
- 3) Sector management plan
 - Institutional arrangements
 - Community development, gender 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 needs 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) was implemented with financial assistance from the World Bank (IBRD). With reference to the Project, the technical assistance to help Provincial Governments prepare 37 provincial sector plans in Luzon area was financed by various bilateral and multilateral agencies, such as the United Nations Development Program (UNDP), the Danish International Development Agency (DANIDA) and the Japan International Cooperation Agency (JICA).

In September 1996, the GOP requested the Government of Japan to finance the preparation of the Study for 21 provinces in Visayas and Mindanao areas. Among these was Capiz province, which was assisted by the JICA. The PW4SP will be the basis to permit execution of the sector development from the proceeds of the sector loan by foreign donors, LGUs budget including internal revenue allotment from National Government and private sector investment.

1.3 The Provincial Plan for the Province of Capiz

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. The members consist of the Provincial Planning and Development Coordinator (PPDC), the planning and development officers from PPDO, and the staff members from Provincial Engineers Office (PEO), Provincial Health Office (PHO) and Provincial Local Government Operations Office (PLGOO-DILG). The preparation of the plan was 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), other national line agencies and non-government organizations (NGOs) active in the sector. The PSPT was also assisted by the JICA Study Team through technical grant assistance from the Japanese Government (refer to Minutes of Discussions between

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

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

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

1.3.2 Outline of the Report

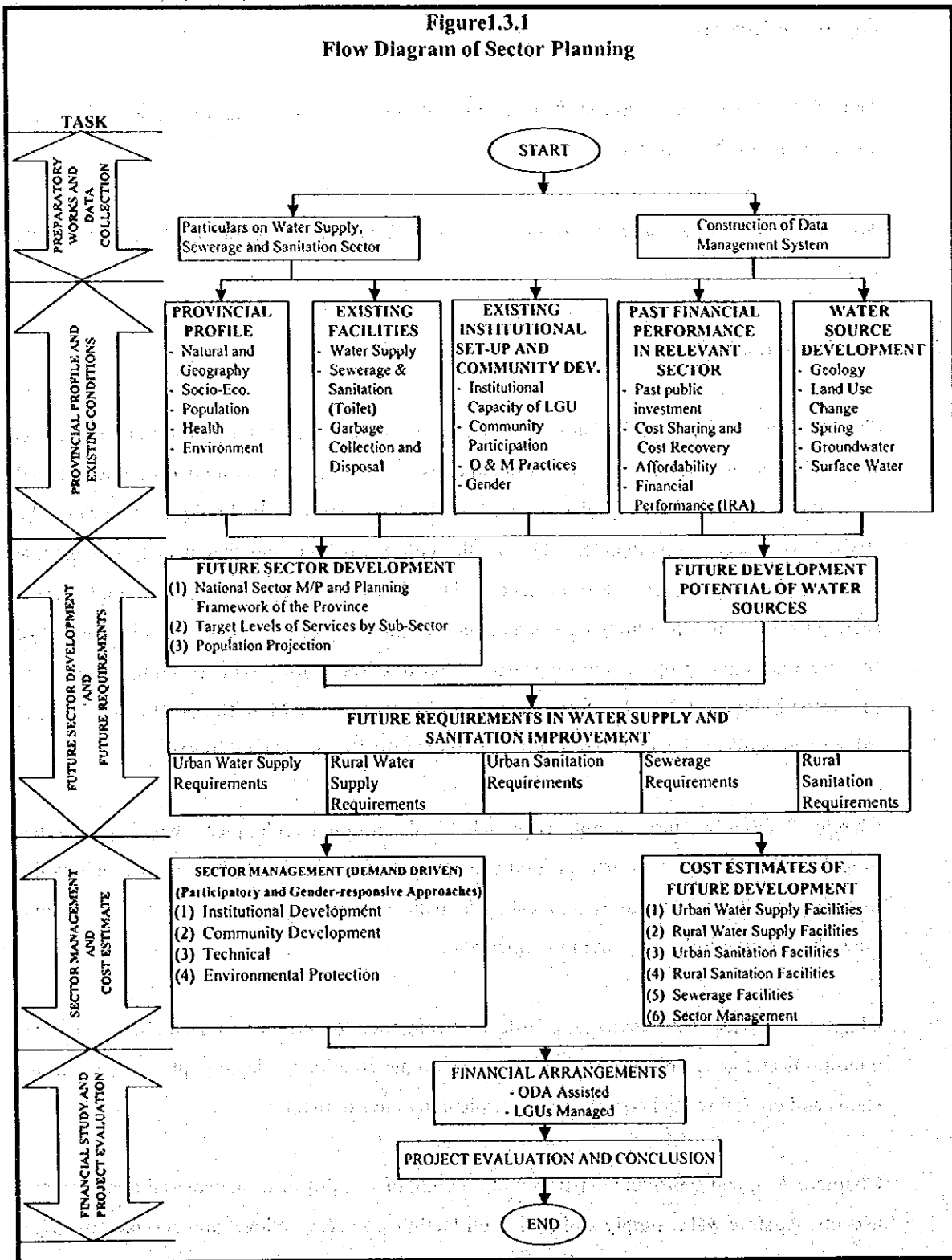
The PW4SP is a framework plan that would serve as the basis for the future implementation work in the sector. It will be carried out either as large-scale projects funded by international agencies or as a small size project carried out by local parties. It should be noted that the PW4SP is a sector development plan for the entire province and that it does not include detailed planning of individual projects. The individual projects will commonly cover selected sub-sector/s for limited areas and detailed planning/design work has to be conducted for the respective projects before start of construction work. The planning process is presented in Figure 1.3.1. 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; as well as the planning tool that relies heavily on local participation and gender responsiveness, and flexible enough to improve planning and implementation.

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

Chapters 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, gender and training, as well as monitoring systems; and financial performances entailing cost recovery and affordability and new fiscal policies that are the basis and references to come up with future development plan.

Figure 1.3.1
Flow Diagram of Sector Planning



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. Furthermore, water source availability by concerned municipality was presented with well specifications for the medium-term development.

Chapters 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 for the medium-term development plan entailing institutional arrangements and operational framework, community development, gender and training and project implementation needs. Required costs for physical and institutional elements are also presented according to the implementation arrangements.

Chapter 11 presents the financial arrangements based on identified sources of funds. The financial shortfall is shown to meet provincial targets established for the Medium-Term Investment Plan. The manner of national budget allocation (IRA) to municipalities by sub-sector is illustrated and trial calculation is made for the target year considering the new cost sharing policy between the central government, the LGUs and the beneficiaries. Investment need ranking of municipalities as a factor of financial allotment is also considered based on synthetic evaluation of sector components. The financial viability study of Level I water supply and sanitation projects is highlighted with reference to ODA assisted projects for eligible municipalities. Finally, cost recovery by the beneficiaries and the LGUs is 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 Acknowledgment

The Provincial Sector Planning Team (PSPT) which was responsible in the preparation of the PW4SP, acknowledges the extended cooperation, support and assistance of the Department of the Interior and Local Government (DILG), and other national, regional, provincial, municipal, city, and barangay institutions. These institutions had shared essential data and planning principles (List of individuals and their corresponding offices who directly participated in the preparation of the plan is included in 1.4 Acknowledgment, 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 with reference to the national sector policy and strategies as well as the 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, the Philippine National Development Plan: 1999-2025, and the Updated Medium Term Philippine Development Plan (MTPDP): 1996-1998, 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 aforementioned national development plans are sustained decentralization; private sector-led development; environmental protection; people participation; full cost recovery; social equity; accelerated information technology applications and macro-economic stability.

According to the Updated MTPDP targets for the year 1998, the population served with potable water shall be increased up to 76.4% (52.4 M). This corresponds to 81.6% (9.9M) of the Metro Manila population, 68.8% (16.3 M) in other urban areas, and 79% (29.5 M) 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 updated MTPDP targets, as well as the goals set in the 1988 NSMP, 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 1995	Year 2003 ¹	Year 2010 ²
Urban Water Supply ³	61%	69%	95%
Rural Water Supply	70% ⁴	79%	93%
Sanitation	60% ⁵	68%	93%

Notes:

¹Based on the Updated MTPDP targets for 1998.

²Based on the long-term targets set in the previous National Sector Master Plan (NSMP).

³Excluding Metro Manila and its outlying areas.

⁴Includes only point sources.

⁵Service coverage for 1996.

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. Recently, more comprehensive **demand-driven** participatory approach and **gender sensitive** participation initiatives are given impetus to ensure success and sustainability of the sector's projects especially in rather small rural and urban fringe 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 sharing arrangement** is enforced. In line with devolving the central government's functions and responsibilities, particularly those that have social and/or environmental objectives, projects/activities are implemented through a cost sharing arrangement between the central government agency and LGUs. As for the sector, national (central) government's (NG's) grant is to be extended only to Level I systems for eligible municipalities, and its share is within a range of 0 to 50% of the total capital cost. The remaining are managed by LGUs, communities, or BWSAs/RWSAs. No subsidies from the central government are to be provided for Levels II and III systems. For public toilets in public markets, the share of the NG is within 50 to 70%.
- (4) **Cost recovery of capital and O & M costs** of all water supply service levels by beneficiaries is to be encouraged. This is a distinct switch from subsidies, which characterized previous strategies. Current priorities also stress the need to promote the collection of such costs, especially in Levels I and II.
- (5) **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. Public-private partnership is to be pursued through any of these mechanisms: build-operate-transfer, concession arrangements, privatization of WDs, LGU-private sector MOA, LGU-WDs collaboration and others.
- (6) **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 people 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 was recently approved. The IRR integrates the common

definition of terms for water supply and sanitation and defines the roles and functions of central government agencies and LGUs for the sector (details are referred to 5.2, Data Report).

- (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 virtue of 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)** established 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 to 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 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 reports.

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 maybe 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 as shown in Figures 2.6.1 and 2.6.2. Data are encoded by 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 together with User's Guide for computer-aided planning are included in 2.6.2 Data Management, Supporting Report.

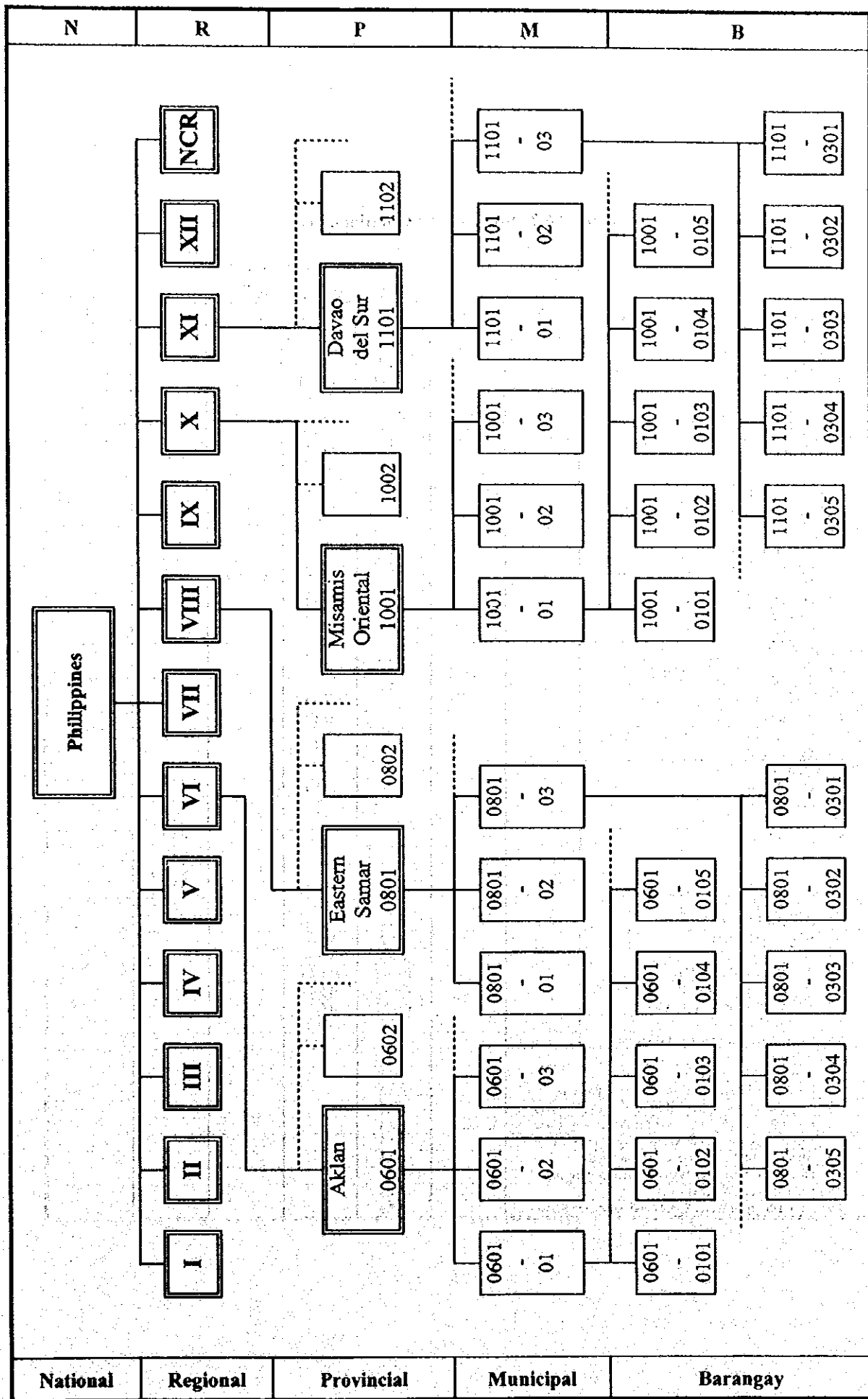


Figure 2.6.1 Institutional Hierarchical System by the NEDA Coding

Table 2.6.2 Structure of Questionnaire

Grouping of Questionnaire	Questionnaire to be addressed						
	National N	Regional R	Provincial P	Municipal M	Barangay B	System S	Independent I
1. Socio-economic Data							
1.1 Mun/City Status and no. of Brgy.			P.1.1				
1.2 Past Population			P.1.2	M.1.2			
1.3 Projected Population			P.1.3.1	M.1.3.1			
			P.1.3.2	M.1.3.2			
1.4 Number of Households			P.1.4	M.1.4			
1.5 Services			P.1.5	M.1.5			
1.6 Occupation			P.1.6	M.1.6			
1.7 Family Income			P.1.7	M.1.7			
1.8 Family Expenditure Pattern			P.1.8	M.1.8			
1.9 Agricultural Annual Income			P.1.9	M.1.9			
1.10 Education and Literacy			P.1.10	M.1.10			
2. Land Use Data							
2.1 Existing Land Use			P.2.1				
2.2 Future Land Use			P.2.2				
3. Health Data							
3.1 Morbidity and Mortality			P.3.1	M.3.1			
3.2 Health Facility			P.3.2	M.3.2			
3.3 Medical Practitioner			P.3.3	M.3.3			
4. Water Sources Data							
4.1 Water Source General Information			P.4.1				
4.2 Water Source Technical Information			P.4.2				
4.3 Untapped Spring Information				M.4.3			
4.4 Well Information				M.4.4			
4.5 Surface Water Sample Point for Water Quality Analysis				M.4.5			
5. Water Supply Data							
5.1 Level I Facility			P.5.1	M.5.1			
5.2 Level II System						S.5.2.1	
						S.5.2.2	
5.3 Level III System						S.5.3.1	
						S.5.3.2	
						S.5.3.3	
						S.5.3.4	
6. Environmental Sanitation							
6.1 Household Toilet			P.6.1	M.6.1			
6.2 School and Student			P.6.2	M.6.2			
6.3 School Toilets			P.6.3	M.6.3			
6.4 Public Toilets (Public Market)			P.6.4.1	M.6.4.1			
Public Toilets (Jeepney/Bus Terminal)			P.6.4.2	M.6.4.2			
Public Toilets (Parks/Playground)			P.6.4.3	M.6.4.3			
6.5 Drainage Facilities			P.6.5	M.6.5			
6.6 Solid Waste Collection and Disposal			P.6.6	M.6.6			
7. Investment Data							
7.1 Income and Expenditure			P.7.1				
7.2 Past Internal Revenue Allotment to the Province			P.7.2				
7.3 Available Funds for Capital Expenditures (20% DF)			P.7.3				
7.4 Sector Previous Investment to the Province by Concerned Agencies			P.7.4				
7.5 Sector Allocation in the Annual Investment Plan			P.7.5				
7.6 Allocation of the 20% Development Fund			P.7.6				
7.7 Financial Indicators of Water District/Waterworks			P.7.7				
7.8 Loan Status of Water District			P.7.8				
7.9 Affordability in Water Supply and Sanitation Services			P.7.9				

(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 the selected parameters.

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

The above-mentioned 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

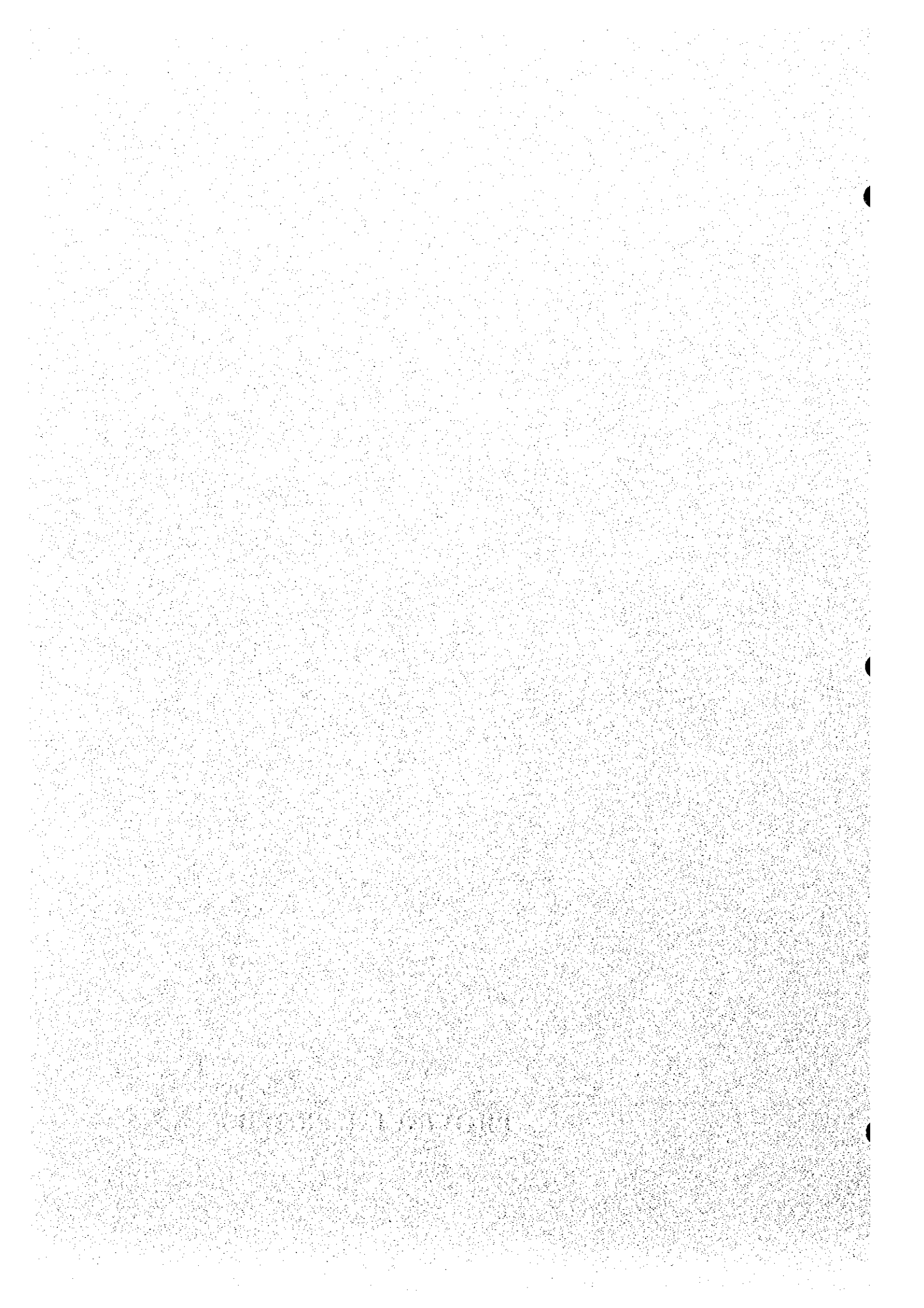
analysis and presentation. Key parameters are entered in a key parameter table linked to the output tables (refer to 2.6.2 Data Management, Supporting Report).

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

PROVINCIAL PROFILE

3



3. PROVINCIAL PROFILE

3.1 General

Capiz is one of the 4 provinces in Panay Island with Roxas City as the seat of the provincial and city governments. It is part of Region VI, the Western Visayas Region. The province is bounded by the Sibuyan Sea on the north, Aklan on the northwest, Antique on the southwest and Iloilo on the east and the south as shown in the Location Map.

The province is classified as 2nd class and has a total land area of 2,633.17km² that is 0.88% of the Philippine total land area of about 300,000km². It is composed of 16 municipalities and one chartered city, Roxas City. Based on the 1995 NSO records, the province has 473 barangays, of which 79 are urban and 394 rural. Provincial total population was 624,469 in 1995. About 81% of the population reside in rural areas, while the remaining 19% in urban areas. At present, there are 6 water districts and 1 LGU/association managed Level III water supply system operating in the province. Table 3.1.1 presents the breakdown per municipality of land area, population and density, as well as administrative composition.

Table 3.1.1 Outline of Municipalities

Municipality/City		Land Area (km ²)	1995 Population		Number of Barangay		
Name	Class		Number	Density (person/km ²)	Urban	Rural	Total
Cuartero	5th	178.20	26,477	114	3	19	22
Dao	4th	72.50	29,266	401	2	18	20
Dumalag	5th	112.40	28,348	220	1	18	19
Dumarao	4th	234.20	38,037	134	3	30	33
Ivisan	5th	54.20	22,720	1,330	2	13	15
Jamindan	4th	544.25	34,022	56	1	29	30
Ma-ayon	4th	141.40	30,333	189	3	29	32
Mambusao	4th	118.70	35,632	291	2	24	26
Panay	4th	116.40	39,124	337	3	39	42
Panitan	4th	89.77	33,269	549	2	24	26
Pilar	4th	115.60	36,464	271	2	22	24
Pontevedra	4th	133.10	38,223	195	3	23	26
President Roxas	4th	77.50	24,695	341	1	21	22
Roxas City (Capital)	3rd	102.00	118,715	5,973	47		47
Sapi-an	5th	80.00	22,534	265	1	9	10
Sigma	5th	101.70	25,801	244	2	19	21
Tapaz	3rd	361.25	40,809	92	1	57	58
Provincial Total	2nd	2,633.17	624,469	219	79	394	473

3.2 Natural Conditions and Geographical Features

3.2.1 Meteorology

The province has Type III climate under the Coronas classification. This type is characterized by an absence of very pronounced maximum rain period with a very short dry season lasting only from 1 to 3 months. Rainfall generally occurs in May to December and the dry months are in January to April as reflected in the Location Map. From the rainfall record of PAGASA in Roxas City, the average rainfall was registered at 2,132mm.

The average annual temperature is 28°C. The occurrence of typhoon in Capiz is infrequent.

3.2.2 Land Use

Remaining forest area constitutes a mere 7.5% of the total area of the province located mostly in the hinterland areas of Tapaz, Dumanlag and Jamindan. Agricultural land occupies majority of land at 71.1%. Primary settlements are concentrated along the seacoast and major transport routes. The existing land use pattern as presented in Table 3.2.1 must be enhanced by rehabilitation of watersheds in order to pursue a sustainable growth of the province. The remaining forest cover must be conserved to primarily serve as watershed rather than as source of timber. An efficiently managed watershed collects and regulates flow of water, controls soil erosion and minimizes water pollution. Conversion of the remaining forestland to other uses will restrict its function as a watershed. Correspondingly, a significant increase in agricultural area will result in a high demand of water use.

Table 3.2.1 Current Land Use

Land Use	Area (km ²)	Percentage over Total Land Area
Forest Land	197.44	7.49
Grassland	-	-
Built-up	66.28	2.52
Agricultural	1,871.92	71.09
Fishponds, Mangrove, Inland Water Area	198.75	7.55
Openlands	298.78	11.35
Provincial Total	2,633.17	100.00

3.2.3 Topography and Drainage

The topography of Capiz is characterized by wide plains on its northern part where the Panay River has formed an extensive delta land. On the northern coast are extensive swamps and marshes, which are underwater throughout the year. Rolling hills descending gradually from the western highlands with peaks of 2,049 masl at Mt. Nangtud command the western terrain, while on the east are rolling hills along the coast dotted by small basins.

The major river in the province is Panay River. Tributaries of Panay River are Mambusao, Badbaran and Maayon Rivers. These four rivers, originating from the western mountain mass and the eastern boundary with Iloilo, drain the lowlands. Generally, Panay and Mambusao Rivers flow in the eastern and northern direction towards the Sibuyan Sea, while Badbaran and Maayon Rivers flow from the east. Extensive floods sometimes occur on the inland plains because of a superposed valley formed by the basaltic lava flow which had blocked the flow way of Panay River at Panitan. Panay River and its tributaries are characterized by a trellis pattern.

Figure 3.2.1 shows the natural drainage systems of the province. Table 3.2.2 is a list of the main rivers and their corresponding drainage areas with recorded flow rates at the site of the gauging station.

Table 3.2.2 Drainage Areas & Flow Rates of Major Rivers

Major River	Drainage Area (km ²)	Flow Rate (m ³ /sec)			Water District (using river water)
		Peak	Maximum	Minimum	
Panay	880	1,668.0	1,427.5	1.2	Panitan and Metro Roxas
Ma-ayon	265	170.7	170.4	0.5	None
Badbaran	No gauging station in the watershed.				None
Mambusao	307	535.0	460.0	0.4	None

Source: Philippine Water Resources Summary Data, established January 1980 by NWRC

Notes: Peak - Peak discharge of Daily Maximum Discharge
 Maximum - Maximum Daily Discharge of Weighted Daily Discharge
 Minimum - Minimum Daily Discharge of Weighted Daily Discharge

Four (4) typical rivers in the province were selected for water quality examination, namely: Panay, Ma-ayon, Badbaran and Mambusao rivers. Analyzed river waters were turbid, colored and slightly ironic. The examination result is referred to 7.5, Data Report.

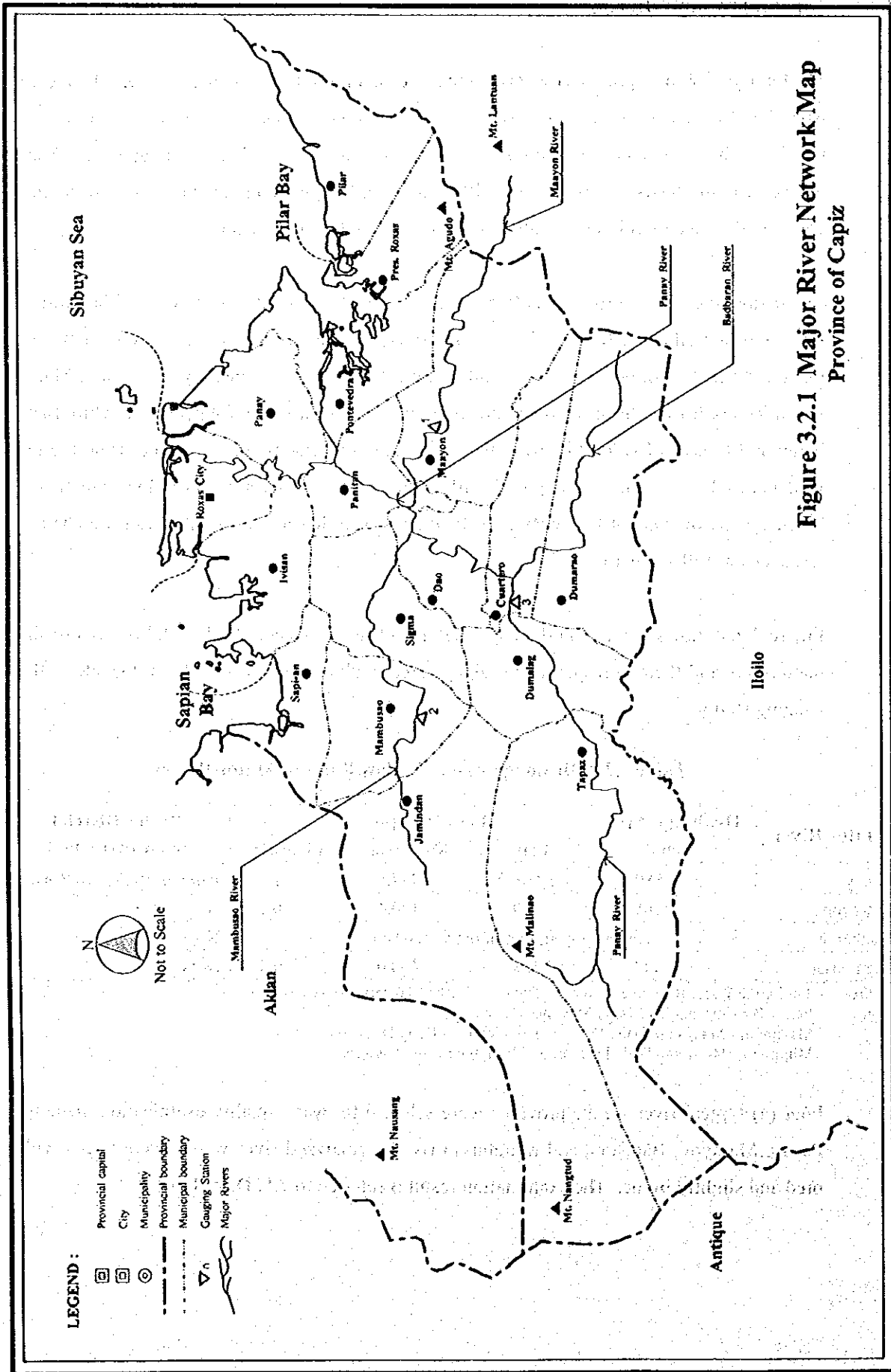


Figure 3.2.1 Major River Network Map
Province of Capiz

3.3 Socio-economic Conditions

3.3.1 Economic Activities and Household Income

Capiz is primarily an agricultural province. The major economic activities are farming and fishing. Principal crops cultivated are palay, corn, sugarcane and coconut. Bounded by a major fishing ground, the province has high commercial and municipal fishery production. At present, the province is cottage industry and value added activities as an income-generating activities both coastal and farming areas.

The NSO Family Income and Expenditures Survey in 1994 showed that the average annual family income of the province was ₱ 46,880 while the expenditure was at ₱ 41,446 or a net saving of ₱ 5,434. Distribution of families 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 families of lower income levels in the province were greater than the average figures in the region. Based on the established poverty threshold income of ₱ 47,133, in Region VI for 1994, about 56% of the total number of families lived within and below the poverty threshold.

As to the number of workers by major industry group, agriculture, fishery and forestry had the dominant share followed by social and personal services (refer to Table 3.3.2, Supporting Report). By class of worker, those who were self-employed without any paid employee had the highest share of 32% as shown in Figure 3.3.2.

3.3.2 Basic Infrastructure

Electric supply coverage to municipalities is 100% for urban and 77% for rural area but with a low service coverage at household level of only 54%. Telecommunication service is also available in all municipalities. There are 27 post office in the province. Land transportation is available by means of jeepney, bus, van and tricycle. There are 560 and 50 business and tourism establishments, respectively. Table 3.3.1 presents an 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 531 schools consisting of 461 elementary schools, 53 high schools and 17 tertiary/technical schools. A large part of the population had attained ele-

Figure 3.3.1 Distribution of Families by Income Class

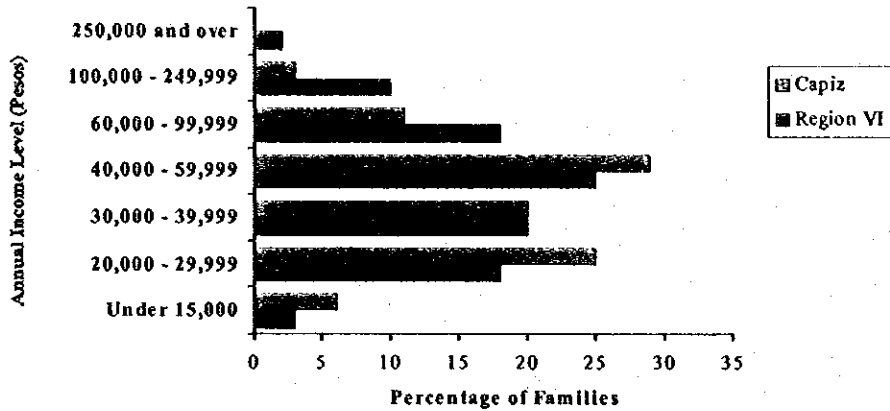


Figure 3.3.2 Employment Distribution by Major Industry and Class of Worker

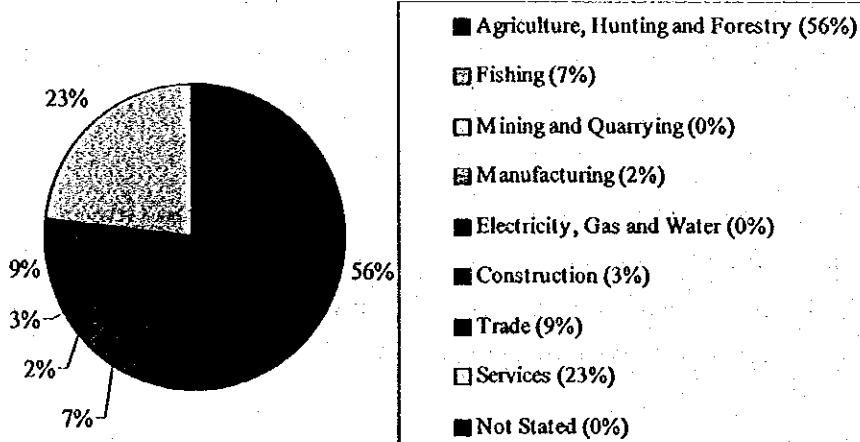


Figure 3.3.3 Population Distribution by Educational Attainment

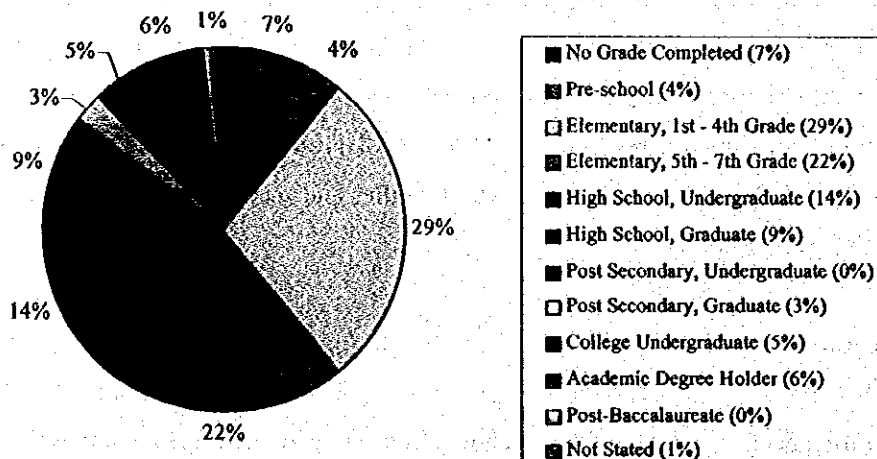


Table 3.3.1 Provincial Outline on Public Services

Item	Unit	Value	Item	Unit	Value
(1) Roads			(8) Tourism facilities	Number	50
a) Total length	Km	1,286.76	(Hotel resort, lodges, recreational facilities, etc.)		
b) Barangay roads	Percent	62			
(2) Electricity service coverage			(9) Schools		
a) Municipality	Percent	100	a) Elementary level	Number	461
b) Barangay	Percent	77	b) Secondary level	Number	53
c) Household	Percent	54	c) Tertiary level/Technical	Number	17
(3) Telecommunication Services			(10) Health Facilities		
a) Availability in municipality	Percent	100	a) Hospital	Number	12
b) Telegraph station	Number	16	b) Main health centers, rural health units, barangay health center, etc	Number	190
c) Telephone station	Number	6			
(4) Post Office	Number	27	(11) Labor		
			a) Labor force participation ratio	Percent	73
(5) Transportation services	Mode	Airplane, Jeep, (ex. Bus, Bus, Van jeep, taxi,.) Tricycle, Boat	b) Employment rate	Percent	97.2
			(12) Average family income		
(6) Banking Facilities	Number	35	a) Monthly income	Pesos/Month	3,907
a) Private bank	(by Private and public)		b) Monthly expenditure	Pesos/Month	3,454
b) Public bank					
(7) Industrial/business/commercial establishment	Number	560			

Sources: PSPT, Provincial Socioeconomic Profile Dev. Plan, 1995 Population Census, 1994 NSO Family Income & Expenditures Survey

Table 3.3.2 Public Facilities and Services by Municipality

Name of Municipality/ City	High School			Technical School	College	Hospital	Public Market	Bank and Financing Institutions
	Public	Private	Total					
	nos.	nos.	nos.					
Cuartero	2		2				2	1
Dao	2	1	3			1	1	1
Dumalag		1	1	1			1	1
Dumarao	3	1	4		1	1	1	1
Ivisan	1		1				1	1
Jamindan	3		3			2	1	1
Ma-ayon	2		2				1	
Mambusao	1	1	2		1	1	1	1
Panay	2		2				1	1
Panitan	2		2		1	1	1	1
Pilar	4		4		1	1	2	1
Pontevedra	2		2		1	1	1	1
President Roxas	1	1	2				1	
Roxas City (Capital)	10	6	16	5	5	4	2	21
Sapi-an	1		1		1		1	1
Sigma	1		1				1	1
Tapaz	4	1	5		1	1	2	1
Provincial Total	41	12	53	6	12	13	21	35

Sources: DECS

3.4 Population

3.4.1 Previous Population Development

A decreasing provincial population growth rate had been experienced since the last six (6) census years (1960-1995) as indicated in Figure 3.4.1. From an average annual growth rate of 2.56% during the period 1960 to 1970, it decreased to 2.01% (1975-1980), and again further decreased to 1.26% (1990-1995). A summary of the average annual growth rates of the province is as follows:

Year	Population	Ave. Annual Growth Rate (%)	Period
1970	394,041	2.56	1960 - 1970
1975	445,716	2.49	1970 - 1975
1980	492,231	2.01	1975 - 1980
1990	584,091	1.73	1980 - 1990
1995	624,469	1.26	1990 - 1995

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 1998 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 from 1948 to 1995.

Figure 3.4.1 Previous Population Development of the Province

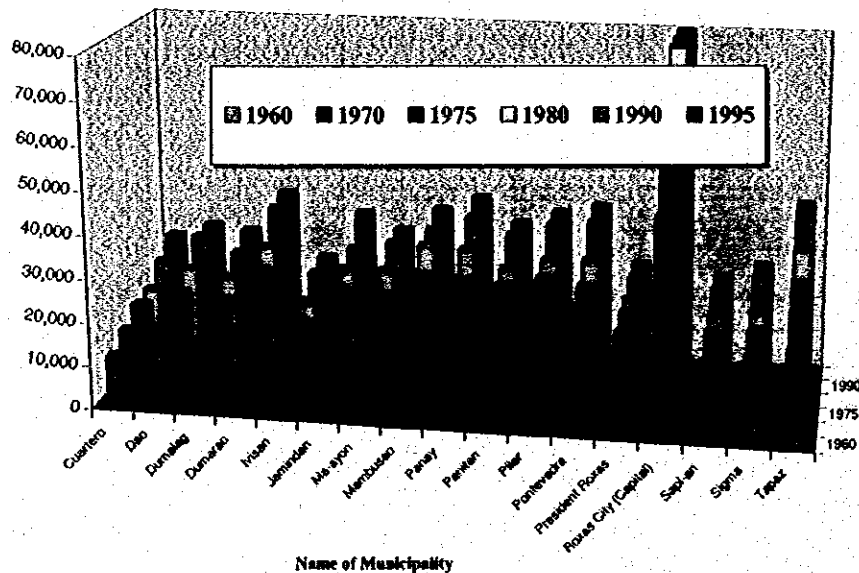


Table 3.4.1 Previous Population Development by Municipality

Municipality/City	Previous Population						
	1948	1960	1970	1975	1980	1990	1995
Cuartero	9,985	11,534	14,497	17,665	18,513	22,597	26,477
Dao	13,706	16,624	18,535	21,052	23,921	29,156	29,266
Dumalag	13,103	14,934	18,348	20,038	22,198	25,484	28,348
Dumarao	16,308	19,231	22,422	27,338	29,934	36,801	38,037
Ivisan	7,678	10,627	13,593	15,374	17,414	21,510	22,720
Jamindan	13,769	10,090	20,483	23,893	25,652	27,896	34,022
Ma-ayon		16,386	20,229	23,075	25,715	29,808	30,333
Mambusao	18,619	16,504	24,530	28,129	32,097	33,213	35,632
Panay	16,648	19,952	24,074	27,479	31,650	36,817	39,124
Panitan	15,179	19,828	23,259	26,361	27,631	32,867	33,269
Pilar	25,720	19,350	24,573	28,589	30,104	35,929	36,464
Pontevedra	26,329	20,965	25,314	27,266	30,489	36,748	38,223
President Roxas		15,263	19,972	21,632	21,805	24,052	24,695
Roxas City (Capital)	32,353	49,326	67,648	71,305	81,183	103,171	118,715
Sapi-an	8,218	11,638	14,171	17,395	18,753	22,011	22,534
Sigma	10,898	12,649	15,911	18,536	20,043	25,089	25,801
Tapaz	16,376	21,178	26,482	30,589	35,129	40,942	40,809
Provincial Total	244,889	306,079	394,041	445,716	492,231	584,091	624,469

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 cities and municipal jurisdictions having a population density of at least 500 persons per square kilometer.
- (2) Poblaciones or central districts of municipalities and cities, which have a population density of at least 500 persons per square kilometer.
- (3) Poblaciones or central districts (not included in nos. 1 and 2) regardless of population size, which have the following:
 - 1) Street pattern, i.e., network of streets either at parallel or in right angle orientation;
 - 2) At least six establishments (commercial, manufacturing, recreational and/or personal services); and
 - 3) At least three of the following:
 - a) a town hall, church or chapel with religious services at least once a month;
 - b) a public plaza, park or cemetery;
 - c) a market place or building where trading activities are carried on at least once a week; and
 - d) a public building like school, hospital, health center or library.

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

All areas not falling under the urban classification are defined as rural area. Distribution of the classified areas is shown in Figure 3.4.1, Supporting Report. For this Master Plan, however, the 1995 NSO classification of urban and rural barangays was modified by the PSPT to reflect the actual conditions prevailing in the study area. A total of 28 urban barangays was re-classified to rural barangays. With the reclassification, there are 51 urban barangays and 422 rural barangays for a total of 473 barangays in 1998.

3.4.3 Present Population Distribution

From the 1995 NSO census, the 1998 urban-rural population was estimated. Rural population accounts for 80.6% of the provincial total, while 19.4% is urban as reflected in Figure 3.4.2. Table 3.4.2 presents the breakdown of the number of urban and rural barangays by municipality and its corresponding present population distribution.

There are 126,257 households with 101,574 residing in rural areas and 24,683 households in urban areas. The average provincial household size is 5.21 persons/household. Table 3.4.3 presents a breakdown per municipality on the number of households and household sizes by urban and rural area.

Figure 3.4.2 Present Population Distribution

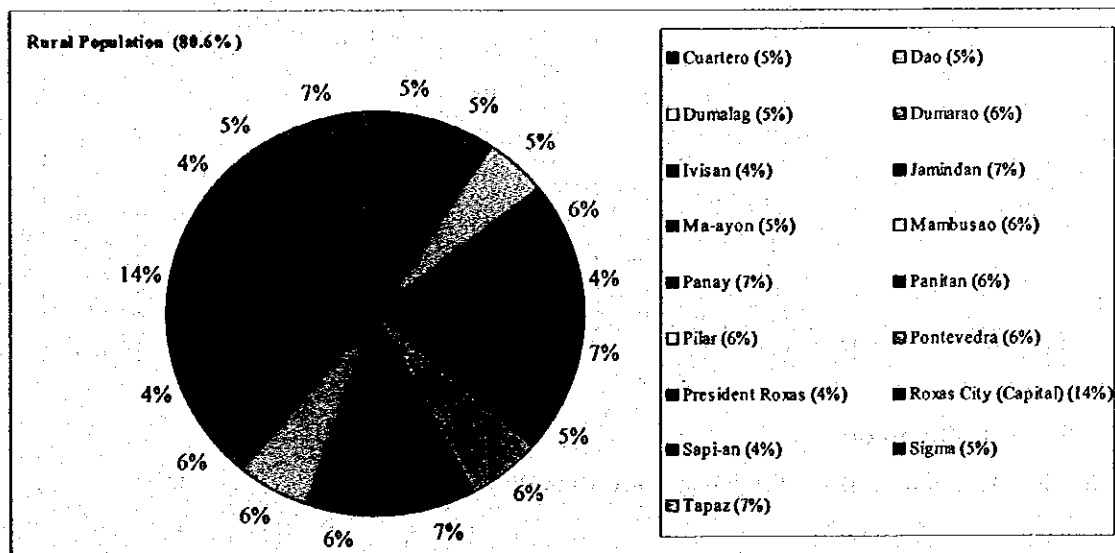
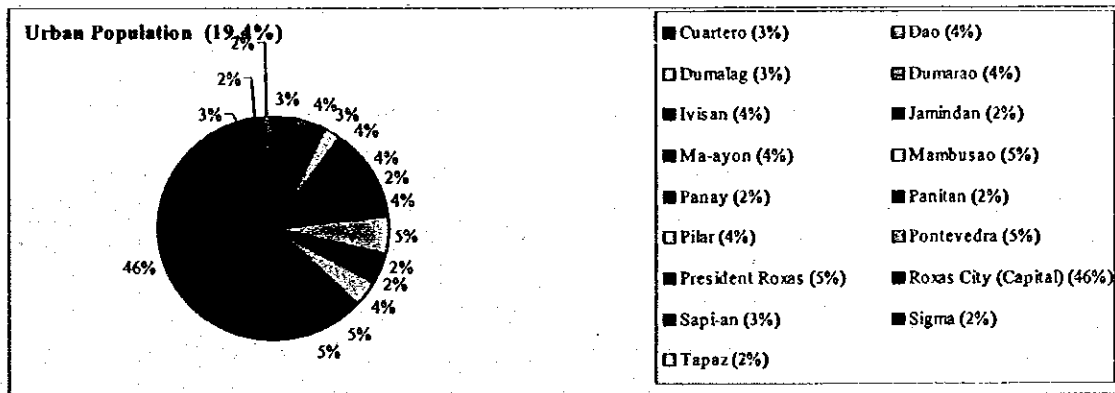
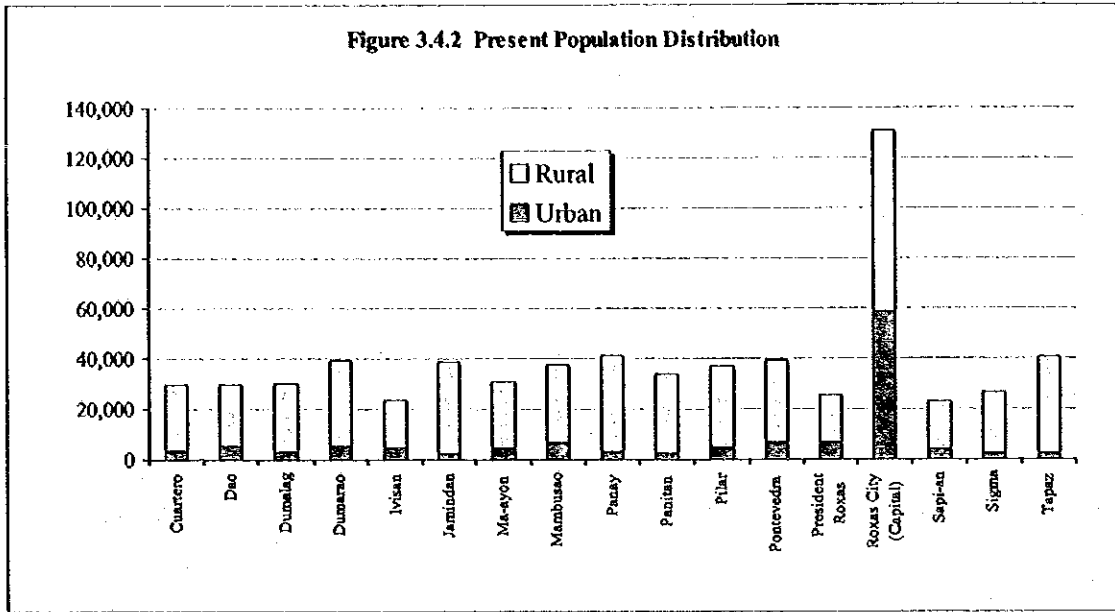


Table 3.4.2 Outline of Urban and Rural Areas in the Province

Municipality/City	Number of Barangay			Population (1998)		
	Urban	Rural	Total	Urban	Rural	Total
Cuartero	3	19	22	3,894	25,529	29,423
Dao	3	17	20	5,646	24,000	29,646
Dumalag	1	18	19	3,193	27,352	30,545
Dumarao	3	30	33	5,447	33,767	39,214
Ivisan	2	13	15	4,632	19,098	23,730
Jamindan	1	29	30	2,516	36,235	38,751
Ma-ayon	3	29	32	4,578	26,410	30,988
Mambusao	2	24	26	6,492	31,068	37,560
Panay	3	39	42	2,969	38,031	41,000
Panitan	2	24	26	2,638	31,224	33,862
Pilar	2	22	24	5,117	32,055	37,172
Pontevedra	3	23	26	6,427	33,126	39,553
President Roxas	1	21	22	6,615	18,736	25,351
Roxas City (Capital)	18	29	47	59,024	71,743	130,767
Sapi-an	1	9	10	4,038	19,055	23,093
Sigma	2	19	21	2,248	24,264	26,512
Tapaz	1	57	58	2,135	38,674	40,809
Provincial Total	51	422	473	127,609	530,367	657,976

Table 3.4.3 Household Numbers and Household Size

Municipality/City	Number of Households (1995)			Number of Households (1998)			1995 Household Size (person/household)		
	Urban	Rural	Total	Urban	Rural	Total	Urban	Rural	Total
Cuartero	641	4,058	4,699	712	4,509	5,222	5.47	5.66	5.63
Dao	1,070	4,655	5,725	1,084	4,716	5,799	5.21	5.09	5.11
Dumalag	535	4,664	5,199	577	5,025	5,602	5.54	5.44	5.45
Dumarao	1,089	6,522	7,611	1,123	6,724	7,847	4.85	5.02	5.00
Ivisan	828	3,593	4,421	865	3,753	4,618	5.36	5.09	5.14
Jamindan	446	6,088	6,534	508	6,934	7,442	4.95	5.23	5.21
Ma-ayon	881	4,972	5,853	900	5,079	5,979	5.09	5.20	5.18
Mambusao	1,113	5,819	6,932	1,173	6,134	7,307	5.53	5.06	5.14
Panay	561	6,617	7,178	588	6,934	7,522	5.05	5.48	5.45
Panitan	494	5,847	6,341	503	5,951	6,454	5.25	5.25	5.25
Pilar	1,016	6,080	7,096	1,036	6,198	7,234	4.94	5.17	5.14
Pontevedra	1,089	5,982	7,071	1,127	6,190	7,317	5.70	5.35	5.41
President Roxas	1,244	3,467	4,711	1,277	3,559	4,836	5.18	5.26	5.24
Roxas City (Capital)	10,491	12,331	22,822	11,556	13,583	25,139	5.11	5.28	5.20
Sapi-an	786	3,569	4,355	806	3,657	4,463	5.01	5.21	5.17
Sigma	435	4,609	5,044	447	4,736	5,183	5.03	5.12	5.12
Tapaz	403	7,890	8,293	403	7,890	8,293	5.30	4.90	4.92
Provincial Total	23,122	96,763	119,885	24,683	101,574	126,257	5.17	5.22	5.21

3.5 Health Status

3.5.1 Morbidity, Mortality and Infant Mortality

The number one cause of morbidity in Capiz was bronchitis, followed by vascular diseases and diarrhea, a water-borne and water-washed disease. Pneumonia and dengue fever ranked

fourth and fifth, respectively. Regarding mortality, the number one cause was heart diseases, followed by bronchitis. Malignant neoplasm and other accidents ranked third and fourth, respectively. Bronchitis, prematurity and birth injuries and difficult labor were the 3 leading causes of infant mortality in the province (refer to Table 3.5.1, Data Report).

The general health status of the populace of the province in 1998 was relatively poor compared with the national condition. The incidence of diseases was higher in Capiz than the country as a whole. Table 3.5.1 presents a comparative statistics on the ten leading causes of morbidity, mortality and infant mortality of the province as well as of the Philippines.

Water-related diseases in the ten leading causes of morbidity included diarrhea (rank 3rd), dengue fever (5th) and typhoid/paratyphoid (7th). Diarrhea also ranked 9th as the leading causes of mortality. Again, diarrhea (rank 5th) was among the ten leading causes of infant mortality.

3.5.2 Water Related Diseases

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

Water-related diseases reported in the province in 1998 were diarrhea, typhoid/parathyphoid, intestinal parasitism, dengue fever, viral hepatitis, scabies and skin diseases. Table 3.5.2 presents the reported cases and deaths of notifiable water-related diseases in the province.

3.5.3 Health Facilities and Practitioners

Present facilities serving the health care of the populace are 12 hospitals, 21 rural health units and 187 barangay health stations. The ratio of the population to these facilities and to the health practitioners are relatively higher as compared to the national average figures (refer to Table 3.5.1 number and ratio of population to health facilities and/or medical practitioners, Supporting Report).

Table 3.5.1 Number and Rates of Ten Leading Causes of Morbidity, Mortality and Infant Mortality
Rate: 1/100,000

Causes	Capiz		Philippines			
	Number	Rate	Number	Rate	Ranking	
Morbidity	1. Bronchitis	10,144	1,541.7	903,508	1,349	2
	2. Vascular Diseases	7,057	1,072.5	-	-	-
	3. Diarrhea	5,341	811.7	1,337,449	1,997	1
	4. Pneumonia	2,327	353.7	470,574	703	4
	5. Dengue Fever	967	147.0	-	-	-
	6. Tuberculosis	793	120.5	159,049	238	6
	7. Typhoid/Paratyphoid	396	60.2	-	-	-
	8. Anemias	394	59.9	-	-	-
	9. Heart Diseases	301	45.7	111,847	167	7
	10. Varicella, Chickenpox	252	38.3	71,317	107	9
Mortality	1. Heart Diseases	663	100.8	48,582	69	1
	2. Bronchitis	654	99.4	-	-	-
	3. Malignant Neoplasms	375	57.0	25,399	38	4
	4. Other Accidents	268	40.7	-	-	-
	5. Tuberculosis	160	24.3	24,580	37	5
	6. Influenza	102	15.5	-	-	-
	7. Kidney/ Nephritis	88	13.4	5,510	8	10
	8. Nutritional Deficiencies	70	10.6	-	-	-
	9. Diarrhea	58	8.8	-	-	-
	10. Septicemia	49	7.4	-	-	-
Infant Mortality	1. Bronchitis	49	7.4	5,654	3.4	2
	2. Prematurity	35	5.3	-	-	-
	3. Birth Injuries & Difficult Labor	32	4.9	1,190	0.7	5
	4. Septicemia	20	3.0	1,252	0.7	5
	5. Diarrhea	13	2.0	1,661	1.0	4
	6. Heart Diseases	8	1.2	-	-	-
	7. Congenital Anomalies	7	1.1	2,366	1.4	3
	8. Tetanus	3	0.5	-	-	-
	9. Other Accidents	3	0.5	-	-	-
	10. Kidney/ Nephritis	2	0.3	-	-	-

Table 3.5.2 Reported Cases and Deaths of Notifiable Water Related Diseases in 1998

Rate: 1/100,000

Diseases	Morbidity		Mortality		Infant Mortality	
	Number	Rate	Number	Rate	Number	Rate
Water-borne						
1. Diarrhea	5,341	855	58	9	13	2.1
2. Typhoid/Paratyphoid	396	63				
3. Viral hepatitis	236	38				
Water-washed						
1. Intestinal parasitism	246	39				
2. Skin disease	115	18				
3. Conjunctivities	22	4				
Water vector						
1. Dengue/H-fever	5,346	155	33	5	1	0.16

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 are no existing sanitary sewerage systems in the province. Majority of the drainage facilities in all municipalities is open canals or ditches. The rivers and streams function as the drainage system. These rivers receive the domestic wastewater and storm water collected by the segmented drainage facilities in urban centers or poblacions (refer to the types of drainage facilities in Table 3.6.1, Supporting Report).

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.

Domestic sewage is identified as potential pollution sources if no control measures are in place. The rivers must be protected and conserved for their intended or beneficial use. As of now, the rivers in the province are not classified as to their use by the Department of Environment and Natural Resources (refer to general information in Table 3.6.2 DENR Water Quality Criteria/Water Usage and Classification, Supporting Report).

3.6.3 Solid Waste Disposal

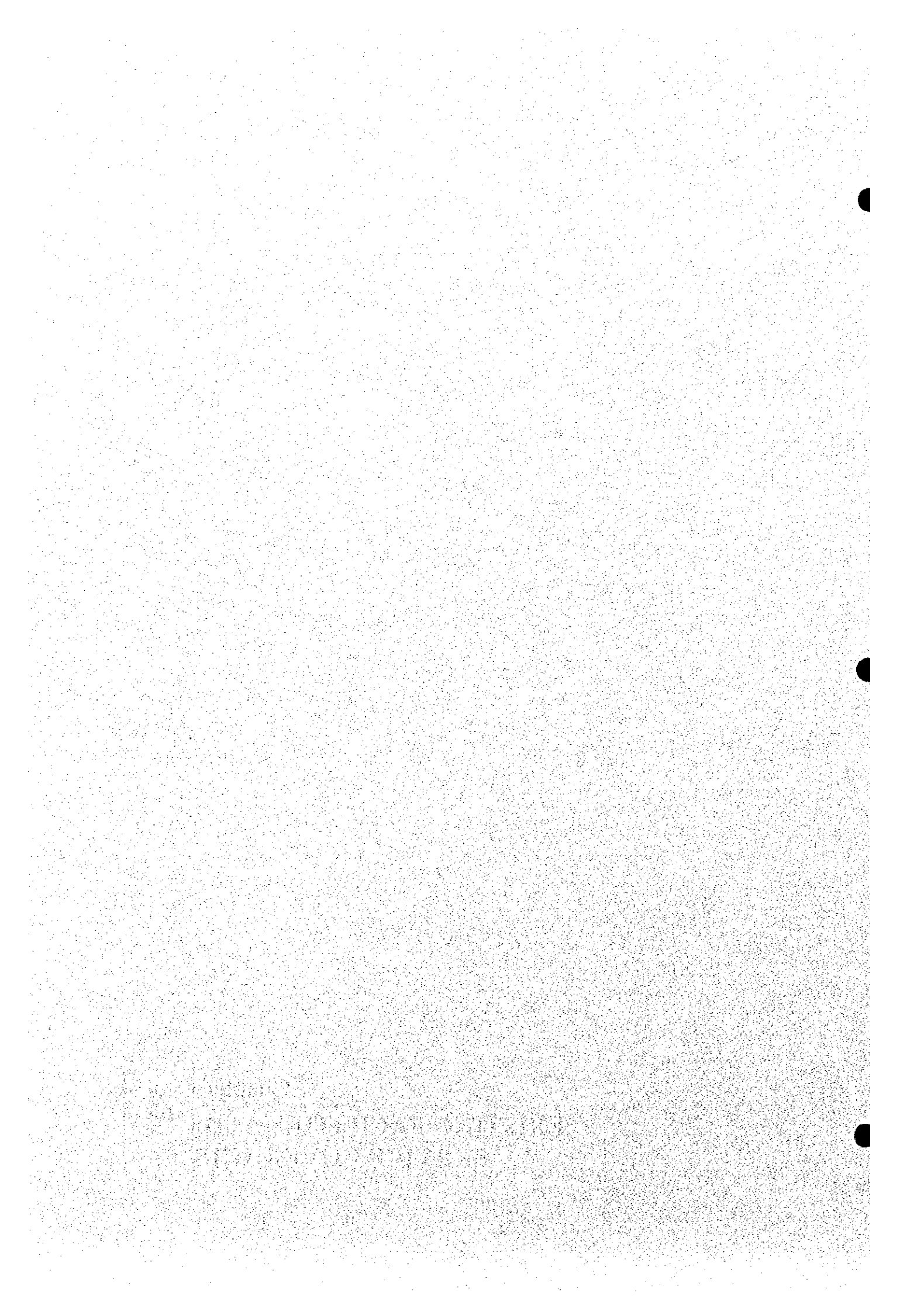
Of the 17 municipalities/city, 15 have municipal refuse collection and disposal services as of 1998 (details are referred to Table 3.6.1, Data Report). These municipalities/city have 1 to 4 units of open dump truck. Only Roxas City and Sapi-an have closed type truck. In the province, only 29% of the households is served, while the majority (71%) is unserved. Table

3.6.1 reflects the manner of solid waste collection and disposal, and service coverage by municipality in 1998.

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

Table 3.6.1 Municipal Solid Waste Collection and Disposal, and Service Coverage, 1998

Name of Municipality	Number of Households 1998	With Service					Without Service					Percentage of Households Served	Percentage of Households Unserved	
		Number of Collection Trucks		Total Units	Disposal		Manner of Disposal (Number of Household)			Total Households Unserved				
		Open Dump Trucks	Closed Type Trucks		Number of Households Served by Open Dump Site	Number of Households Served by Salitary Landfill	Total Households Served	Dumping (Land and Water)	Burying		Composting			
Cuartero	5,222	2		2		280		280	454	3,590	898	4,942	5	95
Dao	5,799	1		1		103		103	173	5,070	453	5,696	2	98
Dumalag	5,602	1		1		700		700	4,902			4,902	12	88
Dumarao	7,847	1		1		616		616	2,292	4,122	817	7,231	8	92
Ivisan	4,618	1		1		839		839	2,016	1,480	283	3,779	18	82
Jamindan	7,442								515	5,550	1,377	7,442		100
Ma-ayon	5,979	1		1		590		590	4,777	126	486	5,389	10	90
Mambusao	7,307	1		1		1,166		1,166	5,116	294	731	6,141	16	84
Panay	7,522								5,650	1,872		7,522		100
Panitan	6,454	1		1		420		420	5,114	192	728	6,034	7	93
Pilar	7,234	3		3		1,175		1,175	3,967	1,585	507	6,059	16	84
Pontevedra	7,317	2		2		1,114		1,114	3,168	2,379	656	6,203	15	85
President Roxas	4,836	1		1		1,852		1,852	2,194	790		2,984	38	62
Roxas City (Capital)	25,139	4	4	8		25,139		25,139					100	
Sapi-an	4,463		1	1		1,100		1,100	108	2,000	1,255	3,363	25	75
Sigma	5,183	1		1		562		562	3,739	882		4,621	11	89
Tapaz	8,293	1		1		441		441	178	654	7,020	7,852	5	95
Provincial Total	126,257	21	5	26		36,097		36,097	39,461	35,488	15,211	90,160	29	71



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 1999 and regarded as a figure in 1998). 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 1998.

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

As a provincial total, approximately 58% of the present population (of which 19% in urban area and 81% in rural area) is considered as adequately served (refer to 4.1, Supporting Report for the detailed study). Under the area classification, 75% of urban population and 54% of rural population have access to safe water sources/facilities, while the rest is underserved or unserved. About 294,800 persons or 77% of the served population depend on Level I facilities, while about 86,700 persons or 23% are served by Level III and/or Level II systems.

4.1.2 Types of Facilities and Definition of Service Level Standard

(1) Composition of water supply system/facility

The NSMP defines service level and system components of the water supply systems/facilities as shown in Table 4.1.1. NEDA Board Resolution No. 12 (s. 1995) also provides the approved definition of terms relative to water supply including levels of service (refer to 4.1.2 Data Report). These terms are to be adopted by all government agencies including LGUs.

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 is provided. Systems with surface water source have 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 250m radius)	Communal faucet (within 25m radius)	Individual house connection/household tap
5. Consumption Rate (Adequately Served)	At least 20 lpcd	At least 60 lpcd	At least 100 lpcd

(2) Safe and unsafe classification of water sources

DOH has classified Level I water source facilities as safe (reliable water source) and unsafe sources/facilities based on the National Standard for Drinking Water (NSDW).

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 rainwater collector

Water sources other than the above, such as untreated surface water of rivers, lakes and ponds are also considered unsafe sources. On the other hand, Levels II and III water supply systems are regarded to have safe/reliable sources with provision of adequate treatment.

(3) Service level standard

The NSMP and NEDA Resolution No. 12 define "adequate service level" by different water supply system. Improvement in the number of households per water source/facility may be expected for Level I service 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 (individual house connection) systems at municipal level are usually established and operated by WD under the technical and financial assistance of LWUA. Some LGUs also implement and operate Level III systems commonly at barangay level.

There are 7 Level III systems in the province operated under different kinds of ownership (authority or association) as shown in Table 4.1.2 together with their service coverage in 1998 (details are referred to in Table 4.1.1, Supporting Report).

These are:

- 6 Water Districts covering 8 municipalities/city of Dumarao, Ivisan, Mambusao, Panay, Panitan, Pilar, Pontevedra and Roxas City;
- 1 Municipal waterworks in the municipality of Dumalag.

The Metro Roxas Water District (MRWD) is the largest system in the province, covering 23 urban and 57 rural barangays in three (3) municipalities/city of Ivisan, Panay and Roxas City, with a served population of about 59,000. Presently, MRWD covers 58% of the urban and 23% of rural population in Roxas City, and 8 to 16% of the population in the other concerned municipalities. Water source of MRWD is surface water. MRWD is planning to expand its system by 2005 with the assistance LWUA.

Following MRWD is the Pontevedra WD, the second largest system in the province. The WD covers 3 urban and 9 rural barangays with a total served population of 7,100 in provision of deep well source.

The other municipalities such as Dumalag, Dumarao, Mambusao, Panitan and Pilar have Level III systems managed by WDs or LGU, with their served population ranging from 1,100 to 2,500 in provision of deep well or spring sources.

Generally, waterworks with spring sources are simply managed without higher expertise needed and in provision of lower water charges.

Some Level-III systems, among the above, practice scheduled water supply (intermittent water supply) due to insufficient water source capacity. Even in case of enough water sources, intermittent water supply is forced due to insufficient capacity of the facilities (distribution pipe) against current water demand. Concerned municipality relevant to the problem is Dumarao during dry season. Lack of due consideration in D/D stage for expansion of the system was also observed.

All waterworks has O&M staff (engineer/technician/plumber/water fee collector) and practice chlorination. They have ensured budget for O&M cost, but the income is insufficient for expansion of the system.

The other 8 municipalities such as Cuartero, Dao, Jamindan, Ma-ayon, President Roxas, Sapi-an Sigma and Tapaz have no Level III system/s both in urban and rural area at present.

Table 4.1.2 Information on Existing Level III System

Name of Municipality/City	Name of Operating Body	Water Consumption			Service Coverage									
		Type of Water Source	Water Consumption (cu.m/day)	Domestic Supply (%)	No. of Brgys. Served			No. of Household Served			No. of Population Served			
					Urban	Rural	Total	Urban	Rural	Total	Urban	Rural	Total	
Dumalao	Dumalao WS	SP	*247			3	3		493	493		2,465	2,465	
Dumarao	Dumarao WD	SP	27	89	2	2	4	378	68	446	1,890	340	2,230	
Ivisan	Metro Roxas WD	DW/Surf	*194		2	5	7	257	131	388	1,285	655	1,940	
Mambusao	Mambusao WD	DW	211	97	2	1	3	436	2	438	2,175	10	2,185	
Panay	Metro Roxas WD	DW/Surf	665		3	24	27	337	992	1,329	1,685	4,960	6,645	
Panitan	Panitan WD	Surf	240	95	2	2	4	199	168	367	995	840	1,835	
Pilar	Pilar WD	SP	59	100	1	2	3	172	39	211	360	195	1,055	
Pontevedra	Pontevedra WD	DW	570	99	3	9	12	736	680	1,416	3,680	3,400	7,080	
Roxas City	Metro Roxas WD	DW/Surf	*5,026		18	28	46	6,789	3,263	10,052	33,945	16,315	50,260	
Provincial Total				2,213	98	33	76	109	9,304	5,836	15,140	46,515	29,180	75,695

Note: 1. Type of Water Source: DW - Deep Well, Surf - Surface Water (River), SP - Spring, IG - Infiltration Gallery.
2. * - Estimated at 100 lpcd.

Table 4.1.3 Information on Water District

Name of Water District	Number of Connections						Production (cu. m/mon)	Accounted for Water (cu. m/mon)
	Domestic	Institutional	Commercial	Industrial	Total	Metered		
Dumarao WD	454		2		456	453	93,300	810
Mambusao WD	438	10	5		453	453	3,900	6,330
Metro Roxas WD	11,800							
Panitan WD	367	10	9		386	386		7,200
Pilar WD	211				211	211	40,890	1,770
Pontevedra WD	1,416	29	30		1,475	1,475		

4.1.4 Level II Systems

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

There are a total of 23 Level II systems in 15 municipalities/city in the province. Majority of these is utilizing spring sources (17 systems), while 6 systems are using deep well sources (details are referred to in Table 4.1.2, Supporting Report).

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

(1) Management practice

Only one waterworks using electric pump in the province, imposes water charge of 30 Pesos/HHH/month as flat rate, and the rest supplies water free of charge. In case of major repair, barangay council collects money required for repair work. Sometimes they resorted to assistance of the MEO/PEO. This fact shows that that current management practices will lead to any one of these systems to become non-operational sooner or later. This is because the financial savings to cope with future repair and depreciation of existing facilities are not duly considered under the current management practice, while cost recovery by the operating bodies is a prerequisite in sector management.

To attain financial and managerial sustainability, reinforcement of RWSA or other operating body shall be promoted with reference to institutional development.

(2) Technical skill for O&M of facilities

Utilization of spring source usually leads to less attention to the daily O&M practice, owing to gravity flow of water to the service area. However, inappropriate care of spring box and pipeline results to various problems, e.g. turbid water, less water flow by clogging at spring box and pipeline, etc. Physical damage may also happen to the transmission line exposed on the ground in the mountainous area due to landslide, etc. associated with heavy rainfall, when proper protection of pipeline is not taken up.

Most of Level II systems practice scheduled water supply due to insufficient water source/insufficient capacity of the facilities. Such problems are mainly caused by orderless expansion or tapping of individual connections without due considerations, resulted in insufficient water flow/ reduction of water pressure.

Expansion of distribution line and installation of additional public faucets are usually undertaken without appropriate technical study on the capacities of water sources and distribution facilities, resulting to decrease of supply pressure and quantity.

It is also common that water quality examination is not adequately conducted.

To attain technical sustainability of existing facilities, an appropriate technical guidance and skills training for operating bodies shall be arranged by concerned agencies/LGUs.

Table 4.1.4 Information on Existing Level II System

Name of Municipality/ City	Name of Operating Body	Service Coverage								
		No. of Brgys. Served			No. of Household Served			No. of Population Served		
		Urban	Rural	Total	Urban	Rural	Total	Urban	Rural	Total
Cuartero Dumalag	Cuartero (Aydahon)		1	1		67	67		402	402
	Duran WS		1	1		25	25		125	125
	San Miguel WS		1	1		130	130		650	650
	Municipal Total		2	2		155	155		775	775
Dumarao	Dacuton		1	1		70	70		350	350
Ivisan	Agustin Navarra Spring		1	1		70	70		350	350
	Cabugao		1	1		65	65		325	325
	Municipal Total		2	2		135	135		675	675
Jamindan	Esperanza WWS		1	1		80	80		400	400
	Lucero WS		1	1		60	60		300	300
	Municipal Total		2	2		140	140		700	700
Ma-ayon	Aglimocon		1	1		25	25		125	125
	Guindi-alan		1	1		35	35		175	175
	Quinabonglan		1	1		40	40		200	200
	Municipal Total		3	3		100	100		500	500
Mambusao	Mambusao (Borias)		1	1		110	110		660	660
Panitan	Agloway		1	1		45	45		225	225
	Cogon WSA		1	1		80	80		400	400
	Municipal Total		2	2		125	125		625	625
Pilar	Casanyan WWSA		1	1		18	18		90	90
	Cayus BWSA		1	1		115	115		575	575
	Municipal Total		2	2		133	133		665	665
Pontevedra	Pontevedra (Bailan)		1	1		438	438		2,628	2,628
President Roxas	Goce WSA		1	1		25	25		125	125
Roxas City (Capital)	Roxas City (Bolo)		1	1		158	158		948	948
Sapi-an	Sapi-an (Majanlud)		1	1		110	110		660	660
Sigma	Mianay BWSA		1	1		120	120		600	600
	Pinamalitan BWSA		1	1		100	100		500	500
	Municipal Total		2	2		220	220		1,100	1,100
Iapaz	San Nicolas		1	1		100	100		500	500
Provincial Total			23	23		2,086	2,086		11,313	11,313

4.1.5 Level I Facilities

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

Level I facilities are classified in terms of safe and unsafe sources referring to the definition of DOH and the data from PHO as presented in Table 4.1.5 (details are referred to in Supporting Report). Served population in 1998 is also estimated as shown in the same table.

Of the 20,520 operational Level I facilities, 28% are shallow wells. According to the study on safe/unsafe percentage for shallow well, 20% of the shallow wells are estimated to be unsafe as the provincial average (detailed are referred to in Supporting Report 4.1.5). All deep wells, covered/improved dug wells and developed springs are regarded as safe water sources. In application of the unsafe percentage to shallow wells for each municipality, 8,076 Level I facilities are classified as safe sources, while 12,444 facilities are under unsafe sources.

Table 4.1.5 Information on Existing Level I Facilities

Name of Municipality/City	Number of Safe Water Sources						Number of Unsafe Water Sources					Served by Safe Source			
	Deep Well	Shallow Well	Covered/Improved Dug Well	Developed Spring	Total	Shallow Well	Open Dug Well	Undeveloped Spring	Rain Water Collector	Total	Number of Household		Number of Population		
											Urban	Rural	Total	Urban	Rural
Cuartero	9	117	6		132	29	2		91	122	325	2,470	1,774	13,981	15,755
Dao		602	110		712	151	14		101	266	742	3,448	3,864	17,548	21,412
Dumalig	56	319	191	12	578	80	21		38	139	513	3,392	2,841	18,464	21,305
Dumarao	357	296	1,646	4	2,303	74			305	379	476	5,618	2,309	28,215	30,524
Ivisan	34	179	31	2	246	45	55		83	183	315	1,988	1,687	10,117	11,804
Jamindan	39	82	43	6	170	20	3,457		374	3,851	146	236	722	1,232	1,954
Ma-ayon	12	461	17	6	496	115	298		339	752	476	2,238	2,422	11,636	14,059
Mambusao	118	617	6	2	743	154	541		266	961	351	2,803	3,154	14,196	16,140
Panay	33	2			35	1			1,773	1,774	5	213	25	1,166	1,191
Pantian	55	664			719	166	165		139	470	157	3,697	3,854	19,394	20,219
Pilar	20	123		2	145	31				31	613	4,711	5,324	24,365	27,391
Pontevedra	45	300	4	1	350	75	752		214	1,041	67	1,604	1,671	8,585	8,964
President Roxas	17	34	55	3	109	8	171		108	287	535	949	1,484	4,997	7,766
Roxas City (Capital)	138	104			242	26			100	126	4,101	6,958	11,059	20,946	36,751
Sapi-an	82	257	25	5	369	64	31		268	363	275	2,307	2,581	13,767	15,394
Sigma	14	312	6		332	78	610		468	1,156	134	1,216	1,350	6,232	6,906
Tapaz	64	110	208	12	394	28	524		2	554	330	3,382	3,712	16,576	18,323
Provincial Total	1,093	4,579	2,348	55	8,075	1,145	6,641		4,669	12,455	9,559	47,229	56,787	245,472	294,803

Percentage shares between public and private Level I facilities for rural water supply is 13% and 87%, respectively. The share of developed springs in public facilities is 2% (details are referred to Supporting Report).

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

Most of the beneficiaries are not aware of the manner for O&M of the facilities. A considerable number of public wells are abandoned/non-functional due to lack of O&M, dried-up of wells and other reasons. In most cases, operating bodies for the facilities are not organized or non-functioning. Order-less private tapping to transmission line (spring water source) are also found at some Level I facilities, which caused insufficient water supply/water pressure.

Beneficiaries still rely on LGUs even for a simple replacement of parts (such as gasket). As for existing public Level-I, barangay council takes care of O&M using IRA allotted to barangay. In cases that major repair is required (replacement of hand pump unit/major parts), the barangay council submits barangay resolution of request for repairing to the municipal government. The municipal government assists them in case financial sources are secured. Beneficiaries contribute free labor.

Considering the current situation of beneficiaries, LGUs shall lead them to recognize the need of formation of association and participation for sound O&M of the facilities. Information dissemination to beneficiaries is a requisite.

(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 in nearby potential pollution sources, such as septic tank and piggery. (The Code on Sanitation requires a minimum distance of 25m between water source and pollution sources.)

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

(2) Non-functioning/abandoned wells

There are a lot of non-functioning public wells in the province as shown in Table 4.1.6.

Table 4.1.6 Operating Status of Existing Wells in the Province

Operating Status	Unit	Public Facility		Private Facility		Total
		Deep Well	Shallow Well	Deep Well	Shallow Well	
Functioning	No.	474	1,605	619	4,119	6,817
	Percent	68	84	93	97	91
Non-Functioning	No.	228	303	46	112	689
	Percent	32	16	7	3	9
Total Number		702	1,908	665	4,231	7,506

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

For Level I facilities, the BWSAs or beneficiaries have responsibility on O&M, however, it is almost negligible. This can be gleaned from the presence of numerous non-functioning/abandoned wells constructed by DPWH. These conditions arise from lack of spare parts, drying up of water source and water quality problems such as colored water.

Among others, deep wells usually necessitate repair/replacement of mechanical parts and re-development of the well itself. Apart from the same problems as deep wells, shallow wells have primary disadvantages such as the use of shallow aquifer which is easily affected by surrounding environmental conditions and the simple construction method applied (driving well point) that makes rehabilitation works difficult.

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

4.1.6 Water Supply Service Coverage

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

The present population of the municipalities as of 1998, base year for planning purpose, was estimated referring to NSO population census results (1980, 1990 and 1995) and 1995 Census-based Regional and Provincial Population projection prepared by NSO. Details are referred to Section 8.3.1 Population Projection.

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

Service percentage/population by Level III and Level II systems was estimated based on the questionnaire survey results.

- Unserved population was estimated using the percentages of unserved households to the total number of households by urban and rural area based on questionnaire and the 1990 population census data; "Households by Main Source of Drinking Water and City/Municipality" with modification of maximum 20% referring to the previous results.
- The rest of the population was considered served by Level I facilities assuming that 50% of private facilities was shared by neighbors to supplement insufficiency of public facilities.

Average number of households sharing at each Level I public/private facility was calculated at an average of 8 households/facility under the above assumptions (details are referred to in Supporting Report).

Table 4.1.7 presents the profile of the service coverage in terms of served, underserved and unserved. As a provincial total, 58% of the population is adequately served (75% of urban population and 54% of rural population).

The percentage of underserved population is estimated at 35% of the total population (18% of urban population and 35% of rural population) who are depending on unsafe sources/facilities.

The provincial service coverage at present is exhibited in Figure 4.1.1 (details are referred to Supporting Report).

Among different service levels, Level I water supply facilities have predominant service coverage in most of all municipalities in the province.

Percentage shares of population coverage by Level I public and private facilities in rural water supply are estimated at 79% and 21%, respectively (details are referred to in Supporting Report).

Level III systems take a major part of service coverage in urban water supply in limited municipalities/city, such as Roxas City (58% of urban population), Panay (57%) and Pontevedra (57%).

With regard to Level II system in rural areas, more or less 2% of service coverage were observed in some municipalities. Presently, piped system including Level III systems have not been fully developed in the entire province (12% for Level II and 2% for Level III systems).

Taking into account the municipal service coverage, of the 17 municipalities/city of the province, 8 are above the average provincial service coverage of 58% in terms of served population. The highest coverage is seen in Roxas City at 83% (93% for urban and 75% for

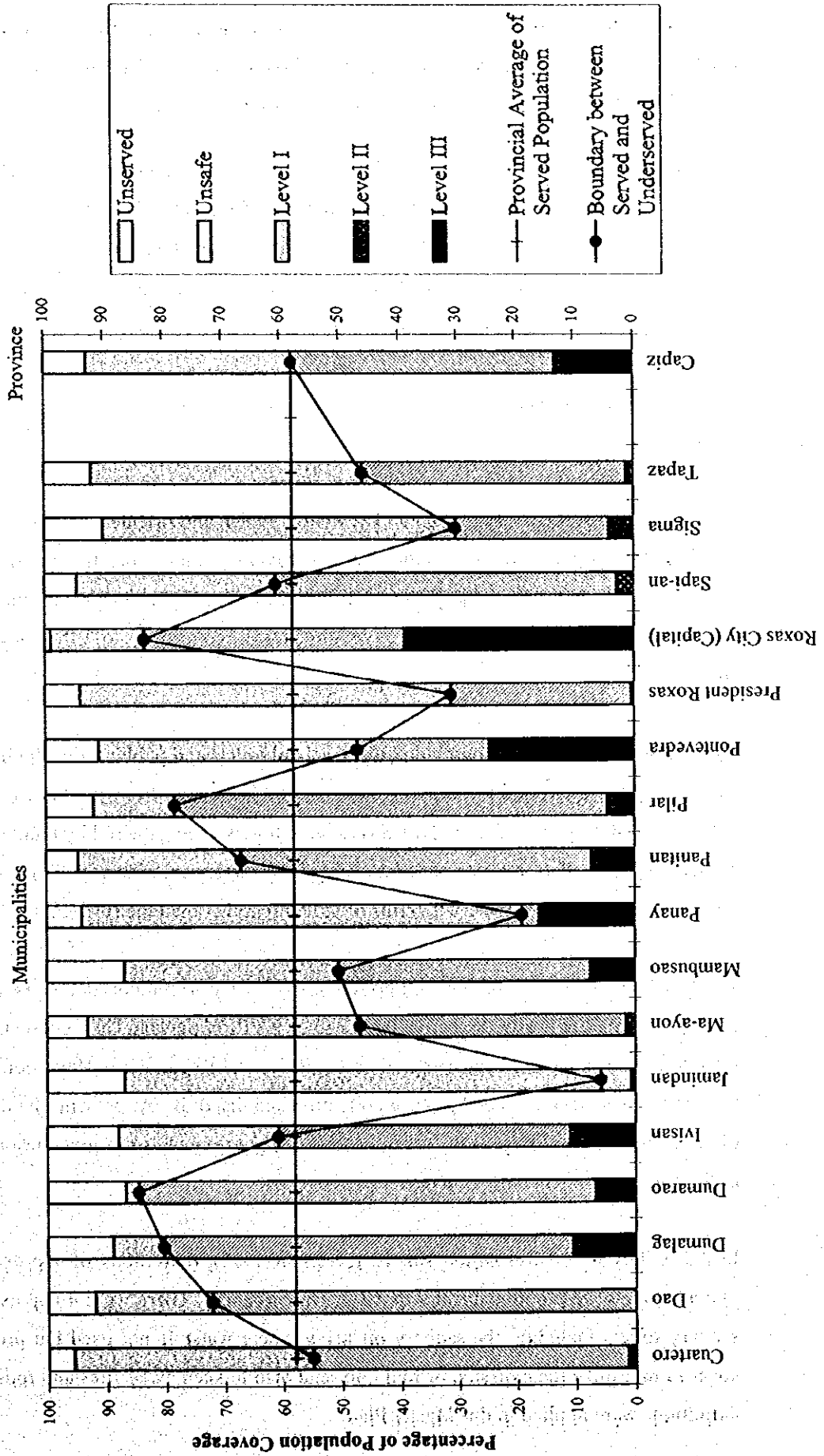
Table 4.1.7 Water Supply Service Coverage by Municipality

Name of Municipality/ City	Area	Population (1998)	Population Coverage						Percentage of Population Coverage							
			Served by Safe Source			Underserved/Unservd			Served by Safe Source			Underserved/Unservd				
			Level III	Level II	Level I	Total	Unsafe Source	Unservd	Total	Level III	Level II	Level I	Total	Unsafe Source	Unservd	Total
Cuartero	Urban	3,894			1,774	1,774	1,847	273	2,120			46	46	47	7	54
	Rural	25,529	402	13,981	14,383	10,127	1,019	11,146		2	55	56	40	4	44	
	Total	29,423	402	15,755	16,157	11,974	1,293	13,266		1	54	55	41	4	45	
Dao	Urban	5,646		3,864	3,864	1,328	454	1,782			68	68	24	8	32	
	Rural	24,000		17,548	17,548	4,534	1,918	6,452			73	73	19	8	27	
	Total	29,646		21,412	21,412	5,863	2,372	8,234			72	72	20	8	28	
Dumalag	Urban	3,193		2,841	2,841		352	352			89	89		11	11	
	Rural	27,352	2,465	18,464	21,704	2,640	3,008	5,648	9	3	68	79	10	11	21	
	Total	30,545	2,465	21,305	24,545	2,640	3,361	6,000	8	3	70	80	9	11	20	
Dumarao	Urban	5,447		2,309	4,274	83	1,090	1,173	35	1	42	78	2	20	22	
	Rural	33,767	340	28,215	28,905	808	4,054	4,862	1	1	84	86	2	12	14	
	Total	39,214	2,230	30,524	33,179	891	5,144	6,035	6	1	78	85	2	13	15	
Ivisan	Urban	4,632		1,687	2,972	922	738	1,660	28		36	64	20	16	36	
	Rural	19,098	655	10,117	11,447	5,551	2,100	7,651	3	4	53	60	29	11	40	
	Total	23,730	1,940	11,804	14,419	6,473	2,838	9,311	8	3	50	61	27	12	39	
Jaminand	Urban	2,516		722	722	1,466	327	1,794			29	29	58	13	71	
	Rural	36,235		1,232	1,532	29,995	4,708	34,703		1	3	4	83	13	96	
	Total	38,751		1,954	2,254	31,462	5,035	36,497		1	5	6	81	13	94	
Mayon	Urban	4,578		2,422	2,422	1,605	551	2,156			53	53	35	12	47	
	Rural	26,410		11,636	12,136	12,691	1,583	14,274		2	44	46	48	6	54	
	Total	30,988		14,059	14,559	14,296	2,134	16,429		2	45	47	46	7	53	
Mambusao	Urban	6,492		1,944	4,119	1,527	846	2,373	34		30	63	24	13	37	
	Rural	31,068	10	14,196	14,866	12,166	4,036	16,202	0	2	46	48	39	13	52	
	Total	37,560	2,185	16,140	18,985	13,693	4,882	18,575	6	2	43	51	36	13	49	
Panay	Urban	2,969		25	1,710	1,079	180	1,259	57		1	58	36	6	42	
	Rural	38,031		1,166	6,126	29,623	2,282	31,905	13		3	16	78	6	84	
	Total	41,000		1,191	7,836	30,702	2,462	33,164	16		3	19	75	6	81	
Pantian	Urban	2,638		825	1,820	530	288	818	38		31	69	20	11	31	
	Rural	31,224	840	19,394	20,859	8,805	1,559	10,365	3	2	62	67	28	5	33	
	Total	33,862	1,835	20,219	22,679	9,335	1,848	11,183	5	2	60	67	28	5	33	
Pilar	Urban	5,117		3,026	3,886	465	766	1,231	17		59	76	9	15	24	
	Rural	32,055	195	24,365	25,225	4,584	2,246	6,830	1	2	76	79	14	7	21	
	Total	37,172	1,055	27,391	29,111	5,049	3,011	8,061	3	2	74	78	14	8	22	
Pontevedra	Urban	6,427		380	4,060	1,789	578	2,367	57		6	63	28	9	37	
	Rural	33,126	3,400	2,628	8,585	14,613	15,534	2,979	18,513	10	8	26	44	47	56	
	Total	39,553	7,080	8,964	18,672	17,323	3,558	20,881	18	7	23	47	44	9	53	

Table 4.1.7 Water Supply Service Coverage by Municipality (Cont'd)

Name of Municipality/ City	Area	Population (1998)	Population Coverage						Percentage of Population Coverage							
			Served by Safe Source			Underserved/Unservd			Served by Safe Source			Underserved/Unservd				
			Level III	Level II	Level I	Total	Unsafe Source	Unservd	Total	Level III	Level II	Level I	Total	Unsafe Source	Unservd	Total
President Roxas	Urban	6,615			2,769	2,769	3,447	399	3,846			42	42	52	6	58
	Rural	18,736		125	4,997	5,122	12,490	1,124	13,614		1	27	27	67	6	73
	Total	25,351		125	7,766	7,891	15,937	1,523	17,460		0	31	31	63	6	69
Roxas City (Capital)	Urban	59,024	33,945		20,946	54,891	3,542	591	4,133	58		35	93	6	1	7
	Rural	71,743	16,315	948	36,751	54,014	17,014	716	17,729	23	1	51	75	24	1	25
	Total	130,767	50,260	948	57,697	108,905	20,555	1,306	21,862	38	1	44	83	16	1	17
Sapi-an	Urban	4,038			1,376	1,376	2,338	324	2,662			34	34	58	8	66
	Rural	19,055		660	12,017	12,677	5,427	950	6,378		3	63	67	28	5	33
	Total	23,093		660	13,394	14,054	7,765	1,274	9,039		3	58	61	34	6	39
Sigma	Urban	2,248			674	674	1,124	450	1,574			30	30	50	20	70
	Rural	24,264		1,100	6,232	7,332	14,748	2,185	16,932		5	26	30	61	9	70
	Total	26,512		1,100	6,906	8,006	15,872	2,634	18,506		4	26	30	60	10	70
Tapaz	Urban	2,135			1,747	1,747	218	170	388			82	82	10	8	18
	Rural	38,674		500	16,576	17,076	18,505	3,093	21,598		1	43	44	48	8	56
	Total	40,809		500	18,323	18,823	18,723	3,262	21,986		1	45	46	46	8	54
Provincial Total	Urban	127,609	46,515	75	49,331	95,921	23,311	8,376	31,688	36	0	39	75	18	7	25
	Rural	530,367	29,180	10,913	245,472	285,565	205,242	39,560	244,802	6	2	46	54	39	7	46
	Total	657,976	75,695	10,988	294,803	381,486	228,553	47,937	276,490	12	2	45	58	35	7	42

Figure 4.1.1 Water Supply Coverage of the Province



rural area), followed by Dumarao at 85% (79% for urban and 86% for rural area), Dumalag at 80% (89% for urban and 80% for rural area), Pilar at 78% (78% for urban and 78% for rural area) and Dao at 74% (73% for urban and 74% for rural area).

In contrast to the above, 9 municipalities are below the provincial average. The lowest is Jamindan at 7% (urban 29%, rural 5%), followed by Panay at 19% (urban 58%, rural 16%), Sigma at 30% (urban 30%, rural 30%) and President Roxas at 31% (urban 42%, rural 27%). The low coverage of these municipalities is considered to arise from a large number of underserved population using unsafe water sources.

4.2 Sanitation and Sewerage

4.2.1 General

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

This sub-sector focuses on household toilets, school toilets and public toilets (public markets, bus/jeepney terminals and parks/playgrounds). The latest data from the PHO on household and public toilets as well as from DECS on school toilets were gathered by municipality. For household toilets, data were compiled 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 (Implementing Rules and Regulations, 1995) defines alternatives for on-site sanitation and sewage collection and disposal. At present, the development of sewerage systems, even in the urban centers of the province is not given priority because of the huge investment cost it entails.

In the NEDA Board Resolution No. 12 (series of 1995), definitions of approved types of sanitary toilets were outlined (refer to 4.1.2, Data Report). There were 4 approved types of sanitary toilets including the sanitary pit privy where water is not used but provided with cover to minimize the emission of foul odor and also to keep away flies and rodents. These definitions were applied in this Master Plan.

4.2.2 Types of Facilities and Definition of Service Level Standard

As set forth in the above-mentioned Resolution, 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 pit or septic tanks/vaults, and ventilated improved pit latrines and sanitary pit privy (dry type) considering its low construction cost especially in rural areas and in areas where water is scarce; and 2) unsanitary facilities - include the types of facilities used for receiving and disposing human waste which do not fall under the category of approved types of toilet facilities such as open pit privy and over-hung latrines (refer to Figure 4.2.1 DOH standard structure of a household toilet that meets the minimum requirements of a sanitary facility, Supporting Report).

In terms of service level, households are classified into: 1) served households - households with at least one (1) sanitary toilet; 2) underserved households - households with unsanitary toilets; and 3) unserved households - households without toilet. Coverage of adequately served households (with sanitary toilets) was estimated by urban and rural area of municipalities. The remaining households were considered as underserved or unserved. The service coverage was determined using the estimated number of households in 1998.

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 40 students with access to sanitary toilets (number of sanitary toilet units multiplied by 40); and (2) underserved or unserved students - those with unsanitary and without toilet facilities, and students unserved (based on the standard ratio) even though they have access to sanitary toilets. Service coverage of adequately served students was estimated both for public and private schools by municipality. Figure 4.2.2, Supporting Report shows a standard structure of a school toilet facility adopted by the DOH through the JICA-DPWII 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 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. Figure 4.2.3, Supporting Report shows a standard structure of a public toilet facility adopted by the DOH.

4.2.3 Sanitation Facilities and Service Coverage

(1) Household Toilets

The service coverage of sanitary toilets in the province is 78% of the total number of households. The rest is underserved or unserved. Of this, about 14% is without toilet facility (refer to 4.2.1, Supporting Report and 4.2.3, Sanitation Facilities and Service Coverage, Data Report).

Municipalities that have higher or equal service coverage from the provincial average of 70% are Roxas City (95%), Dao (90%), Jamindan, Mambusao, Pilar and Pontevedra (89%), Dumalag (85%), Panay (83%), President Roxas (82%), Sapi-an (81%) and Dumarao (78%). On the other hand, the first 3 municipalities that registered the lowest service coverage are Cuartero (18%), Panitan (33%) and Tapaz (45%). It was observed that in municipalities/city that have high water supply service coverage (Roxas City, Pilar, Dumarao), high sanitation coverage occurs and correspondingly, in low water supply service coverage (Tapaz, Cuartero), low sanitation coverage occurs. This can be attributed by the fact that the development of water supply almost always follows the upgrading of the household sanitation facilities because of access to water.

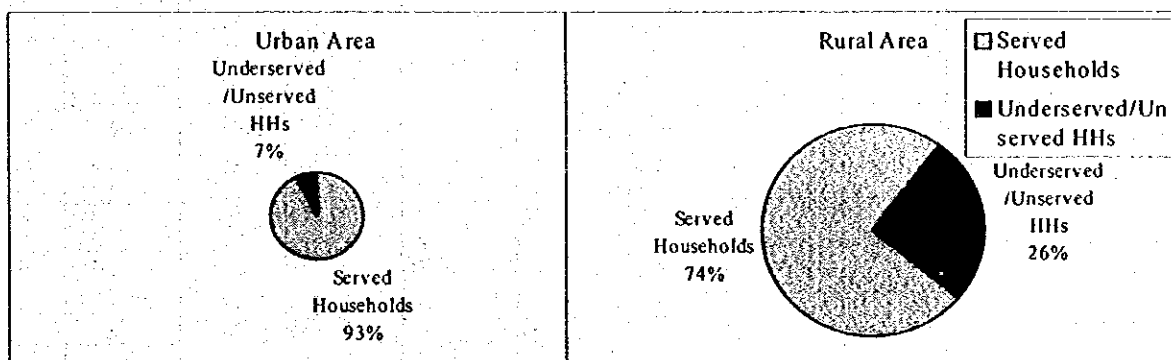
In urban areas, about 93% of the total household are served. A lower served household of 74% exists in rural area. Table 4.2.1 shows the municipal breakdown in the number of urban and rural household toilets by category, and service coverage. Figure 4.2.1 reflects the provincial service coverage of household toilet facilities for urban and rural areas.

Even if high percentages of sanitary toilets are revealed in urban areas, 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. Sullage waste management is unheard of.

Table 4.2.1 Sanitation Facilities and Service Coverage of Household Toilets, Urban and Rural, 1998

Municipality City	No. of Households, 1998			Household Toilet Facilities and Service Coverage											
	Urban	Rural	Total	Urban				Rural				Municipal Total			
				HHs Served by Sanitary Toilets		Underserved/Un-served HHs		HHs Served by Sanitary Toilets		Underserved/Un-served HHs		HHs Served by Sanitary Toilets	Underserved/Un-served HHs		
				Number	% of HHs	Number	% of HHs	Number	% of HHs	Number	% of HHs	Number	% of HHs		
Cuartero	712	4,509	5,222	676	95	36	5	271	6	4,238	91	917	18	4,274	82
Dao	1,034	4,716	5,799	1,009	93	75	7	4,206	89	510	11	5,215	90	585	10
Dumalag	577	5,025	5,602	383	66	194	34	4,364	87	661	13	4,747	85	855	15
Dumarao	1,123	6,724	7,847	1,047	93	76	7	5,056	75	1,658	25	6,113	78	1,734	22
Ivisan	865	3,753	4,618	804	93	61	7	2,540	68	1,213	32	3,344	72	1,274	28
Jamindan	508	6,934	7,442	490	96	18	4	6,146	89	788	11	6,636	89	806	11
Ma-ayon	900	5,079	5,979	845	94	55	6	3,584	71	1,495	29	4,429	74	1,550	26
Mambusao	1,173	6,134	7,307	1,081	92	92	8	5,392	88	742	12	6,473	89	834	11
Panay	589	6,934	7,522	568	97	20	3	5,699	82	1,235	18	6,267	83	1,255	17
Panitan	503	5,951	6,454	385	77	118	23	1,742	29	4,209	71	2,127	33	4,327	67
Pilar	1,036	6,198	7,234	918	89	118	11	5,498	89	700	11	6,416	89	818	11
Pontevedra	1,127	6,190	7,317	960	85	167	15	5,528	89	662	11	6,488	89	829	11
President Roxas	1,277	3,559	4,836	974	76	303	24	2,991	84	568	16	3,965	82	871	18
Roxas City	11,556	13,583	25,139	11,281	98	275	2	12,714	94	869	6	23,995	95	1,144	5
Sapi-an	806	3,657	4,463	742	92	64	8	2,895	79	762	21	3,637	81	826	19
Sigma	447	4,736	5,183	383	86	64	14	3,463	73	1,273	27	3,846	74	1,337	26
Tapaz	403	7,890	8,293	371	92	32	8	3,392	43	4,498	57	3,763	45	4,530	55
Provincial Total	24,683	101,574	126,257	22,917	93	1,768	7	75,491	74	26,081	26	98,408	78	27,849	22

Figure 4.2.1 Provincial Service Coverage of Household Toilet Facilities, 1998



(2) School and Public Toilets

Toilet facilities in elementary and secondary schools for both public and private schools were investigated. The province has a total of 1,112 toilet units found in 514 schools. Sanitary toilets adequately serve 24% of the students. The rest, 76% is underserved or unserved. Meanwhile, sanitary toilets adequately serve 23% of the public school students. Table 4.2.2 provides the number and service coverage of school toilet facilities.

The number of sanitary school toilets is low to meet the service level standard of 40 students per sanitary facility. At present, the average ratio is about 165 students per sanitary toilet, which is well above the standard level. A number of school toilets are not being used due to lack of water supply, destroyed plumbing fixtures and water tank seepage.

Proper operation and maintenance are not usually done. In some areas, this problem is compounded when access to the sanitary facility is limited to only the teachers.

DECS is currently promoting the practice of having one toilet within the classroom. This practice should be thoroughly reviewed with respect to maintaining sanitary condition, provision of water faucet/supply in every toilet/unit, proper design of depository to avoid groundwater pollution, and provision of regular sludge collection and disposal.

Table 4.2.2 School Toilet Service Coverage by Municipality

Municipality/City	Number of School	Total No. of Student	Number of Toilet		Service Coverage				
			Sanitary	Unsanitary	Served	%	Unserved	%	
Quartern	Public	22	6,699	16		640	10	6,059	90
	Private								
	Total	22	6,699	16		640	10	6,059	90
Dao	Public	21	6,146	24		960	16	5,186	84
	Private	1	495	2		80	16	415	84
	Total	22	6,641	26		1,040	16	5,601	84
Dumalag	Public	20	5,510	40	4	1,600	29	3,910	71
	Private	2	222	2		80	36	142	64
	Total	22	5,732	42	4	1,680	29	4,052	71
Dumarao	Public	34	10,120	98	29	3,920	39	6,200	61
	Private	4	781	4	2	160	20	621	80
	Total	38	10,901	102	31	4,080	37	6,821	63
Ivisan	Public	16	6,269	36		1,440	23	4,829	77
	Private								
	Total	16	6,269	36		1,440	23	4,829	77
Jamindan	Public	36	9,196	62		2,480	27	6,716	73
	Private								
	Total	36	9,196	62		2,480	27	6,716	73
Ma-ayon	Public	34	9,600	80		3,200	33	6,400	67
	Private								
	Total	34	9,600	80		3,200	33	6,400	67
Mambusao	Public	33	7,311	41	39	1,640	22	5,671	78
	Private	2	604	6		240	40	364	60
	Total	35	7,915	47	39	1,880	24	6,035	76
Panay	Public	31	8,778	30	32	1,200	14	7,578	86
	Private								
	Total	31	8,778	30	32	1,200	14	7,578	86
Panitan	Public	27	8,282	54		2,160	26	6,122	74
	Private								
	Total	27	8,282	54		2,160	26	6,122	74
Pilar	Public	27	10,277	52		2,080	20	8,197	80
	Private								
	Total	27	10,277	52		2,080	20	8,197	80
Pontevedra	Public	22	10,201	46		1,840	18	8,361	82
	Private	2	455	14		455	100		
	Total	24	10,656	60		2,295	22	8,361	78
President Roxas	Public	19	6,224	32		1,280	21	4,944	79
	Private	4	1,456	12		480	33	976	67
	Total	23	7,680	44		1,760	23	5,920	77
Roxas City (Capital)	Public	47	27,754	159		6,360	23	21,394	77
	Private	12	2,184	24		960	44	1,224	56
	Total	59	29,938	183		7,320	24	22,618	76
Sapi-an	Public	23	6,237	48		1,920	31	4,317	69
	Private								
	Total	23	6,237	48		1,920	31	4,317	69
Sigma	Public	23	4,873	32		1,280	26	3,593	74
	Private								
	Total	23	4,873	32		1,280	26	3,593	74
Tapaz	Public	51	10,472	53	35	2,120	20	8,352	80
	Private	1	347	4		160	46	187	54
	Total	52	10,819	57	35	2,280	21	8,539	79
Provincial Total	Public	486	153,949	901	139	36,120	23	117,829	77
	Private	28	6,544	68	2	2,615	40	3,929	60
	Total	514	160,493	971	141	38,735	24	121,758	76

There are 61 public toilets found in public markets, bus/jeepney terminals and parks/playgrounds in the province. About 92% of these public toilets are sanitary, while only 10% is considered unsanitary. Table 4.2.3 shows the number and service coverage of public utilities.

Public toilets at markets, bus/jeepney terminals and parks/playgrounds, although culturally acceptable, are improperly used and maintained resulting to 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 considered as sanitary because of the structure, most of the facilities have unsanitary conditions due to inadequate/lack of water supply and destroyed appurtenances because of vandalism.

Table 4.2.3 Public Toilet Facilities and Service Coverage in 1998

Municipality/City	Number of Sanitary Toilet			Number of Unsanitary Toilet			Total Number of PU Toilet	Served		Underserved	
	Public Market	Bus/Jeepney Terminal	Parks/ Playground	Public Market	Bus/Jeepney Terminal	Park/ Play-ground		Number of Sanitary Toilet	%	Number of Unsanitary Toilet	%
Cuartero	2						2	2	100		
Dao	2		2				4	4	100		
Dumalag	2		2				4	4	100		
Dumarao	1					2	3	1	33	2	67
Ivisan	2						2	2	100		
Jamindan	2		2				4	4	100		
Ma-ayon	2		2				4	4	100		
Mambusao	1			1		2	4	1	25	3	75
Panay	2						2	2	100		
Panitan	2		2				4	4	100		
Pilar	2						2	2	100		
Pontevedra	2						2	2	100		
President Roxas	2						2	2	100		
Roxas City	10	3					13	13	100		
Sapi-an	2						2	2	100		
Sigma	2						2	2	100		
Tapaz	2		2				5	5	100		
Provincial Total	41	3	12	1		4	61	56	92	5	8

4.2.4 Sewerage Facilities

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