Chapter 1

INTRODUCTION

1. INTRODUCTION

1.1 Sector Development in the Philippines

The Government of the Philippines (GOP) has, over the last decade, with the assistance from external donors, made considerable progress in developing the water supply and sanitation sector. 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 Iloilo 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 Iloilo

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

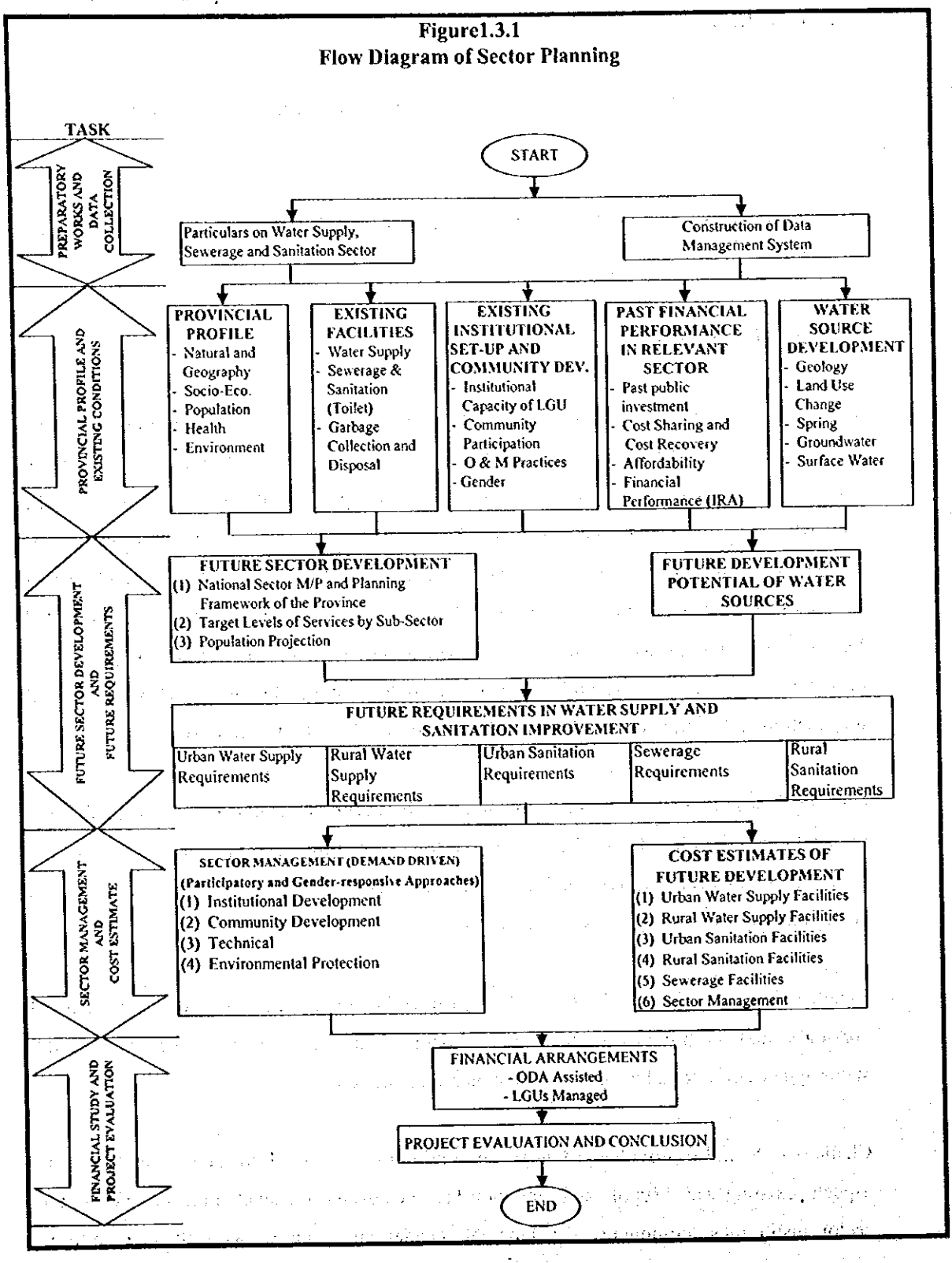
The PW4SP is a framework plan that would serve as the basis for the future implementation work in the sector. It will be carried out either as large-scale projects funded by international agencies or as a small size project carried out by local parties. It should be noted that the PW4SP is a sector development 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.

Figure1.3.1
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:
[1] Based on the Updated MTPDP targets for 1998.
[2] Based on the long-term targets set in the previous National Sector Master Plan (NSMP).
[3] Excluding Metro Manila and its outlying areas.
[4] Includes only point sources.
[5] Service 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.

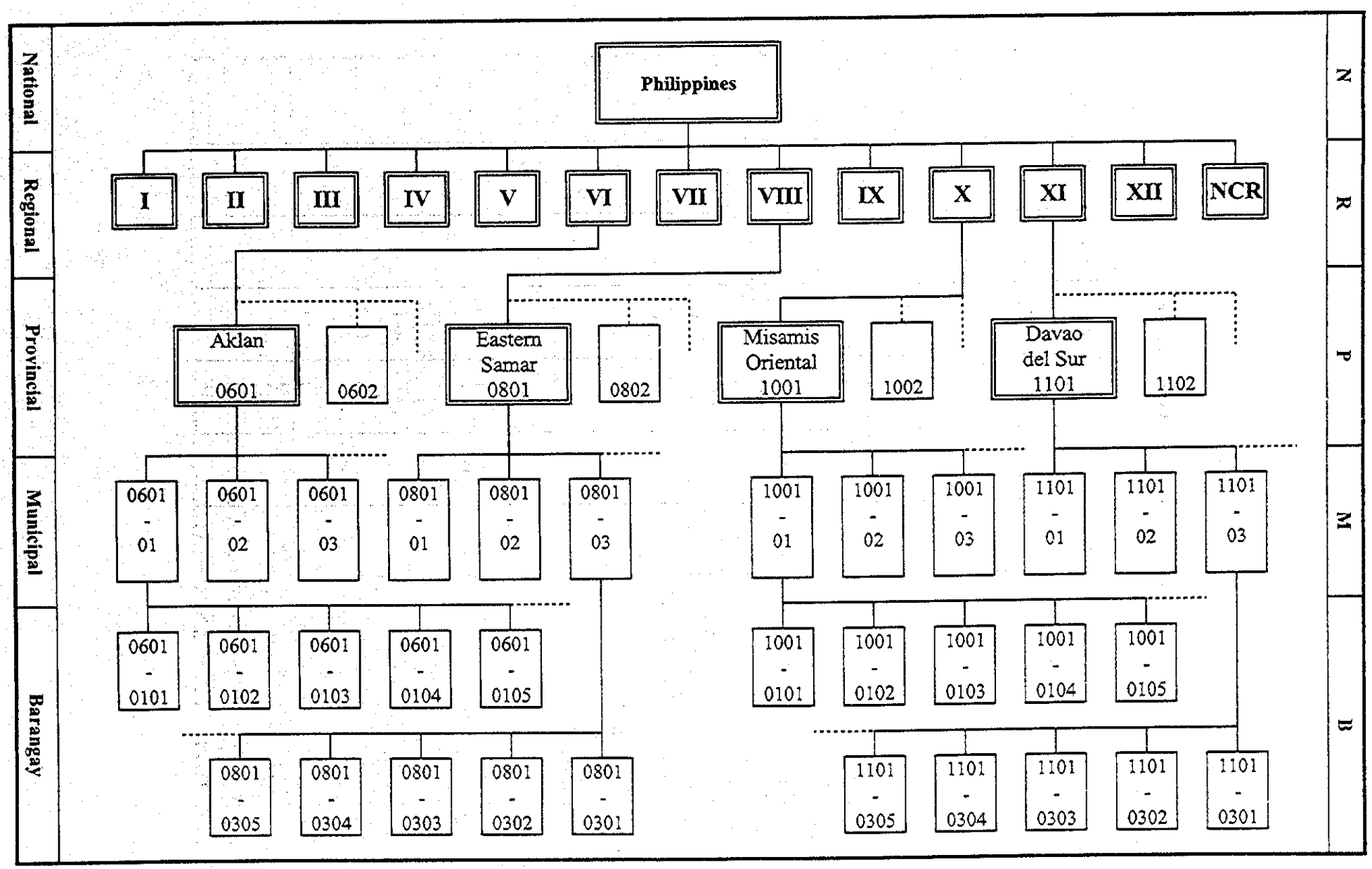


Figure 2.6.1 Institutional Hierarchical System by the NEDA Coding

Table 2.6.2 Structure of Questionnaire

Grouping of Questionnaire	Questionnaire to be addressed						
	National	Regional	Provincial	Municipal	Barangay	System	Independent
	N	R	P	M	B	S	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			
			P1.3.2	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

Chapter 3

PROVINCIAL PROFILE

3. PROVINCIAL PROFILE

3.1 General

Iloilo Province occupies the southern and northeastern portion of Panay Island and belongs to Region VI, the Western Visayas Region. Iloilo City, a highly urbanized independent city is the provincial capital as well as the designated regional center. The province is bounded by Capiz and Jintotolo Channel in the north, by Panay Gulf and Iloilo Strait in the east, Antique in the west and Guimaras Strait in the south as shown in the Location Map.

The province is classified as 1st class and has a total land area of 4,663.42km^2 (excluding Iloilo City) that is almost 1.55% of the Philippine total land area of about 300,000km^2. It is composed of 42 municipalities and 1 component city, Passi City. From the 1995 NSO records, the province has 1,721 barangays, of which 266 are urban and 1,455 are rural. Provincial total population was 1,415,022 in 1995. About 79% of the population reside in rural areas, while the remaining 21% are in urban areas. At present, there are 15 water districts and 14 LGU/association managed Level III water supply systems that are operating in the province. Table 3.1.1 presents the breakdown per municipality of land area, population and density, as well as administrative composition.

3.2 Natural Conditions and Geographical Features

3.2.1 Meteorology

The province has 2 types of climate under the Coronas classification: Type I, which is experienced in the southern part and Type III, in the northern part. Type I is characterized by two pronounced seasons, dry from December to May and wet from June to November, while Type III has no very pronounced maximum rain period, with a short dry season lasting only from one to three months as reflected in the Location Map. From the 5 years average (1994-1998) rainfall record of PAGASA, the average annual rainfall was registered at 2,290.3mm. The northern monsoon prevails during the dry season, while the southern monsoon dominates during the rainy season.

3.2.2 Land Use

Remaining forest area constitutes a mere 15% of the total land area of the province located mostly in the western cordillera mountain ranges. Agricultural land occupies 74%, including

the built-up area. Primary settlements are concentrated along the major transport routes and coastal areas.

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
Ajuy	4th	193.46	38,415	199	1	33	34
Alimodian	4th	144.80	29,179	202	1	50	51
Anilao	5th	75.38	20,711	275	1	20	21
Badiangan	5th	77.50	22,795	294	1	30	31
Balasan	5th	41.00	22,949	560	2	21	23
Banate	4th	118.86	24,976	210	1	17	18
Barotac Nuevo	3rd	94.49	40,968	434	2	27	29
Barotac Viejo	4th	142.30	33,652	236	1	25	26
Batad	5th	44.76	15,345	343	1	23	24
Bingawan	5th	85.00	11,494	135	1	13	14
Cabatuan	4th	82.48	42,264	512	68		68
Calinog	3rd	232.80	45,452	195	4	55	59
Carles	4th	112.02	46,218	413	1	32	33
Concepcion	4th	97.02	30,111	310	1	24	25
Dingle	4th	77.50	35,639	460	4	29	33
Dueñas	4th	90.52	28,954	320	5	42	47
Dumangas	3rd	116.77	51,092	438	5	40	45
Estancia	4th	31.97	30,673	959	3	22	25
Guimbal	5th	44.48	26,316	592	11	22	33
Igbaras	4th	152.43	25,960	170	6	40	46
Janiuay	3rd	179.10	50,066	280	16	44	60
Lambunao	3rd	246.92	58,792	238	2	71	73
Leganes	4th	32.16	19,235	598	5	13	18
Lemery	5th	119.90	20,863	174	2	29	31
Leon	4th	140.13	41,043	293	1	84	85
Maasin	4th	156.58	29,364	188	4	46	50
Miagao	3rd	132.86	52,276	393	7	112	119
Mina	5th	43.35	16,419	379	2	20	22
New Lucena	5th	44.12	16,873	382	1	20	21
Oton	3rd	84.56	56,821	672	37		37
Passi City	2nd	250.68	59,539	238	2	49	51
Pavia	4th	35.02	26,756	764	5	13	18
Pototan	3rd	91.31	56,340	617	10	40	50
San Dionisio	4th	126.77	25,263	199	1	28	29
San Enrique	4th	87.72	25,576	292	2	26	28
San Joaquin	4th	231.35	44,368	192	6	79	85
San Miguel	5th	21.34	18,819	882	19	5	24
San Rafael	5th	145.78	12,000	82	1	8	9
Santa Barbara	4th	77.48	39,667	512	6	54	60
Sara	4th	183.00	38,652	211	3	39	42
Tigbauan	4th	60.62	47,158	778	9	43	52
Tubungan	5th	34.60	18,450	533	3	45	48
Zarraga	5th	82.53	17,519	212	2	22	24
Provincial Total	1st	4,663.42	1,415,022	303	266	1,455	1,721

Note: Iloilo City, a highly urbanized independent city, is excluded from the PW4SP study area.

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	70,339	15
Grassland	0	0
Built-up	0	0
Agricultural*	346,117	74
Fishponds, Mangrove, Inland Water Area	14,698	3
Openlands	35,187	8
Provincial Total	466,341	100

Note: * Including built up area

3.2.3 Topography and Drainage

The relief of the province varies from level plains to rolling lands in the eastern part and hills to mountain peaks in the western part. Level areas are not extensive and are found mostly in the southeastern part as broad level bottoms along the rivers. On the west are rugged highlands commonly known as the western cordillera, while on the east are rolling hills along the coast dotted by small basins which discharge into the Guimaras Strait. In the eastern edge of the province, there are several volcanic islets. Of these islets, Bacot Island and Bulobadiangan Island with their peaks of 574m and 235m, respectively are classified as inactive volcanoes.

In general, the whole province is dotted with long and narrow meandering rivers and is well drained. Some of the large rivers are dammed either for irrigation purposes or for domestic water supplies. Destructive floods oftentimes occur on the lower plains whenever there is heavy rain over the watershed of these rivers. Major drainage systems are Jalaur, Jaro and Sibalom Rivers and their tributaries located in the central Iloilo plain.

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	
Jalaur (1)	1,499.0	1,513.0	1,353.5	0.29	None
Jalaur (2)	534.0	1,937.4	1,549.4	0.38	None
Jalaur (3)	169.0	901.2	488.7	1.09	None
Jaro	97.0	190.6	123.2	0.01	Metro Iloilo WD
Sibalom	117.0	412.8	106.0	0.03	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

Suage river was selected for water quality examination. Analyzed river water was turbid and colored. According to the Regional DENR, river waters in the province were classified into the Class B or C limitation of "DENR Fresh Water Quality Criteria". The examination result is referred to 7.5, Data Report.

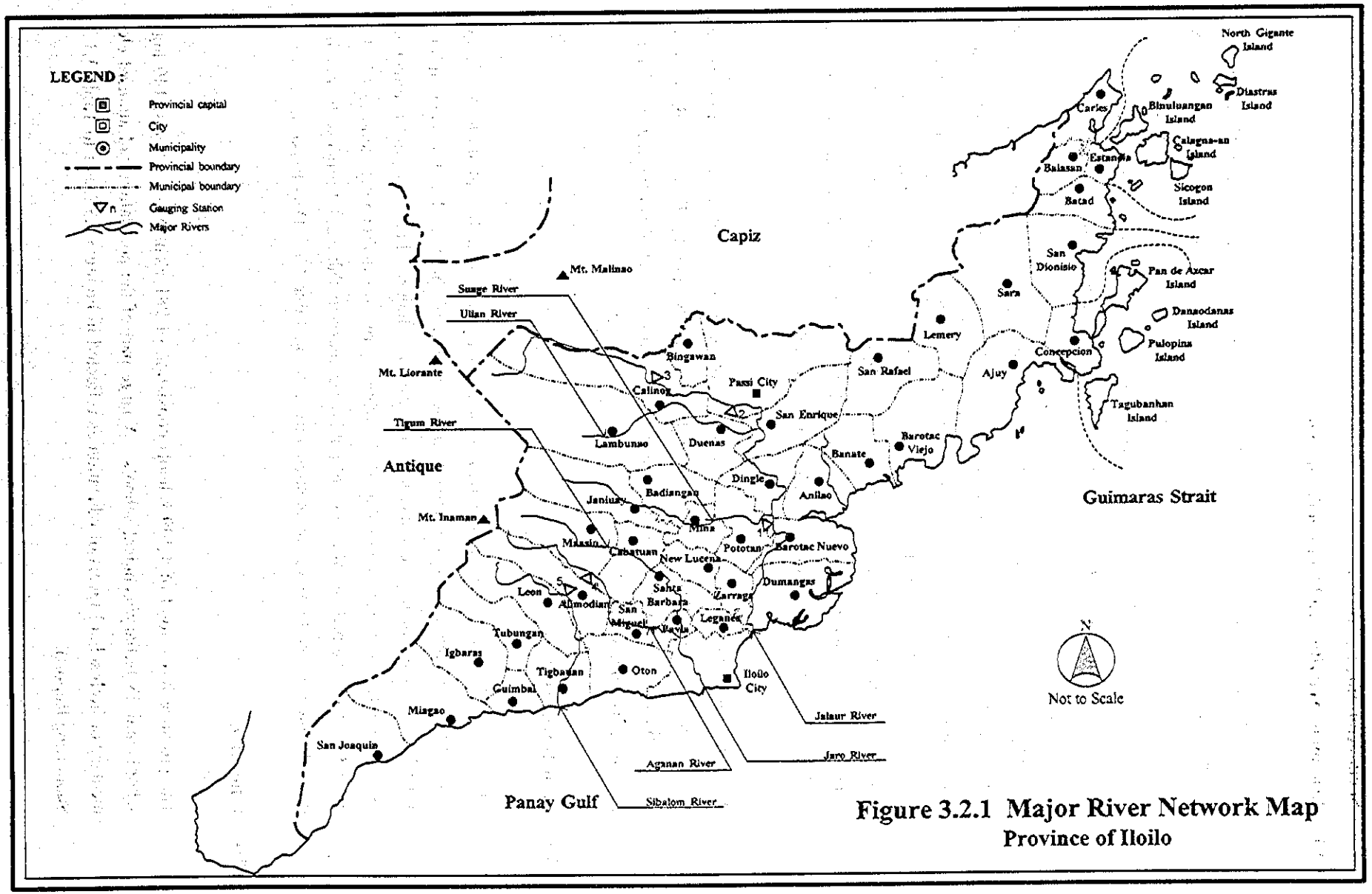


Figure 3.2.1 Major River Network Map
Province of Iloilo

3.3 Socio-economic Conditions

3.3.1 Economic Activities and Household Income

Just like most of the provinces in the country, Iloilo is basically an agricultural province, although the establishment of the Regional Agro-Industrial Center will serve as another stimulus to the economic growth of the province. The major economic activity is still farming. Principal crops cultivated are palay, corn, coconut and sugarcane. Agri-based industries are the production of refined sugar, feeds and processing of marine products.

The NSO Family Income and Expenditures Survey in 1994 showed that the average annual family income of the province was ₱ 58,883 while the expenditure was at ₱ 53,057 or a net saving of ₱ 5,826. Distribution of households by income class in the region and province is shown in Figure 3.3.1 (refer to Table 3.3.1, Supporting Report). Percentages of households of lower income levels were less than the average figures in the region. Based on the established poverty threshold income of ₱ 47,133 in Region VI for 1994, about 46.50% 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 (refer to Table 3.3.2, Supporting Report). By class of worker, those who worked for private business, enterprise or farm had the highest share of 34% as reflected in Figure 3.3.2.

3.3.2 Basic Infrastructure

All municipalities have electric supply, but the service coverage at household level is quite low at 52%. Telephone service is also available in all municipalities. Land transportation is available by means of bus, jeepney, taxi and tricycle. Industrial/business and commercial establishments in the province total to 2,474, while tourism-related facilities total to 47. Table 3.3.1 presents a provincial outline of public services and Table 3.3.2 reflects the number of public facilities and services by municipality (refer to Table 3.3.1, Data Report).

3.3.3 Education

The province has a total of 1,149 schools consisting of 981 elementary schools, 140 high schools and 28 tertiary/technical schools. A large part of the population had attained elementary or high school levels of education as reflected in Figure 3.3.3 (refer to Table 3.3.3, Supporting Report).

Figure 3.3.1 Distribution of Household by Income Class

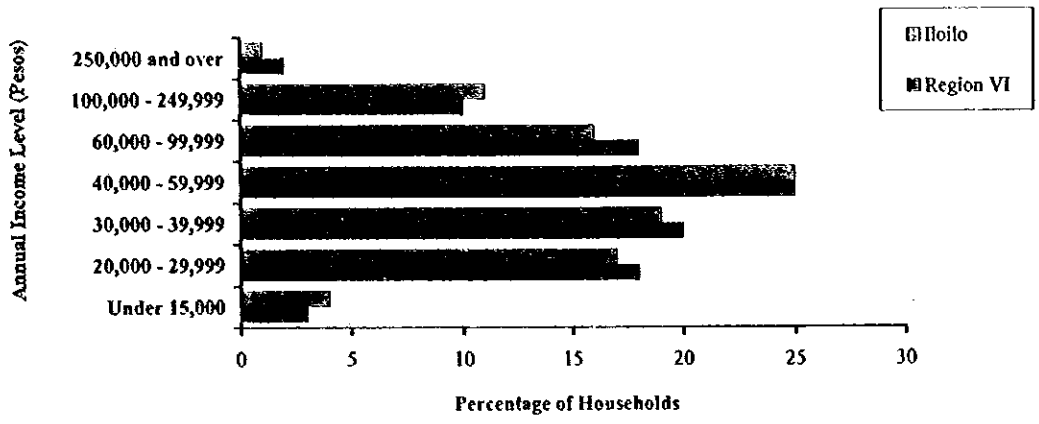


Figure 3.3.2 Population Distribution by Major Industry and Class of Worker

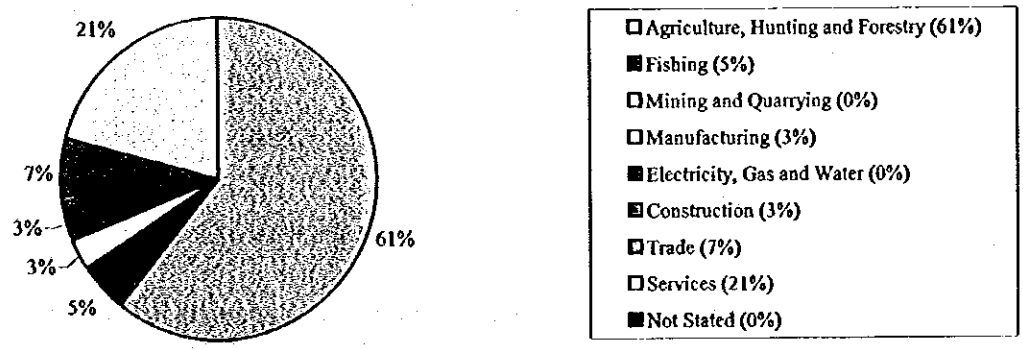


Figure 3.3.3 Population Distribution by Highest Attainment of Education

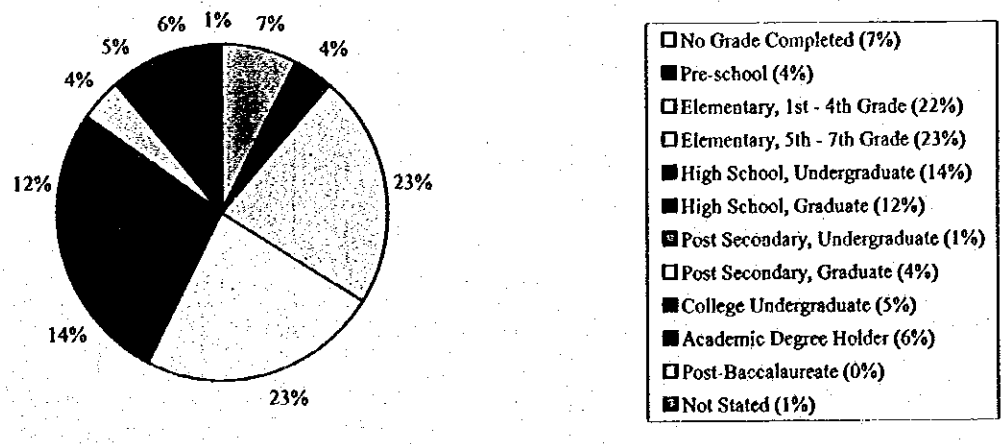


Table 3.3.1 Provincial Outline on Public Services

Item	Unit	Value	Item	Unit	Value
(1) Roads			(8) Tourism facilities	Number	47
a) Total length	Km	4,350.23	(Hotel resort, lodges, recreational		
b) Barangay roads	Percent	59.84	facilities, etc.)		
(2) Electricity service coverage			(9) Schools		
a) Municipality	Percent	100	a) Elementary level	Number	1,002
b) Barangay	Percent	71	b) Secondary level	Number	140
c) Household	Percent	52	c) Tertiary level/Technical	Number	28
(3) Telecommunication Services			(10) Health Facilities		
a) Availability in municipality	Percent	100	a) Hospital	Number	13
b) Telegraph station	Number		b) Main health centers, rural health	Number	406
c) Telephone station	Number	27	units, barangay health center, etc		
(4) Post Office	Number	43	(11) Labor		
			a) Labor force participation ratio	Percent	65.9
(5) Transportation services	Mode	Bus, jeep,	b) Employment rate	Percent	91.2
	(ex. Bus,	taxi, and			
	jeep, taxi,.)	tricycle	(12) Average family income		
			a) Monthly income	Pesos/Month	6,395
(6) Banking Facilities	Number	151	b) Monthly expenditure	Pesos/Month	5,615
a) Private bank	(by Private				
b) Public bank	and public)				
(7) Industrial/business/commercial					
establishment	Number	2,474			

Sources: PSPT, Provincial Socioeconomic Profile Development Plan, 1995Population Census, 1994 Family Income and Expenditures Survey by NSO

Table 3.3.2 Public Facilities and Services by Municipality

Municipality/City	High School			Technical School	College	Hospital	Public Market	Bank and Financing Institution
	Public	Private	Total					
	nos.	nos.	nos.	nos.	nos.	nos.	nos.	nos.
Ajuy	7		7		1		1	1
Alimodian	1		1	1		1	1	1
Anilao	2		2				1	1
Badiangan	2		2				1	1
Balasan	1		1		1	1	1	1
Banate	2		2				1	1
Barotac Nuevo	1	1	2		2	1	1	2
Barotac Viejo	3		3			1	1	1
Batad					1		2	
Bingawan	1		1				2	1
Cabatuan	5		5	1		1	2	1
Calinog	5	1	6		1	1	2	2
Carles	5		5				1	
Concepcion	1		1		1		2	
Dingle	1	2	3		1		1	1
Dueñas	4	1	5				1	
Dumangas	2		2		3	1	2	1
Estancia	2	1	3		1		2	2
Guimbal	4		4			1	2	2
Igbaras	1		1				3	
Janiuay	5	1	6		1	1	2	1

Table 3.3.2 Public Facilities and Services by Municipality

(contd)

Municipality/City	High School			Technical School	College	Hospital	Public Market	Bank and Financing Institution
	Public	Private	Total					
	nos.	nos.	nos.	nos.	nos.	nos.	Nos.	nos.
Lambunao	2		2		2	1	2	
Leganes	3		3				1	1
Lemery	2	1	3		1		1	
Leon	4		4		1		4	
Maasin	6	1	7				5	1
Miagao	4		4		2		1	3
Mina	1		1				1	
New Lucena	4	1	5		1		3	1
Oton	4		4				1	1
Passi City	4		4		1	1	2	4
Pavia	1		1		1		1	1
Pototan	3	2	5		1	1	4	2
San Dionisio	2		2				2	
San Enrique	2		2		1		1	1
San Joaquin	6		6		2		3	1
San Miguel	1		1				1	1
San Rafael	1		1				1	
Santa Barbara	5		5	1			1	2
Sara	4	2	6		1	1	2	3
Tigbauan	8		8				1	1
Tubungan	1		1				1	
Zarraga	2	1	3				1	
Provincial Total	125	15	140	3	27	13	72	43

3.4 Population

3.4.1 Previous Population Development

A declining provincial population growth rate had been experienced since the last six (6) census years (1960-1995). From an average annual growth rate of 1.57% during the period 1960 to 1970, it decreased to 1.22% (1990-1995). A summary of the average annual growth rates of the province is as follows:

Year	Population	Ave. Annual Growth Rate (%)	Period
1970	885,221	1.57	1960 - 1970
1975	1,001,507	3.50	1970 - 1975
1980	1,096,432	1.57	1975 - 1980
1990	1,337,961	1.58	1980 - 1990
1995	1,415,022	1.22	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). Figure 3.4.1 and Table 3.4.1 show how the past population development by municipality behaved from 1948 to 1995.

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. Considering the 1995 NSO classification of urban and rural barangay, there are 266 urban barangays and 1,455 rural barangays for a total of 1,721 barangays in 1998.

Figure 3.4.1 Previous Population Development of the Province

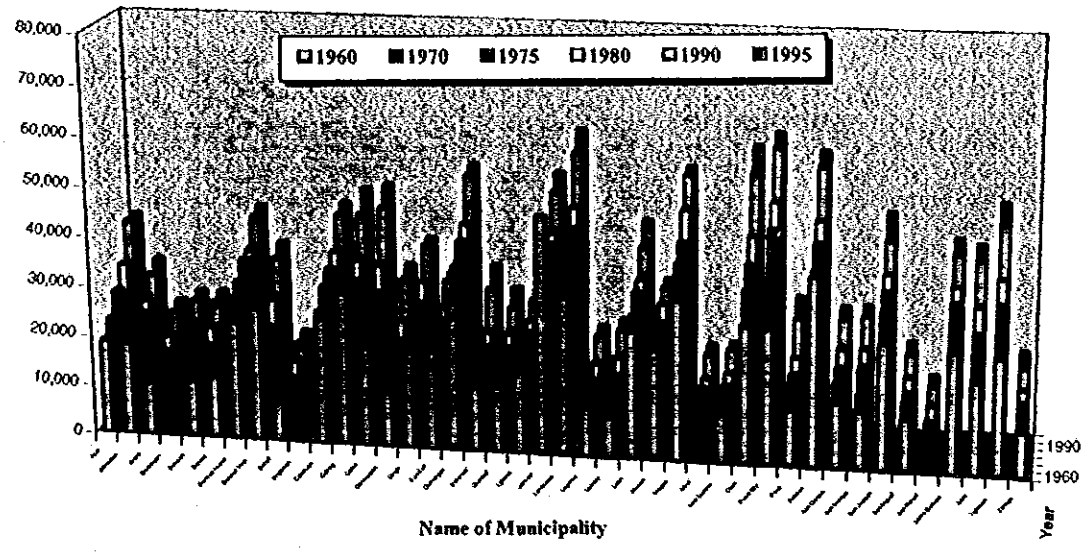


Table 3.4.1 Previous Population Development by Municipality

Municipality/ City	Previous Population						
	1948	1960	1970	1975	1980	1990	1995
Ajuy	17,448	18,655	21,770	26,113	30,397	38,120	38,415
Alimodian	16,886	18,121	19,751	21,886	22,906	27,203	29,179
Anilao	8,518	10,153	12,722	14,067	15,782	19,560	20,711
Badiangan			17,230	19,502	19,239	21,989	22,795
Balasan	15,490	10,967	13,490	15,588	17,979	22,013	22,949
Banate	10,932	11,995	14,179	16,270	17,710	23,364	24,976
Barotac Nuevo	21,860	23,164	30,131	33,443	34,276	39,757	40,968
Barotac Viejo	16,732	26,051	14,655	20,169	24,135	31,660	33,652
Batad		7,712	9,372	9,819	11,790	14,337	15,345
Bingawan			7,740	8,763	9,229	10,872	11,494
Cabatuan	24,743	26,397	30,078	32,268	34,468	40,892	42,264
Calinog	25,484	29,913	25,996	30,074	32,897	41,113	45,452
Carles	18,547	20,006	24,501	27,887	32,184	42,648	46,218
Concepcion	9,184	11,183	15,743	18,554	21,121	28,335	30,111
Dingle	18,475	19,748	23,375	26,368	29,179	35,415	35,639
Dueñas	17,842	19,004	19,866	23,028	23,962	28,472	28,954
Dumangas	29,336	30,127	35,284	38,999	41,241	49,913	51,092
Estancia	8,781	13,323	16,510	17,907	19,817	27,229	30,673
Guimbal	11,862	13,487	16,306	18,041	19,502	23,478	26,316
Igbaras	15,968	17,537	19,720	21,339	22,173	25,274	25,960
Janiuay	44,348	46,946	34,409	39,172	40,120	47,253	50,066
Lambunao	26,099	31,504	36,630	42,537	45,435	55,325	58,792
Leganes	7,447	9,244	11,480	12,328	14,285	18,505	19,235
Lemery	7,137	8,017	10,591	13,357	15,707	19,900	20,863
Leon	21,805	25,099	27,018	30,185	31,552	36,948	41,043
Maasin	16,384	21,510	20,768	24,412	26,962	29,062	29,364

Table 3.4.1 Previous Population Development by Municipality

(contd)

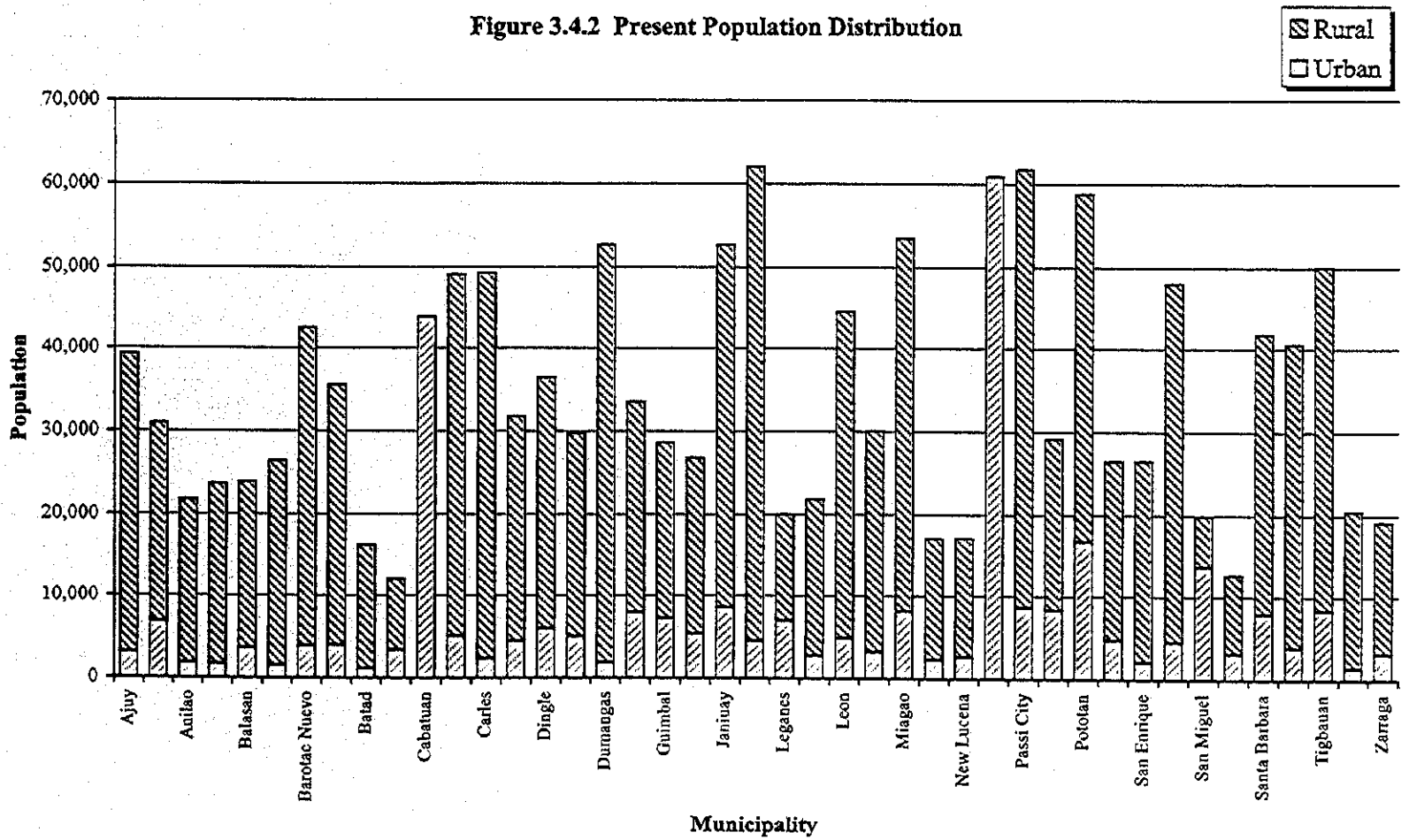
Municipality/ City	Previous Population						
	1948	1960	1970	1975	1980	1990	1995
Miagao	30,143	32,117	37,585	40,603	45,816	51,738	52,276
Mina			9,649	11,641	12,290	15,808	16,419
New Lucena	9,815	9,684	11,074	12,405	13,457	16,910	16,873
Oton	21,306	27,246	32,862	36,566	41,044	52,125	56,821
Passi City	30,918	26,945	35,288	43,755	47,988	57,701	59,539
Pavia	9,637	11,258	13,745	15,180	17,330	23,814	26,756
Pototan	34,717	37,231	37,250	41,363	44,624	54,035	56,340
San Dionisio	11,008	12,690	15,456	16,914	19,410	23,910	25,263
San Enrique		11,109	13,104	17,270	19,663	24,730	25,576
San Joaquin	22,255	24,655	29,610	32,352	34,525	39,958	44,368
San Miguel	8,453	10,014	12,033	12,635	14,241	17,606	18,819
San Rafael			8,322	6,953	8,742	11,199	12,000
Santa Barbara	21,951	23,458	27,858	30,662	32,693	37,730	39,667
Sara	16,042	17,873	21,824	24,892	28,838	36,707	38,652
Tigbauan	19,603	22,804	27,396	30,722	34,540	43,934	47,158
Tubungan	10,464	11,863	12,440	14,069	14,510	15,936	18,450
Zarraga	7,943	8,666	10,410	11,449	12,673	15,483	17,519
Provincial Total	665,563	757,476	885,221	1,001,507	1,096,432	1,337,961	1,415,022

3.4.3 Present Population Distribution

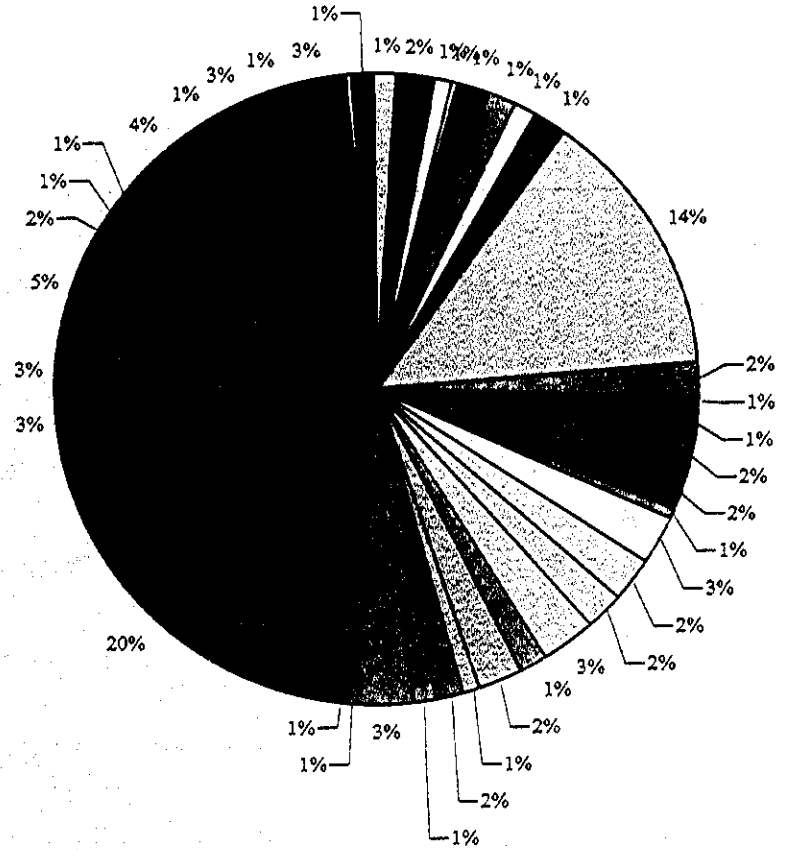
From the 1995 NSO census, the 1998 urban-rural population was estimated for the study area. Rural population accounts for 79% of the provincial total, while 21% is urban as reflected in Figure 3.4.2. Table 3.4.2 presents the breakdown of the number of urban and rural barangays by municipality and its corresponding present population distribution.

There are 280,683 households with 221,563 residing in rural areas and 59,120 households in urban areas. The average provincial household size is 5.31 persons/household. Table 3.4.3 presents a breakdown per municipality on the number of households and household sizes by urban and rural area.

Figure 3.4.2 Present Population Distribution

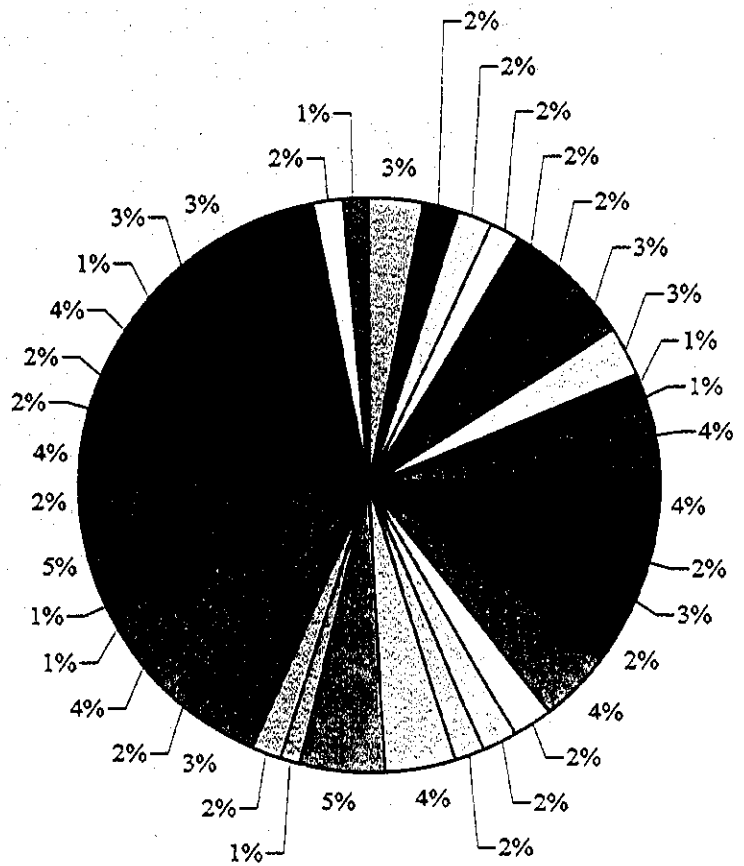


Urban Population (20.9%)



Ajuy (1%)	Alimodian (2%)
Anilao (1%)	Badiangan (1%)
Balasan (1%)	Banate (0%)
Barotac Nuevo (1%)	Barotac Viejo (1%)
Batad (0%)	Bingawan (1%)
Cabatuan (14%)	Calinog (2%)
Carles (1%)	Concepcion (1%)
Dingle (2%)	Dueñas (2%)
Dumangas (1%)	Estancia (3%)
Guimbal (2%)	Igbaras (2%)
Janiuay (3%)	Lambunao (1%)
Leganes (2%)	Lemery (1%)
Leon (2%)	Maasin (1%)
Miagao (3%)	Mina (1%)
New Lucena (1%)	Oton (20%)
Passi City (3%)	Pavia (3%)
Pototan (5%)	San Dionisio (2%)
San Enrique (1%)	San Joaquin (1%)
San Miguel (4%)	San Rafael (1%)
Santa Barbara (3%)	Sara (1%)
Tigbauan (3%)	Tubungan (0%)
Zarraga (1%)	

Rural Population (79.1%)



Ajuy (3%)	Alimodian (2%)
Anilao (2%)	Badiangan (2%)
Balasan (2%)	Banate (2%)
Barotac Nuevo (3%)	Barotac Viejo (3%)
Batad (1%)	Bingawan (1%)
Cabatuan (0%)	Calinog (4%)
Carles (4%)	Concepcion (2%)
Dingle (3%)	Dueñas (2%)
Dumangas (4%)	Estancia (2%)
Guimbal (2%)	Igbaras (2%)
Janiuay (4%)	Lambunao (5%)
Leganes (1%)	Lemery (2%)
Leon (3%)	Maasin (2%)
Miagao (4%)	Mina (1%)
New Lucena (1%)	Oton (0%)
Passi City (5%)	Pavia (2%)
Pototan (4%)	San Dionisio (2%)
San Enrique (2%)	San Joaquin (4%)
San Miguel (1%)	San Rafael (1%)
Santa Barbara (3%)	Sara (3%)
Tigbauan (4%)	Tubungan (2%)
Zarraga (1%)	

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
Ajuy	1	33	34	3,107	36,148	39,255
Alimodian	1	50	51	6,776	24,175	30,951
Anilao	1	20	21	1,806	19,997	21,803
Badiangan	1	30	31	1,680	22,011	23,691
Balasan	2	21	23	3,602	20,328	23,930
Banate	1	17	18	1,517	24,923	26,440
Barotac Nuevo	2	27	29	3,844	38,608	42,452
Barotac Viejo	1	25	26	3,945	31,560	35,505
Batad	1	23	24	1,168	15,093	16,261
Bingawan	1	13	14	3,357	8,731	12,088
Cabatuan	68		68	43,852		43,852
Calinog	4	55	59	5,014	44,091	49,105
Carles	1	32	33	2,349	46,979	49,328
Concepcion	1	24	25	4,455	27,296	31,751
Dingle	4	29	33	5,917	30,470	36,387
Dueñas	5	42	47	4,982	24,784	29,766
Dumangas	5	40	45	1,884	50,816	52,700
Estancia	3	22	25	7,965	25,547	33,512
Guimbal	11	22	33	7,192	21,473	28,665
Igbaras	6	40	46	5,332	21,499	26,831
Janiuay	16	44	60	8,557	44,163	52,720
Lambunao	2	71	73	4,484	57,531	62,015
Leganes	5	13	18	6,921	13,102	20,023
Lemery	2	29	31	2,729	19,099	21,828
Leon	1	84	85	4,830	39,667	44,497
Maasin	4	46	50	3,200	26,869	30,069
Miagao	7	112	119	8,137	45,369	53,506
Mina	2	20	22	2,319	14,763	17,082
New Lucena	1	20	21	2,641	14,498	17,139
Oton	37		37	60,873		60,873
Passi City	2	49	51	8,625	53,085	61,710
Pavia	5	13	18	8,296	20,904	29,200
Pototan	10	40	50	16,790	42,002	58,792
San Dionisio	2	27	29	4,711	21,843	26,554
San Enrique	2	26	28	2,112	24,449	26,561
San Joaquin	5	80	85	4,484	43,573	48,057
San Miguel	19	5	24	13,749	6,170	19,919
San Rafael	1	8	9	3,144	9,579	12,723
Santa Barbara	6	54	60	7,920	33,801	41,721
Sara	3	39	42	3,852	36,699	40,551
Tigbauan	9	43	52	8,335	41,726	50,061
Tubungan	3	45	48	1,411	19,075	20,486
Zarraga	2	22	24	3,134	16,062	19,196
Provincial Total	266	1,455	1,721	310,998	1,178,558	1,489,556

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
Ajuy	578	6,831	7,409	591	6,978	7,569	5.26	5.18	5.18
Alimodian	1,278	4,107	5,385	1,355	4,356	5,711	5.00	5.55	5.42
Anilao	331	3,544	3,875	349	3,731	4,080	5.18	5.36	5.34
Badiangan	315	4,093	4,408	327	4,257	4,584	5.13	5.17	5.17
Balasan	666	3,830	4,496	694	3,994	4,688	5.19	5.09	5.10
Banate	270	4,368	4,638	286	4,624	4,910	5.31	5.39	5.39
Barotac Nuevo	697	7,103	7,800	723	7,354	8,077	5.32	5.25	5.25
Barotac Viejo	716	5,467	6,183	756	5,770	6,526	5.22	5.47	5.44
Batad	233	2,734	2,967	247	2,897	3,144	4.73	5.21	5.17
Bingawan	664	1,629	2,293	698	1,712	2,410	4.81	5.10	5.01
Cabatuan	7,980		7,980	8,274		8,274	5.30		5.30
Calinog	890	7,669	8,559	962	8,288	9,250	5.21	5.32	5.31
Carles	435	8,235	8,670	464	8,781	9,245	5.06	5.35	5.33
Concepcion	758	4,988	5,746	800	5,259	6,059	5.57	5.19	5.24
Dingle	1,174	5,782	6,956	1,198	5,905	7,103	4.94	5.16	5.12
Dueñas	916	4,555	5,471	942	4,685	5,627	5.29	5.29	5.29
Dumangas	371	9,604	9,975	383	9,906	10,289	4.92	5.13	5.12
Estancia	1,379	4,531	5,910	1,506	4,951	6,457	5.29	5.16	5.19
Guimbal	1,183	3,578	4,761	1,289	3,897	5,186	5.58	5.51	5.53
Igbaras	1,012	4,131	5,143	1,045	4,266	5,311	5.10	5.04	5.05
Janiuay	1,597	7,762	9,359	1,681	8,178	9,859	5.09	5.40	5.35
Lambunao	753	9,632	10,385	794	10,164	10,958	5.65	5.66	5.66
Leganes	1,293	2,342	3,635	1,346	2,440	3,786	5.14	5.37	5.29
Lemery	555	3,646	4,201	581	3,812	4,393	4.70	5.01	4.97
Leon	836	6,512	7,348	906	7,058	7,964	5.33	5.62	5.59
Maasin	527	4,470	4,997	540	4,577	5,117	5.93	5.87	5.88
Miagao	1,444	8,558	10,002	1,477	8,758	10,235	5.51	5.18	5.23
Mina	415	2,602	3,017	432	2,709	3,141	5.37	5.45	5.44
New Lucena	508	2,694	3,202	516	2,735	3,251	5.12	5.30	5.27
Oton	10,884		10,884	11,661		11,661	5.22		5.22
Passi City	1,565	9,709	11,274	1,621	10,054	11,675	5.32	5.28	5.28
Pavia	1,428	3,688	5,116	1,559	4,028	5,587	5.32	5.19	5.23
Pototan	2,986	7,679	10,665	3,115	8,016	11,131	5.39	5.24	5.28
San Dionisio	876	3,973	4,849	920	4,176	5,096	5.12	5.23	5.21
San Enrique	381	4,427	4,808	396	4,596	4,992	5.34	5.32	5.32
San Joaquin	750	7,124	7,874	812	7,712	8,524	5.52	5.65	5.63
San Miguel	2,488	1,138	3,626	2,634	1,205	3,839	5.22	5.12	5.19
San Rafael	567	1,619	2,186	601	1,717	2,318	5.23	5.58	5.49
Santa Barbara	1,431	6,260	7,691	1,506	6,589	8,095	5.26	5.13	5.16
Sara	725	6,837	7,562	761	7,168	7,929	5.06	5.12	5.11
Tigbauan	1,413	7,381	8,794	1,499	7,829	9,328	5.56	5.33	5.36
Tubungan	242	3,119	3,361	269	3,462	3,731	5.25	5.51	5.49
Zarraga	551	2,710	3,261	604	2,969	3,573	5.19	5.41	5.37
Provincial Total	56,061	210,661	266,722	59,120	221,563	280,683	5.26	5.32	5.31

3.5 Health Status

3.5.1 Morbidity, Mortality and Infant Mortality

The number one cause of morbidity in Iloilo was ARI, followed by diarrhea and skin diseases, both water-relared diseases. Pneumonia and influenza ranked 4th and 5th, respectively.

Regarding mortality, the number one cause was pneumonia, followed by diarrhea. Tuberculosis and heart diseases ranked third and fourth, respectively. Diarrhea, prematurity and pneumonia 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 better compared with the national condition. The incidence of diseases was lower in Iloilo 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 include diarrhea (rank 2nd), skin diseases (rank 3rd), intestinal parasitism (8th), scabies (9th) and dengue fever (10th). Diarrhea also ranked 2nd as the leading causes of mortality. Diarrhea (rank 1st) is also 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, dysentery, intestinal parasitism, conjunctivities, viral hepatitis, gastroenteritis, skin disease, scabies and dengue fever. Table 3.5.2 presents the reported cases and deaths of notifiable water-related diseases in the province.

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

Rate: 1/100,000

	Causes	Iloilo		Philippines		
		Number	Rate	Number	Rate	Ranking
Morbidity	1. ARI	12,100	812.3	-		
	2. Diarrhea	10,248	688.0	1,337,449	1,997	1
	3. Skin Diseases	5,594	375.5	-		
	4. Pneumonia	4,867	326.7	470,574	703	4
	5. Influenza	4,702	315.7	609,471	910	3
	6. Bronchitis	4,700	315.5	903,508	1,349	2
	7. Nutritional Deficiencies	2,717	182.4	-		
	8. Intestinal Parasitism	2,544	170.8	-		
	9. Scabies	2,474	166.1	-		
	10. Dengue Fever	1,975	132.6	-		
Mortality	1. Pneumonia	965	64.8	35,582	53	3
	2. Diarrhea	377	25.3	5,759	9	9
	3. Tuberculosis	243	16.3	24,580	37	5
	4. Heart Diseases	226	15.2	48,582	69	1
	5. Vascular Diseases	195	13.1	37,358	56	2
	6. Malignant Neoplasms	106	7.1	25,399	38	4
	7. Influenza	92	6.2	-		
	8. Bronchitis	91	6.1	-		
	9. Septicemia	87	5.8	-		
	10. Other Accidents	62	4.2	13,477	20	6
Infant Mortality	1. Diarrhea	72	4.8	1,661	1.0	4
	2. Prematurity	29	1.9	-		
	3. Pneumonia	28	1.9	7,631	4.5	1
	4. Congenital Anomalies	23	1.5	2,366	1.4	3
	5. Septicemia	14	0.9	1,252	0.7	5
	6. Resp. Fetus/Newborn	10	0.7	5,651	3.4	2
	7. Birth Injuries & Difficult Labor	8	0.5	1,190	0.7	5
	8. Other Prenatal Causes	5	0.3	-		
	9. Heart Diseases	4	0.3	-		
	10. Meningitis	3	0.2	-		

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. Typhoid/Parathyphoid	329	23	5	0.35	1	0.07
2. Dysentery	27	2				
3. Gastroenteritis Colitis	141	10				
4. Viral hepatitis	153	11	8		2	0.14
5. Diarrhea	10,248	724	377	27	72	5
Water-washed						
1. Intestinal parasitism	2,544	180				
2. Scabies	5,594	175				
3. Conjunctivities	591	42				
4. Skin disease	2,474	395				
Water vector						
1. Dengue fever	1,975	140	32	2.26		

3.5.3 Health Facilities and Practitioners

Present facilities serving the health care of the populace are 13 hospitals, 43 rural health units and 363 barangay health stations. The ratio of the population to these facilities and to the health practitioners are relatively lower as compared to the national average figures (refer to Table 3.5.1 number and ratio of population to health facilities and/or medical practitioners, Supporting Report).

3.6 Environmental Conditions

3.6.1 General

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. Most of the drainage facilities in all municipalities are open canals or ditches. The rivers and streams function as the drainage system. These rivers receive the domestic wastewater and storm water collected by the segmented drainage facilities in urban centers or poblacions.

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

Heavy industries and agro-industrial establishments are identified as potential pollution sources in the province if no control measures are in place. The rivers must be protected and conserved for their intended or beneficial use. However, as of now, the rivers in the province have not been classified as to their usage by the Department of Environment and Natural Resources (refer to general information in Table 3.6.1 DENR Water Quality Criteria/Water Usage and Classification, Supporting Report).

3.6.3 Solid Waste Disposal

Of the 43 municipalities/city, 33 have municipal refuse collection and disposal services as of 1998 (details are referred to Table 3.6.1, Data Report). These municipalities/city have a total of 47 units of open dump truck. Balasan, Calinog and Leon have one (1) unit each of closed type truck, while Passi City has two (2) units. In the province, 21% of the households is served, while 79% 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			Disposal			Manner of Disposal (Number of Household)					
		Open Dump Trucks	Closed Type Trucks	Total Units	Number of Households Served by Open Dump Site	Number of Households Served by Sanitary Landfill	Total Households Served	Dumping (Land and Water)	Burying	Composting	Total Households Unserved		
Ajuy	7,569	3		3	1,087		1,087	1,663	2,029	2,790	6,482	14	86
Alimodian	5,711	1		1		658	658	503	4,040	510	5,053	12	88
Anilao	4,080				254		254	106	1,761	1,959	3,826	6	94
Badiangan	4,584	1		1	338		338	115	4,056	75	4,246	7	93
Balasan	4,688		1	1	612		612	2,747	454	875	4,076	13	87
Banate	4,910				875		875	1,087	1,638	1,310	4,035	18	82
Barotac Nuevo	8,077	1		1	711		711	659	4,302	2,405	7,366	9	91
Barotac Viejo	6,526	1		1	777		777	1,252	2,409	2,088	5,749	12	88
Batad	3,144	1		1	90	1,541	1,631	922	533	58	1,513	52	48
Bingawan	2,410	1		1	359		359	1,300	238	513	2,051	15	85
Cabatuan	8,274				1,857		1,857	2,654	1,950	1,813	6,417	22	78
Calinog	9,250	2	1	3	3,978		3,978	1,206	3,178	888	5,272	43	57
Carles	9,245				3,953		3,953	2,043	2,648	601	5,292	43	57
Concepcion	6,059	3		3	642		642	1,215	3,491	711	5,417	11	89
Dingle	7,103	2		2		2,594	2,594	1,456	1,784	1,269	4,509	37	63
Dueñas	5,627	1		1	913		913	1,399	3,229	86	4,714	16	84
Dumangas	10,289	1		1	1,989		1,989	3,100	4,674	526	8,300	19	81
Estancia	6,457	2		2	2,127		2,127	1,551	2,695	84	4,330	33	67
Guimbal	5,186	1		1	1,029		1,029	1,877	659	1,621	4,157	20	80
Igbaras	5,311				250		250	1,112	3,577	372	5,061	5	95
Janiuay	9,859	1		1	2,108		2,108	2,224	2,675	2,852	7,751	21	79
Lambunao	10,958	1		1	2,984		2,984	3,458	3,257	1,259	7,974	27	73
Leganes	3,786	1		1	230		230	501	2,936	119	3,556	6	94
Lemery	4,393				295		295	1,253	2,466	379	4,098	7	93
Leon	7,964		1	1	189	1,375	1,564	85	730	5,585	6,400	20	80
Maasin	5,117	3		3	527		527	466	441	3,683	4,590	10	90
Miagao	10,235	3		3	1,371		1,371	1,972	3,933	2,959	8,864	13	87
Mina	3,141	1		1	832		832	840	929	540	2,309	26	74
New Lucena	3,251				273		273	1,350	1,340	288	2,978	8	92
Oton	11,661	2		2	2,070		2,070	3,362	3,884	2,345	9,591	18	82
Passi City	11,675	2	2	4	3,445		3,445	1,385	2,686	4,159	8,230	30	70
Pavia	5,587	1		1	1,558		1,558	2,471	1,000	558	4,029	28	72
Pototan	11,131	2		2	2,834	1,630	4,464	2,080	3,475	1,112	6,667	40	60
San Dionisio	5,096	1		1	1,235	789	2,024	1,370	645	1,057	3,072	40	60
San Enrique	4,992	1		1	875		875	1,715	1,327	1,075	4,117	18	82
San Joaquin	8,524	2		2	855		855	1,332	2,855	3,482	7,669	10	90
San Miguel	3,839				701		701	1,850	1,183	105	3,138	18	82
San Rafael	2,318				200		200	500	1,483	135	2,118	9	91
Santa Barbara	8,095				1,653	592	2,245	878	3,035	1,937	5,850	28	72
Sara	7,929	1		1	1,859		1,859	2,599	2,345	1,126	6,070	23	77
Tigbauan	9,328	1		1	458		458	2,467	4,842	1,561	8,870	5	95
Tubungan	3,731	1		1	399		399	207	1,891	1,234	3,332	11	89
Zarraga	3,573	2		2	206		206	270	2,861	236	3,367	6	94
Provincial Total	280,683	47	5	52	48,998	9,179	58,177	62,602	101,564	58,340	222,506	21	79

Chapter 4

EXISTING FACILITIES AND SERVICE COVERAGE

4. EXISTING FACILITIES AND SERVICE COVERAGE

4.1 Water Supply

4.1.1 General

Existing water supply facilities and conditions were surveyed by municipality under the category of urban and rural areas (as of October 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 63% of the present population (of which 21% in urban area and 79% in rural area) is considered as adequately served (refer to 4.1, Supporting Report for the detailed study). Under the area classification, 69% of urban population and 62% of rural population have access to safe water sources/facilities, while the rest is underserved or unserved. About 806,400 persons or 85% of the served population depend on Level I facilities, while about 138,600 persons or 15% 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 29 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:

- 15 Water Districts covering 22 municipalities/city of Ajuy, Alimodian, Anilao, Barotac Nuevo, Barotac Viejo, Cabatuan, Calinog, Dingle, Duenas, Dumangas, Estancia, Janiuay, Leganes, Leon, Maasin, Miagao, Oton, Passi City, Pavia, Pototan, San Miguel and Sta. Barbara;
- 5 Municipal waterworks in the municipalities of Badiangan, New Lucena, San Dinisio, San Joaquin and Sara;
- 9 systems operated by RWSA in the municipalities of Batad, Dingle, Guimbal, Leon, Passi (2 systems), Pavia (2 systems) and San Joaquin.

The Metro Iloilo Water District (MIWD) is the largest system in the province, covering urban barangays in six (6) adjacent municipalities of Iloilo City; Cabatuan, Maasin, Oton, Pavia, San Miguel and Sta. Barbara. Total served population of the concerned municipalities excluding Iloilo City is about 22,500 at present. Water source of MIWD is surface water from Tigum River (Maasin weir; 8,700 cu.m/d), and eight wells and two infiltration galleries (14,700 cu.m/d). MIWD has an expansion plan to meet future needs in the service area applying BOT scheme.

Following MIWD is Dingle-Pototan WD, the second largest system in the province. The WD covers 6 urban and 11 rural barangays of Dingle and Pototan with the total served population of 14,800 in provision of spring water located in the municipality of Dingle.

Dumangas-Barotac Nuevo WD is the third largest system in the province. The WD supplies water to 7 urban and 26 rural barangays of Barotac Nuevo and Dumangas with a total served population of about 11,000 in provision of deep well source.

Passi City has a water district and two (2) RWSAs. The WD covers two (2) urban barangays with served population of about 8,600 in use of combination of infiltration gallery and spring source. While, 2 RWSAs serve for 2 rural barangays with total served population of about 2,500.

In the municipality of Ajuy, the WD supplies to one urban and four (4) rural barangays with served population of 7,400. Its water source is surface water.

Some other municipalities have Level III systems managed by WDs/LGUs/RWSAs with their served population ranging from about 300 to 3,700 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 municipalities relevant to the problem are Sara, San Dionisio, Concepcion, Balotac Viejo, Alimodian, Miagao, San Joaquin, Estancia and Guimbal. Lack of due consideration in D/D stage for expansion of the system was also observed.

All waterworks have 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 15 municipalities have no Level III system 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 (m3/day)	Domestic Supply (%)	No. of Brgys. Served			No. of Household Served			No. of Population Served		
					Urban	Rural	Total	Urban	Rural	Total	Urban	Rural	Total
Ajuy	Ajuy WD	Surf	162	94	1	4	5	578	898	1,476	2,890	4,490	7,380
Alimodian	Alimodian WD	DgW	*324	95	1		1	648		648	3,240		3,240
Anilao	Anilao WD	DW	262	85	1	4	5	184	55	239	1,104	330	1,434
Badiangan	Badiangan WW	SP	*49	95	1		1	98		98	490		490
Barotac Nuevo	Dumangas-Btac.WD (a)	DW	*365	95	2	5	7	402	327	729	2,010	1,635	3,645
Barotac Viejo	Barotac Viejo WD	Dgw	117	100		2	2		480	480		2,880	2,880
Batad	Batad Rural WW	DW	*78	100	1		1	130		130	780		780
Cabatuan	Metro Iloilo WD (a)		*249	95	19		19	498		498	2,490		2,490
Calinog	Calinog WD	DgW	128	100	4	2	6	294	25	319	1,764	150	1,914
Dingle	Dingle-Pototan WD (a)		349	88	1	10	11	392	1,216	1,608	1,960	6,080	8,040
	Asalanan WW	DW				1	1		113	113		678	678
	Municipal Total				1	11	12	392	1,339	1,721	1,960	6,758	8,718
Dueñas	Dueñas WD	DW	*195	95	5		5	325		325	1,950		1,950
Dumangas	Dumangas-Btac. WD (b)	DgW	*738	95	5	21	26	233	1,243	1,476	1,165	6,215	7,380
Estancia	Estancia WD	DgW/DW	241	99	4		4	545		545	3,270		3,270
Guimbal	Guimbal Rural WW	DgW/DW	600	100	11		11	618		618	3,708		3,708
Janiuay	Janiuay WD	DW	*257	95	15	1	16	401	28	429	2,406	168	2,574
Leganes	Leganes WD	WD			1	1	2	50	25	75	300	150	450

Table 4.1.2 Information on Existing Level III System

(Cont'd)

Name of Municipality City	Name of Operating Body	Water Consumption			Service Coverage								
		Type of Water Source	Water Consumption (m3/day)	Domestic Supply (%)	No. of Brgys. Served			No. of Household Served			No. of Population Served		
					Urban	Rural	Total	Urban	Rural	Total	Urban	Rural	Total
Leon	Buga WW	DW	84	100		1	1		173	173		1,038	1,038
	Leon WD	DW	243	95	1	1	2	293	51	344	1,758	312	2,070
	Municipal Total	DW	327	96	1	2	3	293	224	517	1,758	1,350	3,108
Maasin	Metro Iloilo WD (b)		*132	95	4	5	9	117	146	263	585	730	1,315
Miagao	Miagao WD	Surf	*211	100	7		7	352		352	2,112		2,112
New Lucena	New Lucena WW	DW	18	100		1	1		45	45		270	270
Oton	Metro Iloilo WD (c)		*263	95	10		10	525		525	2,625		2,625
Passi City	Passi WD	IG/SP	324	94	2		2	1,430		1,430	8,607		8,607
	Agdayao WW	SP				1	1		156	156		936	936
	Jaguimitan WW	SP				1	1		255	255		1,530	1,530
	Municipal Total				2	2	4	1,430	311	1,741	8,607	2,466	11,73
Pavia	Metro Iloilo WD (d)		*1,286	95	5	6	11	1,169	1,402	2,571	5,845	7,010	12,855
	Pal-agon	DW				1	1		159	159		954	954
	Amparo RWSA						n.a.			n.a			n.a
	Municipal Total					7	12	1,169	1,561	2,730	5,845	7,964	13,809
Pototan	Dingle-Pototan WD (b)		1,034	96	5	1	6	1,272	87	1,359	6,360	435	6,795
San Dionisio	San Dionisio WW	SP	263	98	1		1	459		459	2,754		2,754
San Joaquin	LGU-San Joaquin	SP	*251	95	5	3	8	114	225	339	1,303	1,210	2,513
	Simogbahan WW	SP				1	1		202	202		1,212	1,212
	Municipal Total				5	4	9	114	427	541	1,303	2,422	3,725
San Miguel	Metro Iloilo WD (e)		*82	95	1		1	163		163	815		815
Santa Barbara	Metro Iloilo WD (f)		*245	95	6	7	13	226	263	489	1,130	1,315	2,445
Sara	Sara Mun. WS	SP/Surf	*102	95	3	4	7	97	72	169	582	434	1,016
Provincial Total			8,652	96	122	84	206	11,563	6,736	18,299	63,703	34,702	98,405

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		
Ajuy WD	358	6	14		378	365	14,400	4,860
Alimodian WD	540	2	1		543	541	6,930	120
Anilao WD	239	1	2		242	242	4,560	7,860
Barotac Viejo WD	480	2	13		495	495	61,890	3,510
Dumangas-Btac.	2,607	11	67		2,685	2,685	23,340	
Calinog WD	319				319	319	9,690	3,840
Dingle-Pototan WD	1,664	30	119		1,813	1,813		41,490
Dueñas WD	325	6	10		341	341	4,530	
Estancia WD	605	2	1		608	548		7,230
Janiuay WD	429	8	12		449	449	8,640	
Leganes WD								
Leon WD	344	1	17		362	362	14,700	7,290
Metro Iloilo WD*	4,509				4,509			
Miagao WD	350		1		351	297		540
Passi WD	358		11		369	351	19,980	9,720

(Note) Metro Iloilo WD*: Iloilo City is not included.

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 total of 163 Level II systems in 24 municipalities/city in the province. The majority is utilizing spring sources (140 systems), while 23 systems use shallow/deep wells (details are referred to in Table 4.1.2, Supporting Report). The municipality of San Joaquin has the largest number, 42 systems or 26% of the total as shown in Table 4.1.4 together with service coverage in 1998.

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

Level II systems using deep/shallow wells impose water rates ranging from ₱10 to 75/HH/month as flat rate, while the rest using spring sources supply with flat rate (₱5 to 10/HH/month) or free of charge. Regarding repair works, some waterworks collects required money from beneficiaries and hire local contractor. Others request to barangay officials for assistance. This fact shows 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

Most of the Level II systems using electric pump practice scheduled water supply (2 to 8 hours a day) due to insufficient water source/capacity of the facilities. Such problems are mainly caused by order-less expansion or tapping of communal faucets without due considerations, resulted in insufficient water flow/ reduction of water pressure.

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

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
Aiuv	B. Bungles, P. Navarro		3	3		20	20		100	100
	Barrido WS		1	1		70	70		350	350
	Bay-ang WS		1	1		65	65		325	325
	Central WS		1	1		45	45		225	225
	Culasi WS		1	1		35	35		175	175
	Pedada WS		1	1		20	20		100	100
	Pili		1	1		55	55		275	275
	Punta Buri WW		1	1		75	75		375	375
	Tagubanhan WS		1	1		75	75		375	375
	Municipal Total		11	11		460	460		2,300	2,300
Alimodian	Bancal WS		1	1		30	30		150	150
	Binalud WS		1	1		20	20		100	100
	Cabacanan Proper WS		1	1		35	35		175	175
	Cabacanan Rizal WS		1	1		35	35		175	175
	Coline WS		1	1		30	30		150	150
	Cunsad WS		1	1		25	25		125	125
	Dao WS		1	1		20	20		100	100
	Lico WS		1	1		20	20		100	100
	Luan-luan WS		1	1		20	20		100	100
	Malamhay WS		1	1		20	20		100	100
	Manduyog WS		1	1		30	30		150	150
	Pajo WS		1	1		20	20		100	100
	Sinamay WS		1	1		25	25		125	125
	Sulong WS		1	1		30	30		150	150
	Taban-Manguining WS		1	1		35	35		175	175
	Tabug WS		1	1		20	20		100	100
	Tarug WS		1	1		20	20		100	100
	Municipal Total		39	39		1,355	1,355		6,775	6,775
Badiangan	Iniligan WWA		1	1		50	50		250	250
Barotac Viejo	Lipata WS		1	1		45	45		225	225
	Puerto Princesa WS		1	1		100	100		500	500
	San Francisco WS		1	1		60	60		300	300
	Santiago (Purok I) WS		1	1		85	85		425	425
	Santiago (Purok III)		1	1		25	25		125	125
	Municipal Total		5	5		315	315		1,575	1,575
Batad	Alinsolong WS		1	1		45	45		225	225
	Binon-an WS		1	1		175	175		875	875
	Embarcadero WS		1	1		105	105		525	525
	Municipal Total		3	3		325	325		1,625	1,625
Cabatuan	Gines Patag WS	1		1	30		30	150		150
	J. Montinola WS	1		1	35		35	175		175
	Municipal Total	2		2	65		65	325		325
Carles	Alipata WS		1	1		45	45		225	225
	Asluman WS		1	1		20	20		100	100
	Bancal Proper WS		1	1		25	25		125	125
	Bancal WS		1	1		30	30		150	150
	Buaya & Caña WS		2	2		40	40		200	200
	Dayhagan WS		1	1		75	75		375	375
	Gabi WS		1	1		50	50		250	250
	Lantangan WS		1	1		50	50		250	250
	Punta Batuanan WS		1	1		50	50		250	250
	San Fernando (Caburi-		1	1		50	50		250	250
	San Fernando WS		1	1		25	25		125	125
	Taunting WS		1	1		25	25		125	125
	Municipal Total		13	13		485	485		2,425	2,425
Concepcion	Bagongon WS		1	1		5	5		25	25
	Balabago WS		1	1		4	4		20	20
	Dungon WS		1	1		5	5		25	25
	Igbon WS		1	1		5	5		25	25
	Maliogliog WS		1	1		4	4		20	20
	Polopiña WS		1	1		4	4		20	20
	Tambaliza WS		1	1		10	10		50	50
	Municipal Total		7	7		37	37		185	185
Dingle	Lincud WS		1	1		245	245		1,225	1,225
	Moroboro WS		1	1		35	35		175	175
	Municipal Total		2	2		280	280		1,400	1,400
Guimbal	Bongol San Miguel WS		1	1		20	20		100	100
	Calampitao WS		1	1		35	35		175	175

Table 4.1.4 Information on Existing Level II System (cont'd)

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
Guimbal	**Municipal Total**		2	2		55	55		275	275
Igbaras	Bagacayan WS		1	1		20	20		100	100
	Binanua-an WS		1	1		35	35		175	175
	Buenavista WS		1	1		30	30		150	150
	Santa Barbara WS		1	1		25	25		125	125
	Talayatay WS		1	1		25	25		125	125
	Taytay WS		1	1		20	20		100	100
	Tugbanaba WS		1	1		35	35		175	175
	Municipal Total		7	7		190	190		950	950
Leganes	Cagamutan Norte WS		1	1		80	80		400	400
	Cagamutan Sur WS	1		1	25		25		125	125
	San Vicente WS	2		2	30		30		150	150
	Municipal Total	3	1	4	55	80	135		675	675
Lemery	Cabantohan WS		1	1	40		40		200	200
Leon	Agta WS		1	1		20	20		100	100
	Apian WS		1	1		20	20		100	100
	Avanzada WS		1	1		20	20		100	100
	Ayubo WS		1	1		25	25		125	125
	Bucari WS		1	1		25	25		125	125
	Camandag WS		1	1		20	20		100	100
	Carolina WS		1	1		20	20		100	100
	Dorog WS		1	1		25	25		125	125
	Dusacan WS		1	1		25	25		125	125
	Igcadios WS		1	1		30	30		150	150
	Ingay WS		1	1		20	20		100	100
	Oluangan WS		1	1		20	20		100	100
	Municipal Total		12	12		270	270		1,350	1,350
Miagao	Bacolod BWSA		1	1		35	35		175	175
	Banuyao BWSA		1	1		50	50		250	250
	Dalije BWSA		1	1		70	70		350	350
	Manibatad BWSA		1	1		20	20		100	100
	Municipal Total		4	4		175	175		875	875
Passi City	Jaguimitan & Talon-		2	2		25	25		125	125
Pavia	Pal-agon WS		1	1		190	190		950	950
Pototan	Pajo WS		1	1		20	20		100	100
San Dionisio	Agdaliran WS		1	1		20	20		100	100
	Bagacay WS		1	1		25	25		125	125
	Borongon WS		1	1		20	20		100	100
	Canas WS		1	1		20	20		100	100
	Capinang WS		1	1		30	30		150	150
	Cudionan WS		1	1		20	20		100	100
	Madanlag WS		1	1		70	70		350	350
	Moto WS		1	1		20	20		100	100
	Odiongan WS		1	1		20	20		100	100
	Pase WS		1	1		20	20		100	100
	San Nicolas WS		1	1		45	45		225	225
	Sua WS		1	1		75	75		375	375
	Municipal Total		12	12		385	385		1,925	1,925
San Joaquin	Antalon WS		1	1		25	25		125	125
	Bad-as WS		1	1		20	20		100	100
	Balabago WS		1	1		4	4		20	20
	Bayunan WS		1	1		25	25		125	125
	Cadluman WS		1	1		20	20		100	100
	Camaba-an WS		1	1		30	30		150	150
	Camia WS		1	1		20	20		100	100
	Cata-an WS		1	1		20	20		100	100
	Crossing Dapuyan WS		1	1		100	100		500	500
	Cubay WS		1	1		25	25		125	125
	Cumarascas WS		1	1		40	40		200	200
	Danawan WS		1	1		35	35		175	175
	Doldol WS		1	1		25	25		125	125
	Dongoc WS		1	1		20	20		100	100
	Ginot-an WS		1	1		25	25		125	125
	Igbangcal WS		1	1		30	30		150	150
	Igcabutong WS		1	1		20	20		100	100
	Igcadlum WS		1	1		20	20		100	100
	Igcaratong WS		1	1		20	20		100	100
	Igcores WS		1	1		30	30		150	150
	Igdagmay WS		1	1		25	25		125	125
	Igpayong WS		1	1		20	20		100	100

Table 4.1.4 Information on Existing Level II System (cont'd)

Name of Municipality	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
San Joaquin	Jawod WS		1	1		20	20		100	100
	Langca WS		1	1		20	20		100	100
	Ianguanan WS		1	1		25	25		125	125
	Lawigan WS		1	1		60	60		300	300
	Mabini Norte WS		1	1		25	25		125	125
	Mabini Sur WS		1	1		25	25		125	125
	Maninila WS		1	1		20	20		100	100
	Masagud WS		1	1		35	35		175	175
	Matambog WS		1	1		30	30		150	150
	Nagsipit WS		1	1		25	25		125	125
	Panatan WS		1	1		20	20		100	100
	Pitogo WS		1	1		150	150		750	750
	Qui-anan WS		1	1		70	70		350	350
	Roma WS		1	1		25	25		125	125
	San Luis WS		1	1		25	25		125	125
	San Mateo Norte WS		1	1		25	25		125	125
	Taslan WS		1	1		50	50		250	250
	Tiglawa WS		1	1		20	20		100	100
	Tiolas WS		1	1		40	40		200	200
	Ulay WS		1	1		30	30		150	150
	Municipal Total		42	42		1,339	1,339		6,695	6,695
San Miguel	Santa Cruz WS		1	1		65	65		325	325
	Santo Angel BWSA		1	1		20	20		100	100
	Municipal Total		2	2		85	85		425	425
Sara	Apelo WS		1	1		60	60		300	300
	Crespo WS		1	1		70	70		350	350
	San Luis WWS		1	1		150	150		750	750
	Municipal Total		3	3		280	280		1,400	1,400
Tigbauan	Bagumbayan WS		1	1		45	45		225	225
	Barangay 8		1	1		30	30		150	150
	Parara Sur WS		1	1		210	210		1,050	1,050
	Tan Pael		1	1		40	40		200	200
	Municipal Total		4	4		325	325		1,625	1,625
Tubungan	Cadabdab		1	1		25	25		125	125
	Igpaho WS		1	1		20	20		100	100
	Igtuble WS		1	1		50	50		250	250
	Jolason		1	1		25	25		125	125
	Lanag Norte WS		1	1		45	45		225	225
	Lanag Sur WS		1	1		20	20		100	100
	Molina WS		1	1		20	20		100	100
	Navillan WS		1	1		10	10		50	50
	Tagpuan WS		1	1		45	45		225	225
	Zone I WS	1		1	25		25	125		125
	Municipal Total	1	9	10	25	260	285	125	1,300	1,425
Provincial Total		30	238	268	1,131	12,928	14,059	5,657	63,839	69,496

clogging at spring box and pipeline, etc. Some of them were constructed neglecting design standards. Indigenous materials are usually used (in some cases made of bamboo tubes).

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.

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.

4.1.5 Level I Facilities

Level I facilities (point source) are common in rural barangays. 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 60,980 operational Level I facilities, 57% are shallow wells. According to the study on safe/unsafe percentage for shallow well, 30% 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, 39,467 Level I facilities are classified as safe sources, while 21,513 facilities are under unsafe sources.

Percentage shares between public and private Level I facilities for rural water supply is 39% and 61%, respectively. The share of developed springs in public facilities is 4% (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 referral to the municipal

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					
											Number of Household			Number of Population		
	Deep Well	Shallow Well	Covered/ Improved Dug Well	Developed Spring	Total	Shallow Well	Open Dug Well	Undeveloped Spring	Rain Water Collector	Total	Urban	Rural	Total	Urban	Rural	Total
Ajuy		365	5	1	371	156	78		11	245		3,434	3,434		17,788	17,788
Alimodian	3	425	179	30	637	182	17			199	385	2,535	2,920	1,926	14,068	15,995
Anilao		350			350	150	266			416	29	1,543	1,572	152	8,271	8,423
Badiangan	609	113			722	49				49	193	4,018	4,211	991	20,771	21,761
Balasan		267			267	114				114	484	2,788	3,272	2,512	14,190	16,702
Banate	33	385	45	1	464	165	60			225	229	2,669	2,898	1,214	14,388	15,602
Barotac Nuevo	2,435	8	330		2,773	3	365			368	325	6,389	6,714	1,727	33,544	35,271
Barotac Viejo		445	1		446	191	11			202	388	2,864	3,252	2,026	15,667	17,693
Batad		165		1	166	71	29			100	16	1,583	1,599	74	8,249	8,323
Bingawan		57	178	2	237	25	486		1	512	643	590	1,233	3,094	3,009	6,103
Cabatuan	124	987	10		1,121	423				423	5,655		5,655	29,974		29,974
Calinog		424			424	182	673			855	231	2,513	2,744	1,202	13,370	14,572
Carles	1	81			82	35	274			309	180	2,189	2,369	909	11,712	12,621
Concepcion		251	2		253	108	88			196	387	2,420	2,807	2,154	12,558	14,713
Dingle	2,128	14			2,142	6	47			53	561	3,631	4,192	2,770	18,737	21,507
Dueñas	313	768	90	1	1,172	329	107			436	402	3,159	3,561	2,128	16,712	18,840
Dumangas	5	260	32		297	112	376			488	37	3,209	3,247	184	16,464	16,648
Estancia	1	81	8		90	35	82			117	495	2,461	2,955	2,616	12,696	15,312
Guimbal		855	109	1	965	367	247			614	430	2,484	2,914	2,399	13,689	16,089
Igbaras		529		174	703	227	373			600	621	2,016	2,637	3,165	10,162	13,327
Janiuay		1,658		1	1,659	710				710	771	4,981	5,752	3,926	26,896	30,822
Lambunao		1,021			1,021	437			1,540	1,977	223	4,274	4,498	1,261	24,193	25,455
Leganes		408	89		497	175	235		34	444	712	1,518	2,230	3,660	8,149	11,809
Lemery		1,733			1,733	743	363			1,106	461	2,928	3,389	2,168	14,667	16,835
Leon	5	675	166	87	933	289	1			290	339	4,230	4,570	1,808	23,774	25,583
Maasin	3	389			392	167				167	269	2,596	2,865	1,596	15,236	16,832
Miagao	2	1,357	1	103	1,463	581	340			921	471	4,986	5,457	2,597	25,826	28,424
Mina	4	695	44		743	298	310		1	609	261	1,579	1,840	1,404	8,605	10,009
New Lucena	114	204	38	7	363	88	13			101	328	1,884	2,212	1,678	9,984	11,662
Oton		1,226			1,226	526	1,797			2,323	4,174		4,174	21,787		21,787
Passi City	11	786	1,203	302	2,302	337	106		64	507		7,032	7,032		37,129	37,129
Pavia	3	694	109		806	297	76			373	368	1,855	2,223	1,957	9,626	11,583
Pototan		1,613			1,613	691	117			808	1,469	5,337	6,806	7,916	27,968	35,884
San Dionisio		494			494	212	166			378	150	1,769	1,919	767	9,253	10,020
San Enrique	17	925			942	396	163			559	233	2,616	2,849	1,243	13,918	15,162
San Joaquin		893			893	383	301			684	355	2,446	2,802	1,960	13,822	15,783
San Miguel		318	1,992		2,310	136				136	2,443	1,106	3,549	12,753	5,661	18,414
San Rafael	539	1	59	20	619	0	220			220	532	1,252	1,784	2,782	6,989	9,771
Santa Barbara	74	178	307	1	560	76	92			168	996	5,072	6,068	5,240	26,017	31,257
Sara	2,500	182	2		2,684	78	104			182	552	6,487	7,039	2,792	33,213	36,005
Tigbauan	4	1,523		3	1,530	653	1,352			2,005	1,010	3,118	4,128	5,618	16,616	22,235
Tubungan	43	29	329	31	432	13	42			55	191	2,356	2,547	1,001	12,981	13,982
Zarraga		557			557	239	49			288	403	1,962	2,365	2,093	10,615	12,708
Provincial Total	8,971	24,387	5,328	766	39,452	10,451	9,426		1,651	21,528	28,402	123,879	152,282	149,225	657,187	806,413

government. The municipal government assists them in case that 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.

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.

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.	2,857	11,876	6,114	22,962	43,809
	Percent	97	97	98	98	98
Non-Functioning	No.	77	405	94	404	980
	Percent	3	3	2	2	2
Total Number		2,934	12,281	6,208	23,366	44,789

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

Among others, deep wells usually necessitate repair/replacement of mechanical parts and redevelopment of the well itself. Apart from the same problems as deep wells, shallow wells have primary disadvantages such as the use of shallow aquifer which is easily af-

fected 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 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 11 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, 63% of the population is adequately served (69% of urban population and 62% of rural population).

The percentage of underserved population is estimated at 26% of the total population (23% of urban population and 27% 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 the municipalities in the province.

Percentage shares of population coverage by Level I public and private facilities in rural water supply are estimated at 73% and 27%, 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 Ajuy (93%), Anilao (61%), Barotac Nuevo (52%), Batad (67%), Dumangas (62%), Guimbal (52%), Passi City (99%), Pavia (70%), and San Dionisio (58%).

With regard to Level II system in rural areas, 1 to 11% of service coverage were observed in some municipalities. Presently, piped system including Level III systems have not been fully developed in the entire province (2% for Level II and 7% for Level III systems).

Taking into account the municipal service coverage, of the 43 municipalities/city of the province, 22 are above the average provincial service coverage of 63% in terms of served population. The highest coverage is seen in San Miguel at 99% both for urban and rural area, followed by Barotac Nuevo at 97% both for urban and rural area, Badiangan at 95% (88% for urban and 96% for rural area), Sara at 95% (88% for urban and 96% for rural area), Pavia at 90% (94% for urban and 89% for rural area), Dingle at 87% (80% for urban and 88% for rural area), Santa Barbara at 81%(77% for urban and 82% for rural area) and Passi City at 78% (100% for urban and 74% for rural area).

In contrast to the above, 19 municipalities are below the provincial average. The lowest is Carles at 31%, Calinog at 34%, Oton at 40%, Lambunao at 41%, Anilao at 45%, Dumangas at 45% and Tigbauan at 48%. The low coverage of these municipalities is considered to arise from a large number of underserved population (40 to 60%) using unsafe water sources.

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/Unserved			Served by Safe Source				Underseved/Unserved		
			Level III	Level II	Level I	Total	Unsafe Source	Unserved	Total	Level III	Level II	Level I	Total	Unsafe Source	Unserved	Total
Ajuy	Urban	3,107	2,890			2,890		217	217	93			93		7	7
	Rural	36,148	4,490	2,300	17,788	24,578	9,850	1,720	11,570	12	6	49	68	27	5	32
	Total	39,255	7,380	2,300	17,788	27,468	9,850	1,937	11,787	19	6	45	70	25	5	30
Alimodian	Urban	6,776	3,240		1,926	5,166	252	1,357	1,610	48		28	76	4	20	24
	Rural	24,175		2,175	14,068	16,243	3,099	4,833	7,932		9	58	67	13	20	33
	Total	30,951	3,240	2,175	15,995	21,410	3,351	6,190	9,541	10	7	52	69	11	20	31
Anilao	Urban	1,806	1,104		152	1,256	190	360	550	61		8	70	10	20	30
	Rural	19,997	330		8,271	8,601	9,844	1,552	11,396	2		41	43	49	8	57
	Total	21,803	1,434		8,423	9,857	10,034	1,912	11,946	7		39	45	46	9	55
Badiangan	Urban	1,680	490		991	1,481	103	96	199	29		59	88	6	6	12
	Rural	22,011		250	20,771	21,021	754	237	990		1	94	96	3	1	4
	Total	23,691	490	250	21,761	22,501	857	333	1,190	2	1	92	95	4	1	5
Balasan	Urban	3,602			2,512	2,512	1,063	27	1,090			70	70	30	1	30
	Rural	20,328			14,190	14,190	6,074	64	6,138			70	70	30	0	30
	Total	23,930			16,702	16,702	7,137	91	7,228			70	70	30	0	30
Banate	Urban	1,517			1,214	1,214		303	303			80	80		20	20
	Rural	24,923			14,388	14,388	5,548	4,987	10,535			58	58	22	20	42
	Total	26,440			15,602	15,602	5,548	5,290	10,838			59	59	21	20	41
Barotac Nuevo	Urban	3,844	2,010		1,727	3,737	8	99	107	52		45	97	0	3	3
	Rural	38,608	4,210		33,544	37,754	614	239	854	11		87	98	2	1	2
	Total	42,452	6,220		35,271	41,491	622	338	961	15		83	98	1	1	2
Barotac Viejo	Urban	3,945			2,026	2,026	1,131	788	1,919			51	51	29	20	49
	Rural	31,560	2,880	1,575	15,667	20,122	5,879	5,559	11,438	9	5	50	64	19	18	36
	Total	35,505	2,880	1,575	17,693	22,148	7,010	6,347	13,357	8	4	50	62	20	18	38
Batad	Urban	1,168	780	75	74	929	67	171	239	67	6	6	80	6	15	20
	Rural	15,093		1,625	8,249	9,874	3,867	1,353	5,219		11	55	65	26	9	35
	Total	16,261	780	1,700	8,323	10,803	3,934	1,524	5,458	5	10	51	66	24	9	34
Bingawan	Urban	3,357			3,094	3,094	238	25	263			92	92	7	1	8
	Rural	8,731			3,009	3,009	5,663	59	5,722			34	34	65	1	66
	Total	12,088			6,103	6,103	5,901	84	5,985			50	50	49	1	50
Cabatuan	Urban	43,852	2,490	375	29,974	32,839	7,815	3,198	11,013	6	1	68	75	18	7	25
	Rural															
	Total	43,852	2,490	375	29,974	32,839	7,815	3,198	11,013	6	1	68	75	18	7	25
Calinog	Urban	5,014	1,764		1,202	2,966	1,045	1,003	2,048	35		24	59	21	20	41
	Rural	44,091	150		13,370	13,520	24,845	5,726	30,571	0		30	31	56	13	69
	Total	49,105	1,914		14,572	16,486	25,890	6,729	32,619	4		30	34	53	14	66

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/Unserved			Served by Safe Source				Underseved/Unserved		
			Level III	Level II	Level I	Total	Unsafe Source	Unserved	Total	Level III	Level II	Level I	Total	Unsafe Source	Unserved	Total
Carles	Urban	2,349			909	909	970	470	1,440			39	39	41	20	61
	Rural	46,979		2,425	11,712	14,137	30,554	2,288	32,842		5	25	30	65	5	70
	Total	49,328		2,425	12,621	15,046	31,525	2,757	34,282		5	26	31	64	6	69
Concepcion	Urban	4,455			2,154	2,154	1,407	893	2,301			48	48	32	20	52
	Rural	27,296		185	12,558	12,743	10,043	4,509	14,553		1	46	47	37	17	53
	Total	31,751		185	14,713	14,898	11,451	5,403	16,853		1	46	47	36	17	53
Dingle	Urban	5,917	1,960		2,770	4,730	2	1,184	1,187	33		47	80	0	20	20
	Rural	30,470	6,758	1,400	18,737	26,895	13	3,562	3,575	22	5	61	88	0	12	12
	Total	36,387	8,718	1,400	21,507	31,625	15	4,747	4,762	24	4	59	87	0	13	13
Dueñas	Urban	4,982	1,950		2,128	4,078	137	767	904	39		43	82	3	15	18
	Rural	24,784			16,712	16,712	6,184	1,888	8,072			67	67	25	8	33
	Total	29,766	1,950		18,840	20,790	6,321	2,655	8,976	7		63	70	21	9	30
Dumangas	Urban	1,884	1,165		184	1,349	160	376	535	62		10	72	8	20	28
	Rural	50,816	6,215	175	16,464	22,854	24,808	3,154	27,962	12	0	32	45	49	6	55
	Total	52,700	7,380	175	16,648	24,203	24,968	3,529	28,497	14	0	32	46	47	7	54
Estancia	Urban	7,965	3,270		2,616	5,886	2,050	29	2,079	41		33	74	26	0	26
	Rural	25,547			12,696	12,696	12,789	62	12,851			50	50	50	0	50
	Total	33,512	3,270		15,312	18,582	14,839	91	14,930	10		46	55	44	0	45
Guimbal	Urban	7,192	3,708		2,399	6,107	738	347	1,085	52		33	85	10	5	15
	Rural	21,473		275	13,689	13,964	6,669	840	7,509		1	64	65	31	4	35
	Total	28,665	3,708	275	16,089	20,072	7,407	1,187	8,593	13	1	56	70	26	4	30
Igbaras	Urban	5,332			3,165	3,165	1,103	1,064	2,167			59	59	21	20	41
	Rural	21,499		950	10,162	11,112	6,088	4,299	10,387		4	47	52	28	20	48
	Total	26,831		950	13,327	14,277	7,191	5,363	12,554		4	50	53	27	20	47
Janiuay	Urban	8,557	2,406		3,926	6,332	515	1,709	2,225	28		46	74	6	20	26
	Rural	44,163	168		26,896	27,064	8,269	8,830	17,099	0		61	61	19	20	39
	Total	52,720	2,574		30,822	33,396	8,784	10,540	19,324	5		58	63	17	20	37
Lambunao	Urban	4,484			1,261	1,261	2,324	899	3,223			28	28	52	20	72
	Rural	57,531			24,193	24,193	23,482	9,855	33,338			42	42	41	17	58
	Total	62,015			25,455	25,455	25,806	10,754	36,560			41	41	42	17	59
Leganes	Urban	6,921	300		3,660	3,960	2,934	27	2,961	4		53	57	42	0	43
	Rural	13,102	150	675	8,149	8,974	4,061	67	4,128	1	5	62	68	31	1	32
	Total	20,023	450	675	11,809	12,934	6,995	94	7,089	2	3	59	65	35	0	35
Lemery	Urban	2,729			2,168	2,168	344	216	561			79	79	13	8	21
	Rural	19,099		200	14,667	14,867	3,672	561	4,232		1	77	78	19	3	22
	Total	21,828		200	16,835	17,035	4,016	777	4,793		1	77	78	18	4	22

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/Unserved			Served by Safe Source				Underseved/Unserved		
			Level III	Level II	Level I	Total	Unsafe Source	Unserved	Total	Level III	Level II	Level I	Total	Unsafe Source	Unserved	Total
Leon	Urban	4,830	1,758		1,808	3,566	299	965	1,264	36		37	74	6	20	26
	Rural	39,667	1,350	1,350	23,774	26,474	5,262	7,931	13,193	3	3	60	67	13	20	33
	Total	44,497	3,108	1,350	25,583	30,041	5,561	8,896	14,456	7	3	57	68	12	20	32
Maasin	Urban	3,200	585		1,596	2,181	382	638	1,019	18		50	68	12	20	32
	Rural	26,869	730	25	15,236	15,991	5,504	5,374	10,878	3	0	57	60	20	20	40
	Total	30,069	1,315	25	16,832	18,172	5,886	6,011	11,897	4	0	56	60	20	20	40
Miagao	Urban	8,137	2,112		2,597	4,709	1,799	1,629	3,428	26		32	58	22	20	42
	Rural	45,369		875	25,826	26,701	12,248	6,420	18,668		2	57	59	27	14	41
	Total	53,506	2,112	875	28,424	31,411	14,047	8,048	22,095	4	2	53	59	26	15	41
Mina	Urban	2,319			1,404	1,404	658	257	915			61	61	28	11	39
	Rural	14,763			8,605	8,605	5,517	641	6,158			58	58	37	4	42
	Total	17,082			10,009	10,009	6,175	898	7,073			59	59	36	5	41
New Lucena	Urban	2,641			1,678	1,678	433	530	963			64	64	16	20	36
	Rural	14,498	270		9,984	10,254	2,118	2,126	4,244	2		69	71	15	15	29
	Total	17,139	270		11,662	11,932	2,551	2,656	5,207	2		68	70	15	15	30
Oton	Urban	60,873	2,625		21,787	24,412	35,192	1,270	36,461	4		36	40	58	2	60
	Rural															
	Total	60,873	2,625		21,787	24,412	35,192	1,270	36,461	4		36	40	58	2	60
Passi City	Urban	8,625	8,550	75		8,625				99	1		100			
	Rural	53,085	2,466	125	37,129	39,720	2,747	10,618	13,365	5	0	70	75	5	20	25
	Total	61,710	11,016	200	37,129	48,345	2,747	10,618	13,365	18	0	60	78	4	17	22
Pavia	Urban	8,296	5,845		1,957	7,802	494		494	70		24	94	6		6
	Rural	20,904	7,964	1,025	9,626	18,615	2,289		2,289	38	5	46	89	11		11
	Total	29,200	13,809	1,025	11,583	26,417	2,783		2,783	47	4	40	90	10		10
Pototan	Urban	16,790	6,360		7,916	14,276	2,048	467	2,514	38		47	85	12	3	15
	Rural	42,002	435	100	27,968	28,503	12,383	1,116	13,499	1	0	67	68	29	3	32
	Total	58,792	6,795	100	35,884	42,779	14,431	1,583	16,013	12	0	61	73	25	3	27
San Dionisio	Urban	4,711	2,754		767	3,521	249	941	1,190	58		16	75	5	20	25
	Rural	21,843		1,925	9,253	11,178	6,294	4,371	10,665		9	42	51	29	20	49
	Total	26,554	2,754	1,925	10,020	14,699	6,543	5,312	11,855	10	7	38	55	25	20	45
San Enrique	Urban	2,112			1,243	1,243	447	421	869			59	59	21	20	41
	Rural	24,449			13,918	13,918	5,643	4,888	10,531			57	57	23	20	43
	Total	26,561			15,162	15,162	6,091	5,309	11,399			57	57	23	20	43
San Joaquin	Urban	4,484	1,303		1,960	3,263	324	897	1,221	29		44	73	7	20	27
	Rural	43,573	2,422	6,695	13,822	22,939	13,221	7,413	20,634	6	15	32	53	30	17	47
	Total	48,057	3,725	6,695	15,783	26,203	13,545	8,310	21,854	8	14	33	55	28	17	45

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/Unserved			Served by Safe Source				Underseved/Unserved		
			Level III	Level II	Level I	Total	Unsafe Source	Unserved	Total	Level III	Level II	Level I	Total	Unsafe Source	Unserved	Total
San Miguel	Urban	13,749	815		12,753	13,568	181	0	181	6		93	99	1	0	1
	Rural	6,170		425	5,661	6,086	84		84		7	92	99	1		1
	Total	19,919	815	425	18,414	19,654	265	0	265	4	2	92	99	1	0	1
San Rafael	Urban	3,144			2,782	2,782	24	338	362			88	88	1	11	12
	Rural	9,579			6,989	6,989	1,708	882	2,590			73	73	18	9	27
	Total	12,723			9,771	9,771	1,732	1,220	2,952			77	77	14	10	23
Santa Barbara	Urban	7,920	1,130		5,240	6,370	1,218	332	1,550	14		66	80	15	4	20
	Rural	33,801	1,315	150	26,017	27,482	5,525	794	6,319	4	0	77	81	16	2	19
	Total	41,721	2,445	150	31,257	33,852	6,743	1,126	7,869	6	0	75	81	16	3	19
Sara	Urban	3,852	582		2,792	3,374		478	478	15		72	88		12	12
	Rural	36,699	434	1,400	33,213	35,047	460	1,192	1,652	1	4	91	95	1	3	5
	Total	40,551	1,016	1,400	36,005	38,421	460	1,670	2,130	3	3	89	95	1	4	5
Tigbauan	Urban	8,335			5,618	5,618	1,844	873	2,717			67	67	22	10	33
	Rural	41,726		1,625	16,616	18,241	21,427	2,058	23,485		4	40	44	51	5	56
	Total	50,061		1,625	22,235	23,860	23,271	2,931	26,201		3	44	48	46	6	52
Tubungan	Urban	1,411		125	1,001	1,126	5	280	285		9	71	80	0	20	20
	Rural	19,075		1,300	12,981	14,281	977	3,816	4,794		7	68	75	5	20	25
	Total	20,486		1,425	13,982	15,407	983	4,096	5,079		7	68	75	5	20	25
Zarraga	Urban	3,134			2,093	2,093	825	216	1,041			67	67	26	7	33
	Rural	16,062			10,615	10,615	4,896	551	5,447			66	66	30	3	34
	Total	19,196			12,708	12,708	5,721	767	6,488			66	66	30	4	34
Provincial Total	Urban	310,998	63,946	650	149,225	213,821	71,019	26,158	97,177	21	0	48	69	23	8	31
	Rural	1,178,558	42,737	31,230	657,187	731,154	320,972	126,431	447,404	4	3	56	62	27	11	38
	Total	1,489,556	106,683	31,880	806,413	944,976	391,991	152,590	544,580	7	2	54	63	26	10	37

Figure 4.1.1 Water Supply Coverage of the Province