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 Aklan 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 Aklan

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

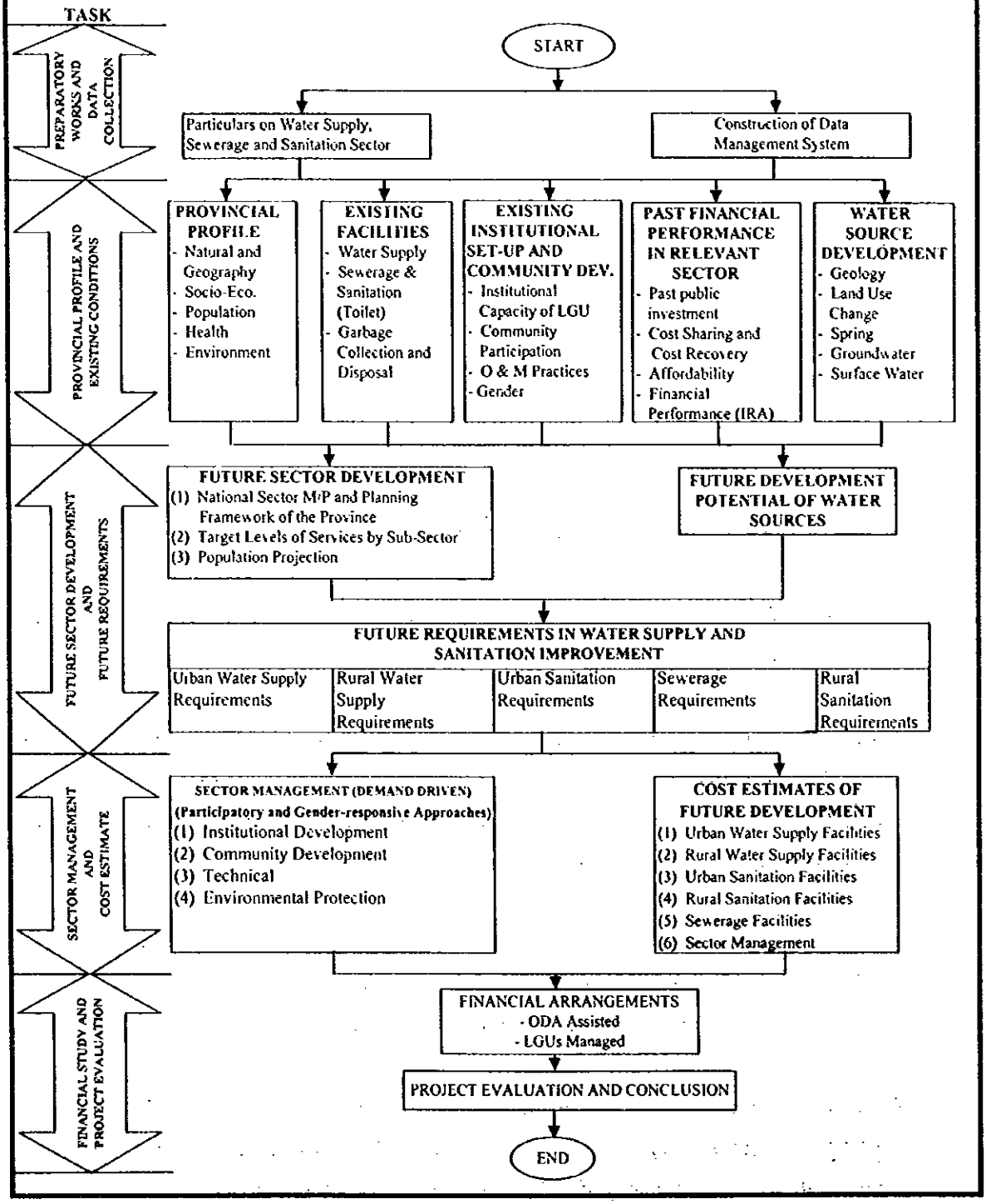
The PW4SP is a framework plan that would serve as the basis for the future implementation work in the sector. It will be carried out either as large-scale projects funded by international agencies or as a small size project carried out by local parties. It should be noted that the PW4SP is a sector development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

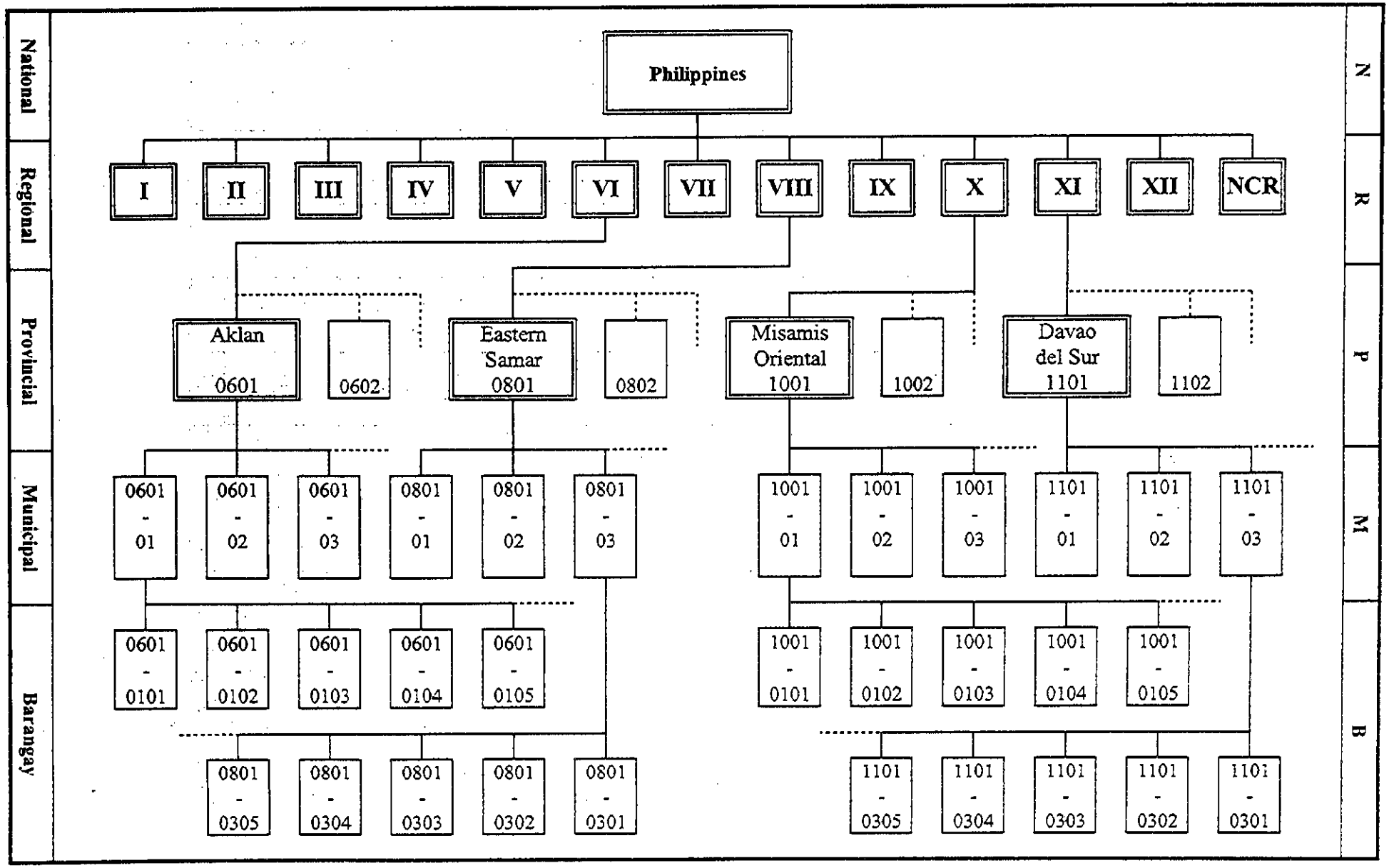


Figure 2.6.1 Institutional Hierarchical System by the NEDA Coding

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

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

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

Chapter 3

PROVINCIAL PROFILE

3. PROVINCIAL PROFILE

3.1 General

Aklan is located at the northeastern part of Panay Island and is one of the 6 provinces comprising Western Visayas (Region VI). Kalibo, the provincial capital is about 160 road kms north of Iloilo City, the regional center. The province is bounded by Sulu Sea on the northwest, by the Sibuyan Sea on the northeast and the east, by Antique on the west, and by Capiz on the south as shown in the Location Map. The internationally famous Boracay Island is the northernmost limit of the province.

The province is classified as 3rd class and has a total land area of 1,817.89km^2 that is 0.61% of the Philippine total land area of about 300,000km^2. It is composed of 17 municipalities with 327 barangays, of which 36 are urban and 291 rural. Provincial total population was 410,539 in 1995. About 75% of the population reside in rural areas, while the remaining 25% in urban areas. At present, there are 5 water districts and 6 LGU/association managed Level III water supply systems operating in the province. Table 3.1.1 presents the breakdown per municipality of land area, population and density, as well as administrative composition.

Table 3.1.1 Outline of Municipalities

Municipality		Land Area (km^2)	1995 Population		Number of Barangay		
Name	Class		Number	Density (person/km^2)	Urban	Rural	Total
Altavas	5th	109.05	21,475	197	1	13	14
Balete	5th	131.77	19,972	152	1	9	10
Banga	4th	80.70	30,071	373	1	29	30
Batan	4th	69.32	26,415	381	1	19	20
Buruanga	5th	68.75	12,665	184	1	14	15
Ibajay	4th	158.64	36,184	228	1	34	35
Kalibo (capital)	5th	45.75	58,065	1,269	16		16
Lezo	5th	23.40	11,536	493	1	11	12
Libacao	4th	325.93	22,812	70	1	23	24
Madalag	5th	283.43	16,659	59	1	24	25
Makato	5th	58.53	21,955	375	1	17	18
Malay	4th	67.31	19,406	288	2	15	17
Malinao	5th	152.07	21,509	141	1	22	23
Nabas	5th	96.82	21,391	221	2	18	20
New Washington	4th	62.50	31,896	510	1	15	16
Numancia	5th	26.02	22,356	859	2	15	17
Tangalan	5th	57.90	16,172	279	2	13	15
Provincial Total	3rd	1,817.89	410,539	226	36	291	327

3.2 Natural Conditions and Geographical Features

3.2.1 Meteorology

The province has Type III climate under the Coronas classification. This type is characterized by an absence of very pronounced maximum rain period with a very short dry season lasting only from 1 to 3 months. Rainfall generally occurs in May to December and the dry months are in January to April as reflected in the Location Map. Rainfall records of PAGASA indicated an average annual rainfall of 3,285mm at the western part and 2,852mm at the eastern part of the province. The average number of rainy days in a year was recorded at 164.

Mean temperature recorded was 27.5°C. The province is exposed to the southwest monsoon and gets a large amount of rainfall brought about by the tropical cyclones during maximum rain periods.

3.2.2 Land Use

Remaining forest area constitutes 38% of the total area of the province located mostly in Mt. Nausang and the Albinan mountain range. Agricultural and grassland/brushland occupy 59% and 11%, respectively. Primary settlements are concentrated along the coastal area and the primary transportation network. 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 essentially 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	290.32	16
Grassland/Brush Land	201.75	11
Built-up		0
Agricultural	1,074.93	59
Fishponds, Mangrove, Inland Water Area	76.11	4
Openlands	174.80	10
Provincial Total	1,817.90	100

3.2.3 Topography and Drainage

The western Cordillera consists of continuous mountain ranges that bounds the western to southern sides of the province. The slopes are highest and steepest on the southwest where they reach a maximum elevation of 1,650 m at Mt. Nausang. These highlands make up areas of the headwaters for Aklan River and its tributaries. The physiographic features of the province are: (a) the northern portion of western Cordillera flanking Panay Island including the Buruanga Peninsula, (b) the valley of Aklan River, and (c) the mangrove area bordering the coastline.

From the southern part of the province in this Cordillera, the river flows to the north up to Kalibo. The other rivers are smaller creeks and stream. The drainage system of these rivers is characterized by a dendritic pattern. Among the major rivers are Aklan, Tangalan, Ibajay and Malay Rivers, most of which discharge into the Sibuyan Sea at the northern coast of the province.

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 gauging station.

Three (3) typical rivers in the province were selected for water quality examination, namely: Aklan, Tangalan and Ibajay rivers. Analyzed river waters were turbid and colored. The examination result is referred to 7.5, Data Report.

Table 3.2.2 Drainage Areas & Flow Rates of Major Rivers

Major Rivers	Drainage Area (km^2)	Flow Rate (m^3/sec)			Water Districts (using river water)
		Peak	Maximum	Minimum	
Malay	No gauging station in the watershed.				None
Ibajay	No gauging station in the watershed.				None
Tangalan	38	510.4	218.9	0.1	None
Aklan	705	4,104.0	1,503.0	9.2	None
Hal-o	No gauging station in the watershed.				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
Inc. - Incomplete/Lacks record

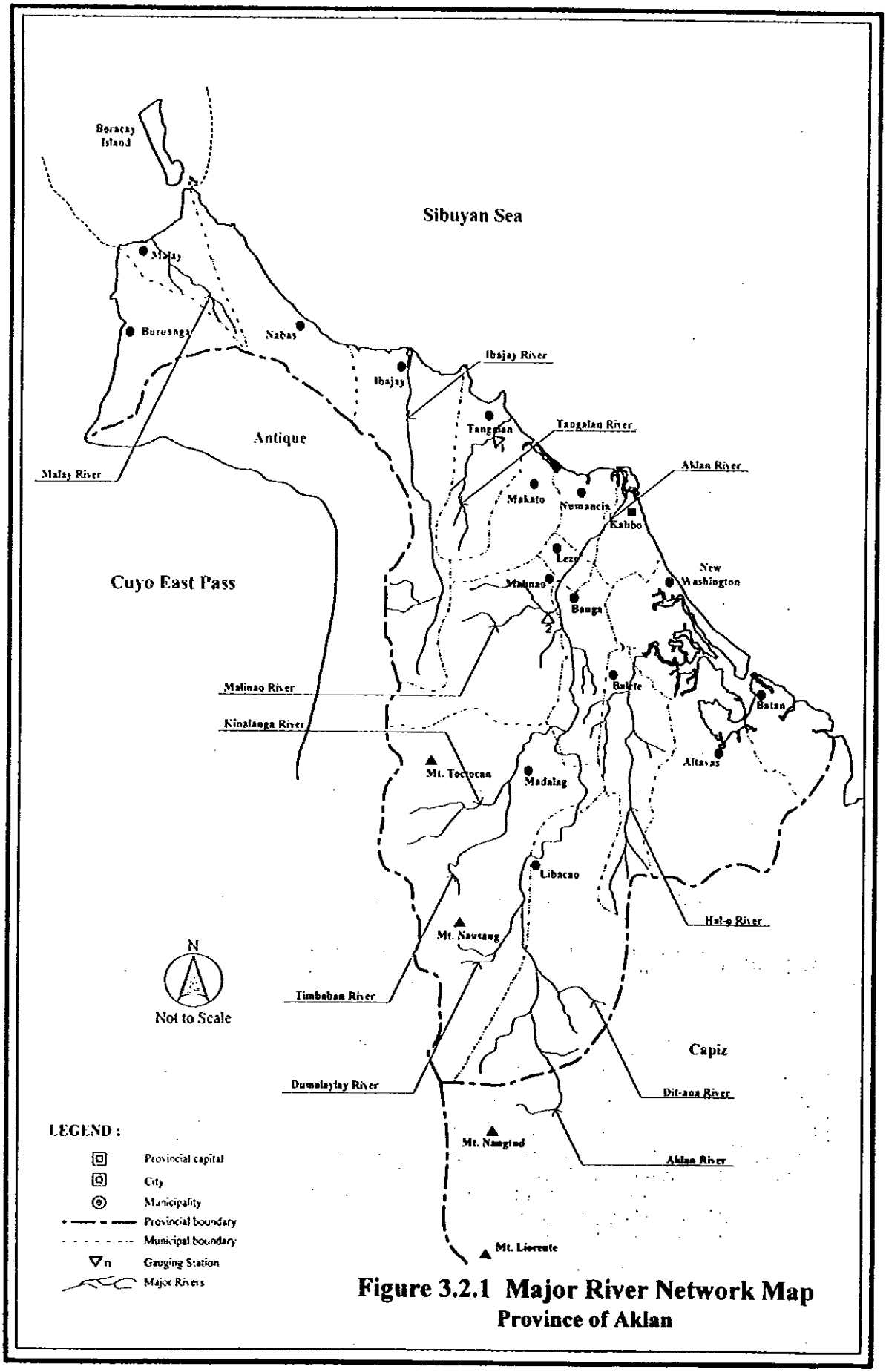


Figure 3.2.1 Major River Network Map
Province of Aklan

3.3 Socio-economic Conditions

3.3.1 Economic Activities and Household Income

Aklan is basically an agricultural province. The major economic activities are farming and fishing. Principal crops cultivated are palay, coconut and bananas. With the whole stretch of its northern and northwestern coasts facing the rich fishing grounds of Sibuyan Sea and Sulu Sea, respectively, the province also yields commercial marine fishery products. Swampy areas have also been converted into aqua-business ventures. At present, the province is promoting cottage industries and tourism as other income-generating activities.

The NSO Family Income and Expenditures Survey in 1994 showed that the average annual family income of the province was ₱ 70,376 while the expenditure was at ₱ 57,305 or a net saving of ₱ 13,071. Distribution of families by income class in the region and province is indicated in Figure 3.3.1 (refer to Table 3.3.1, Supporting Report). Percentages of families of lower income levels were higher than the average figures in the region. Based on the established poverty threshold income of ₱ 47,133 per family in Region VI for 1994, about 57% of the total number of families lived within and below the poverty threshold.

As to the number of workers by major industry group, agriculture, fishery and forestry had the dominant share followed by social and personal services (refer to Table 3.3.2, Supporting Report). By class of worker, those who worked for private business/enterprise or farm had highest share of 25% as shown in Figure 3.3.2.

3.3.2 Basic Infrastructure

All municipalities have electric supply, while the service coverage at household level is only 51%. Telephone service is also available in all municipalities. There are 28 post office in the province. Land transportation is available by means of PUV, bus, taxi, rent-a car and tricycle. There are 1,785 business establishments and another 415 tourism facilities. Table 3.3.1 presents a provincial outline of public services and Table 3.3.2 reflects the number of public facilities and services by municipality (refer to Table 3.3.1, Data Report).

3.3.3 Education

The province has a total of 427 schools consisting of 361 elementary schools, 53 high schools and 13 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 Families by Income Class

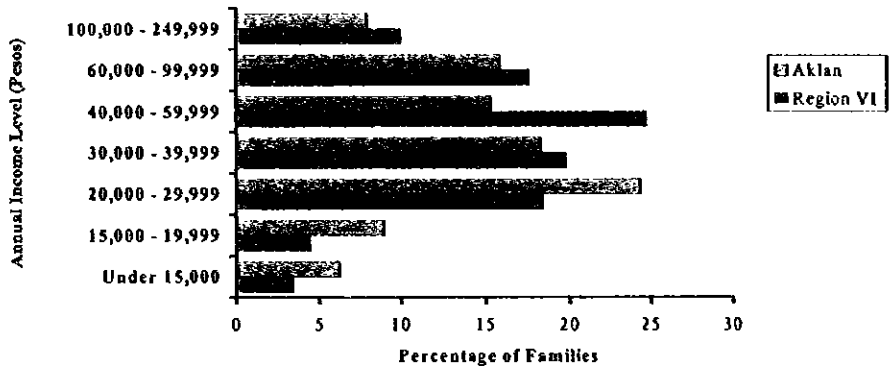


Figure 3.3.2 Employment Distribution by Major Industry and Class of Worker

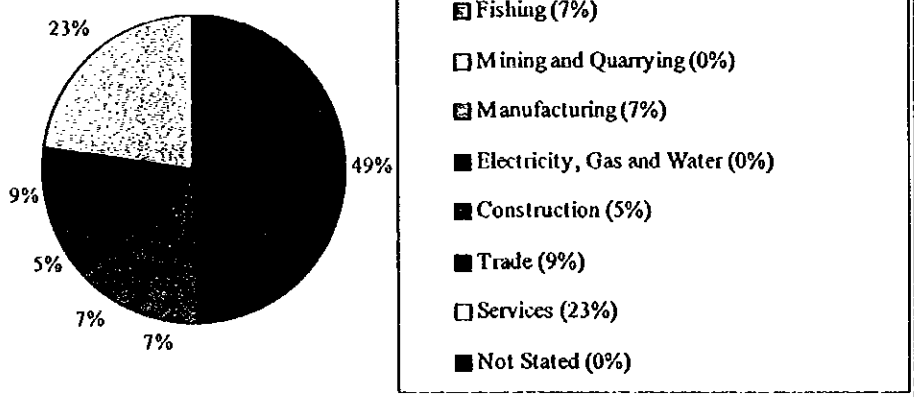


Figure 3.3.1 Distribution of Families by Income Class

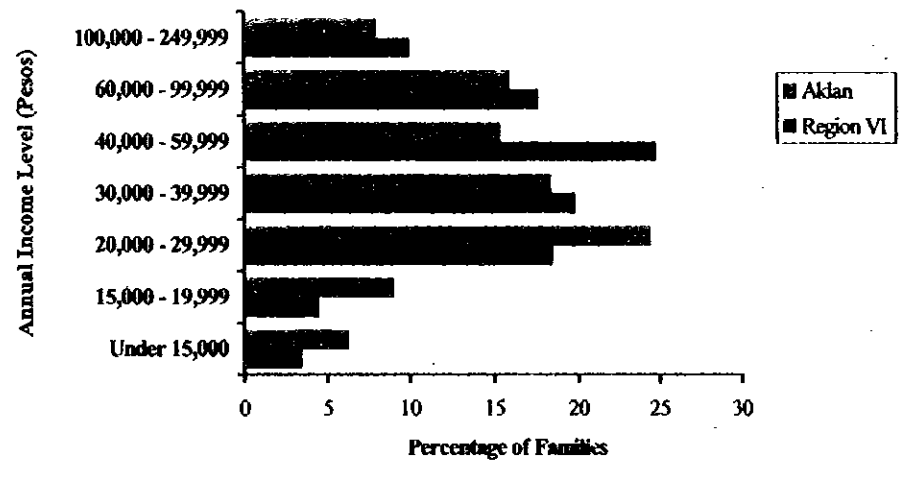


Table 3.3.1 Provincial Outline on Public Services

Item	Unit	Value	Item	Unit	Value
(1) Roads			(8) Tourism facilities	Number	150
a) Total length	Km	1,228.95	(Hotel resort, lodges, recreational		
b) Barangay roads	Percent	58.54	facilities, etc.)		
(2) Electricity service coverage			(9) Schools		
a) Municipality	Percent	100	a) Elementary level	Number	361
b) Barangay	Percent	72.47	b) Secondary level	Number	53
c) Household	Percent	51	c) Tertiary level/Technical	Number	13
(3) Telecommunication Services			(10) Health Facilities		
a) Availability in municipality	Percent	100	a) Hospital	Number	16
b) Telegraph station	Number	17	b) Main health centers, rural health	Number	118
c) Telephone station	Number	17	units, barangay health center, etc		
(4) Post Office	Number	28	(11) Labor		
			a) Labor force participation ratio	Percent	65.7
(5) Transportation services	Mode	Bus, PUV, .	b) Employment rate	Percent	93.3
	(ex. Bus,	Taxi, Rent a car,			
	jeep, taxi,)	Tricycle, pumpboat,	(12) Average family income		
		airplane	a) Monthly income	Pesos/Month	5,053
(6) Banking Facilities	Number		b) Monthly expenditure	Pesos/Month	3,287
a) Private bank	(by Private	25			
b) Public bank	and public)	3			
(7) Industrial/ business/					
commercial establishment	Number	1,335			

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	High School			Vocational School	College	Hospital	Public Market	Bank and Financing Institution
	Public	Private	Total					
	nos.	nos.	nos.	nos.	nos.	nos.	nos.	nos.
Altavas	1		1			1	2	1
Balete	3	1	4				2	1
Banga	3	1	4		1		1	1
Batan	5	2	7				1	1
Buruanga		1	1	1		1	1	1
Ibajay	4	2	6		1	1	1	1
Kalibo (Capital)	3	3	6	1	6	4	2	12
Lezo		1	1				1	1
Libacao				1		1	1	1
Madalag	1		1			1	1	1
Makato	1	1	2				1	1
Malay	2		2			2	1	1
Malinao	4	1	5	1			1	1
Nabas	4	1	5				1	1
New Washington	2		2		1		1	1
Numancia	2	2	4				1	1
Tangalan	2		2				1	1
Provincial Total	37	16	53	4	9	11	20	28

3.4 Population

3.4.1 Previous Population Development

A fluctuating provincial population growth rate had been experienced since the last six (6) census years (1960-1995) as indicated in Figure 3.4.1. From an average annual growth rate of 1.53% during the period 1960 to 1970, it increased to 2.18% (1970-1975) and again decreased to 1.43% (1990-1995). A summary of the average annual growth rates of the province is as follows:

Year	Population	Ave. Annual Growth Rate (%)	Period
1970	263,358	1.53	1960 - 1970
1975	293349	2.18	1970 - 1975
1980	324,563	2.04	1975 - 1980
1990	380,497	1.60	1980 - 1990
1995	410,539	1.43	1990 - 1995

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

The 1998 population was estimated to provide the planning base for this Master Plan (refer to Section 8.3.1 Population Projection, Main Report). Table 3.4.1 shows a breakdown of the past population development by municipality from 1948 to 1995.

Figure 3.4.1 Previous Population Development of the Province

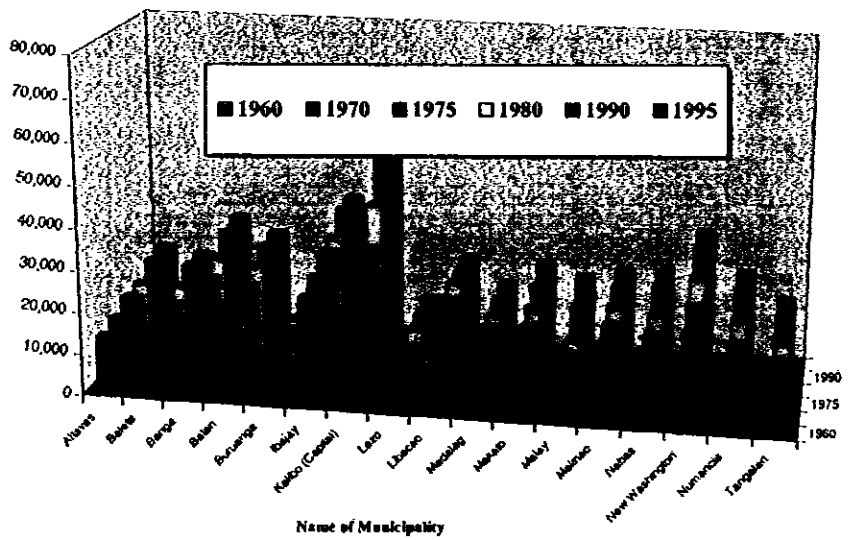


Table 3.4.1 Previous Population Development by Municipality

Municipality	Previous Population						
	1948	1960	1970	1975	1980	1990	1995
Altavas	10,238	13,325	14,519	16,855	17,443	20,531	21,475
Balete	10,835	12,677	14,310	15,827	17,300	19,842	19,972
Banga	17,977	18,582	21,560	22,462	25,034	28,651	30,071
Batan	14,714	17,466	20,025	21,248	23,393	25,710	26,415
Buruanga	12,514	8,393	9,291	10,311	10,764	12,653	12,665
Ibajay	24,086	25,305	27,129	30,343	31,214	35,640	36,184
Kalibo (Capital)	17,842	21,303	30,247	31,947	39,894	51,387	58,065
Lezo	6,008	5,942	6,890	8,224	9,625	10,343	11,536
Libacao	13,523	14,913	15,837	20,243	21,683	21,429	22,812
Madalag	8,664	10,883	12,440	14,209	14,128	15,166	16,659
Makato	9,939	11,951	13,287	14,972	16,732	19,230	21,955
Malay		6,816	7,623	8,770	9,120	14,378	19,406
Malinao	11,000	12,987	14,947	16,483	18,117	20,180	21,509
Nabas	10,442	11,879	13,850	15,051	16,607	20,538	21,391
New Washington	13,370	15,966	19,131	22,131	26,119	30,147	31,896
Numancia	9,065	10,194	12,285	13,764	16,216	19,899	22,356
Tangalan	6,765	7,650	9,987	10,509	11,174	14,773	16,172
Provincial Total	196,982	226,232	263,358	293,349	324,563	380,497	410,539

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. Considering the 1995 NSO classification of urban and rural barangays there are 36 urban barangays and 291 rural barangays for a total of 327 barangays in 1998. Distribution of the classified areas is shown in Figure 3.4.1, Supporting Report.

3.4.3 Present Population Distribution

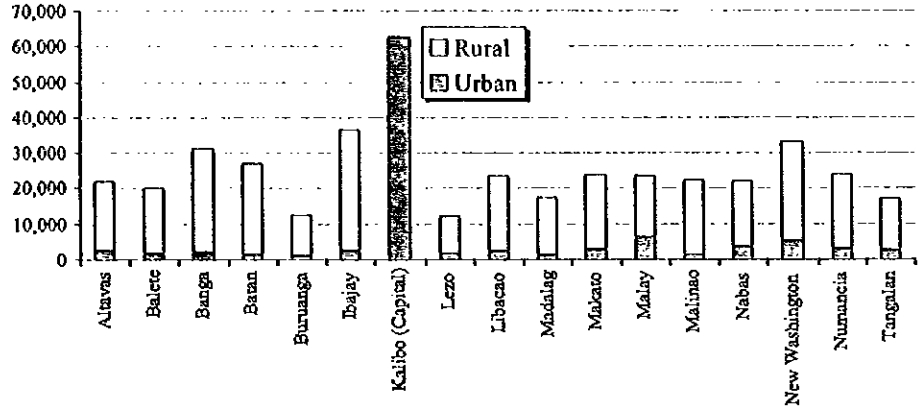
From the 1995 NSO census, the 1998 urban-rural population was estimated. Rural population accounts for 75.2% of the provincial total, while 24.8% is urban as reflected in Figure 3.4.2. Table 3.4.2 presents the breakdown of the number of urban and rural barangays by municipality and its corresponding present population distribution.

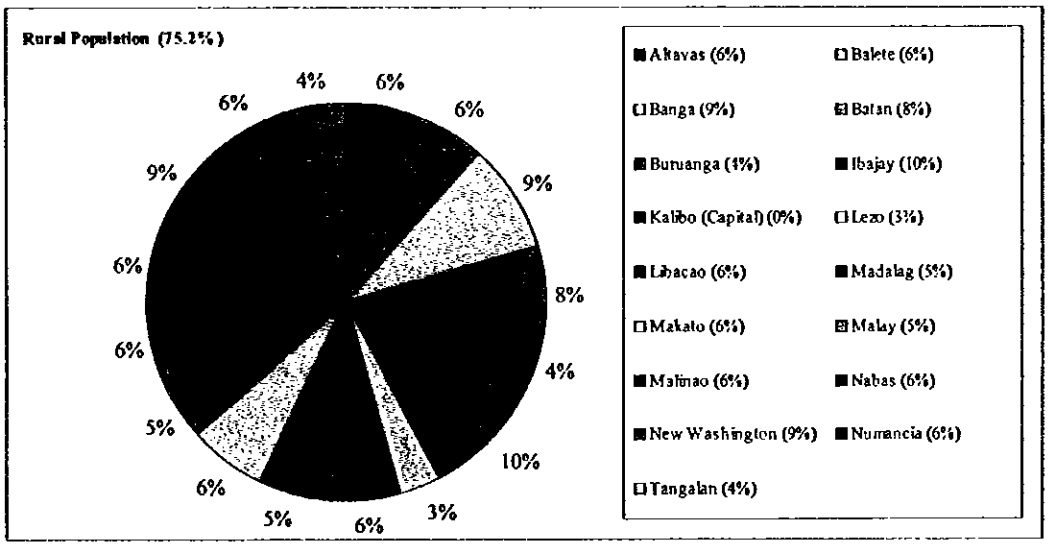
There are 83,281 households with 62,558 residing in rural areas and 20,723 households in urban areas. The average provincial household size is 5.19 persons/household. Table 3.4.3 presents a breakdown per municipality on the number of households and household sizes by urban and rural area.

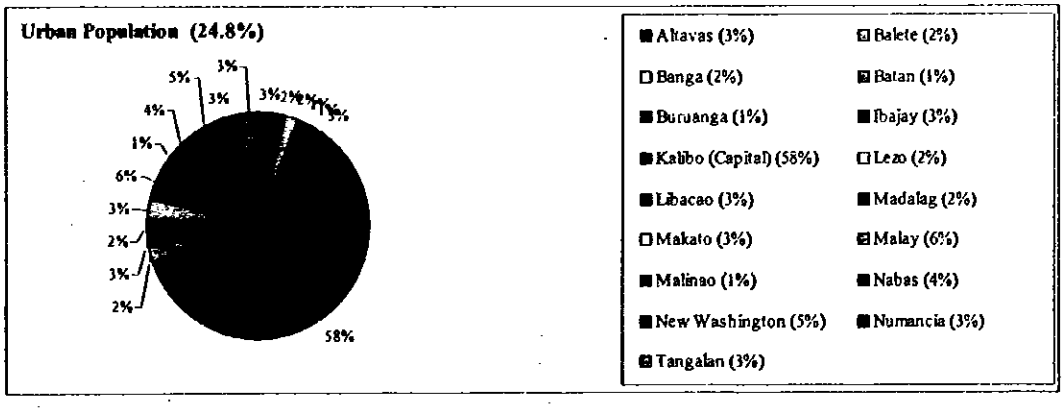
Table 3.4.2 Outline of Urban and Rural Areas in the Province

Name of Municipality	Number of Barangay			Population (1998)		
	Urban	Rural	Total	Urban	Rural	Total
Altavas	1	13	14	2,829	19,311	22,140
Balete	1	9	10	1,727	18,392	20,119
Banga	1	29	30	2,155	28,914	31,069
Batan	1	19	20	1,569	25,377	26,946
Buruanga	1	14	15	1,181	11,535	12,716
Ibajay	1	34	35	2,738	33,926	36,664
Kalibo (Capital)	16		16	62,774		62,774
Lezo	1	11	12	1,969	10,393	12,362
Libacao	1	23	24	2,808	20,959	23,767
Madalag	1	24	25	1,657	16,032	17,689
Makato	1	17	18	2,928	20,926	23,854
Malay	2	15	17	6,484	17,000	23,484
Malinao	1	22	23	1,544	20,893	22,437
Nabas	2	18	20	3,899	18,098	21,997
New Washington	1	15	16	5,139	28,002	33,141
Numancia	2	15	17	3,154	20,910	24,064
Tangalan	2	13	15	2,834	14,301	17,135
Provincial Total	36	291	327	107,389	324,969	432,358

Figure 3.4.2 Present Population Distribution







. Table 3.4.3 Household Numbers and Household Size

Municipality	Number of Households (1995)			Number of Households (1998)			1995 Household Size (person/household)		
	Urban	Rural	Total	Urban	Rural	Total	Urban	Rural	Total
Altavas	505	3,588	4,093	521	3,699	4,220	5.43	5.22	5.25
Balete	341	3,613	3,954	344	3,640	3,983	5.03	5.05	5.05
Banga	408	5,480	5,888	421	5,662	6,083	5.11	5.11	5.11
Batan	339	5,006	5,345	346	5,107	5,452	4.54	4.97	4.94
Buruanga	223	2,311	2,534	224	2,320	2,544	5.27	4.97	5.00
Ibajay	523	6,856	7,379	530	6,947	7,477	5.17	4.88	4.90
Kalibo (Capital)	11,281		11,281	12,196		12,196	5.15		5.15
Lezo	388	1,944	2,332	416	2,083	2,499	4.73	4.99	4.95
Libacao	508	3,634	4,142	529	3,786	4,315	5.31	5.54	5.51
Madalag	269	2,598	2,867	286	2,759	3,044	5.80	5.81	5.81
Makato	514	3,536	4,050	558	3,842	4,400	5.24	5.45	5.42
Malay	982	2,676	3,658	1,188	3,238	4,427	5.46	5.25	5.31
Malinao	303	3,791	4,094	316	3,955	4,271	4.88	5.28	5.25
Nabas	757	3,441	4,198	778	3,539	4,317	5.01	5.11	5.10
New Washington	931	5,167	6,098	967	5,369	6,336	5.31	5.22	5.23
Numancia	539	3,725	4,264	580	4,010	4,590	5.44	5.22	5.24
Tangalan	493	2,458	2,951	522	2,604	3,127	5.43	5.49	5.48
Provincial Total	19,304	59,824	79,128	20,723	62,558	83,281	5.18	5.19	5.19

3.5 Health Status

3.5.1 Morbidity, Mortality and Infant Mortality

Based on the 1995 PHO health statistics, the number one cause of morbidity in Aklan was diarrhea, a water related disease, followed by pneumonia, bronchitis, influenza and TB pulmonary. Diseases of the nervous system, heart diseases and dengue fever ranked sixth, seventh and eighth, respectively. Regarding mortality, the number one cause was pneumonia, followed by acute respiratory infection. Other accidents and nutritional deficiencies ranked third and fourth, respectively. Pneumonia, congenital anomalies, diarrhea and prematurity were the 4 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 fair compared with the national condition. The incidence of diseases was lower in Aklan 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 1st), and dengue fever (8th). These were no water-related diseases in the ten leading causes of mortality. Diarrhea, (rank 3rd) was among the ten leading causes of infant mortality.

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

Rate: 1/100,000

	Causes	Aklan		Philippines		
		Number	Rate	Number	Rate	Ranking
Morbidity	1. Diarrhea	5,101	1,179.80	1,337,449	1,996.7	1
	2. Pneumonia	4,866	1,125.50	470,574	702.5	4
	3. Bronchitis	4,019	929.60	903,508	1,348.9	2
	4. Influenza	1,670	386.30	609,471	909.9	3
	5. Tuberculosis	1,323	306.00	159,049	237.5	6
	6. Nervous System	1,293	299.10	-		
	7. Heart Diseases	655	151.5	111,874	167.0	7
	8. Dengue Fever	350	81	-		
	9. Venerial Diseases	337	77.9	-		
	10. Measles	257	59.4	85,345	127.4	8
Mortality	1. Pneumonia	438	101.3	35,582	53.1	3
	2. ARI	304	70.3	24,580	36.7	5
	3. Other Accidents	163	37.7	13,477	20.1	6
	4. Nutritional Deficiencies	54	12.5	-		
	5. Obstructive Pulmonary	50	11.6	11,154	16.7	3.5
	6. Other Diges. Diseases	47	10.9	-		
	7. Kidney/ Nephritis	45	10.4	5,510	8.2	10
	8. Diabetes Mellitus	44	10.2	-		
	9. Anemias	35	8.1	-		
	10. Chronic Liver Disease	31	7.2	-		
Infant Mortality	1. Pneumonia	74	17.1	7,631	4.5	1
	2. Congenital Anomalies	30	6.9	2,366	1.4	3
	3. Diarrhea	15	3.5	1,661	1.0	4
	4. Prematurity	9	2.1	-		
	5. Nutritional Deficiencies	6	1.4	925	0.6	6
	6. ARI	5	1.2	5,651	3.4	2
	7. Septicemia	3	0.7	1,252	0.7	5
	8. Meningitis	3	0.7	-		
	9. Other Diges. Diseases	3	0.7	-		
	10. Tetanus	2	0.5	-		

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 typhoid/parathyphoid, intestinal parasitism, diarrhea, conjunctivities, cholera, dengue fever, viral hepatitis, gastroenteritis/colitis, and scabies. Table 3.5.2 presents the reported cases and deaths of notifiable water-related diseases in the province.

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

Rate: 1/100,000

Diseases	Morbidity		Mortality		Infant Mortality	
	Number	Rate	Number	Rate	Number	Rate
Water-borne						
1. Diarrhea	5,101	1,179.80	19	4.39	15	3.5
2. Typhoid/parathyphoid	140	32.38				
3. Cholera	1	0.23				
4. Viral hepatitis	135	31.22				
5. Gastoenteritis Colitis			8	1.85		
Water-washed						
1. Intestinal parasitism	26	6.0				
2. Conjunctivities	32	7.4				
3. Scabies	30	6.9				
Water vector						
1. Dengue/H-fever	350	81.0				

3.5.3 Health Facilities and Practitioners

Present facilities serving the health care of the populace are 12 hospitals, 19 rural health units and 108 barangay health stations. The ratio of the population to these facilities and to the health practitioners are relatively higher as compared to the national average figures (refer to Table 3.5.1 number and ratio of population to health facilities and/or medical practitioners, Supporting Report).

3.6 Environmental Conditions

3.6.1 General

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

3.6.2 Water Pollution

There are no existing sanitary sewerage systems in the province. Majority of the drainage facilities in all municipalities is open canals or ditches. The rivers and streams function as

the drainage system. These rivers receive the domestic wastewater and storm water collected by the segmented drainage facilities in urban centers or poblacions (refer to the types of drainage facilities in Table 3.6.1, Supporting Report).

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

Domestic sewage is identified as potential pollution source 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 3.6.2 DENR Water Quality Criteria/Water Usage and Classification, Supporting Report).

3.6.3 Solid Waste Disposal

Of the 17 municipalities, 10 have municipal refuse collection and disposal services as of 1998 (details are referred to in Table 3.6.1, Data Report). These municipalities have 1 to 2 units each of open dump truck. Only Kalibo has a closed type truck. In the province, 13% of the households is served, while the majority (87%) 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		
Altavas	4,220				983		983	3,002	185	50	3,237	23	77
Balete	3,983	1		1	478		478	3,505			3,505	12	88
Banga	6,083	1		1	395		395	1,324	464	3,900	5,688	6	94
Batan	5,452	1		1	403		403	3,803	833	413	5,049	7	93
Buruanga	2,544				208		208	1,936	220	180	2,336	8	92
Ibajay	7,477	1		1	368		368	7,109			7,109	5	95
Kalibo (Capital)	12,196	1	1	2	2,415		2,415	4,721	2,316	2,744	9,781	20	80
Lezo	2,499	1		1	240		240	2,259			2,259	10	90
Libacao	4,315	1		1	617		617	3,698			3,698	14	86
Madalag	3,044				410		410	1,744	845	45	2,634	13	87
Makato	4,400				836		836	248	1,554	1,762	3,564	19	81
Malay	4,427	2		2	950		950	2,119	978	380	3,477	21	79
Malinao	4,271				70		70	3,288	408	505	4,201	2	98
Nabas	4,317				415		415	3,662	130	110	3,902	10	90
New Washington	6,336	1		1	475		475	5,861			5,861	7	93
Numancia	4,590	1		1	1,697		1,697		1,612	1,281	2,893	37	63
Tangalan	3,127				250		250	1,304	993	580	2,877	8	92
Provincial Total	83,281	11	1	12	11,210		11,210	49,583	10,538	11,950	72,071	13	87

Chapter 4

EXISTING FACILITIES AND SERVICE COVERAGE

4. EXISTING FACILITIES AND SERVICE COVERAGE

4.1 Water Supply

4.1.1 General

Existing water supply facilities and conditions were surveyed by municipality under the category of urban and rural areas (as of October 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 25% in urban area and 75% in rural area) is considered as adequately served (refer to 4.1, Supporting Report for the detailed study). Under the area classification, 75% of urban population and 59% of rural population have access to safe water sources/facilities, while the rest is underserved or unserved. About 194,600 persons or 72% of the served population depend on Level I facilities, while about 77,400 persons or 28% 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 11 Level III systems in the province, of which majority is utilizing deep well sources. They are 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:

- 5 Water Districts covering 7 municipalities of Ibajay, Kalibo, Lezo, Libacao, Makato, Malinao and Numancia;
- 1 Municipal waterworks in the municipality of Altavas;
- 5 systems operated by association/cooperative in the municipalities of Batan, Ibajay, Madalag and Numancia.

The Kalibo Water District (KWD) is the largest system in the province, covering 30 urban barangays with served population of about 30,200 corresponding to about 50% of the urban population in Kalibo. Water source of KWD is 3 units of deep wells with total production capacity of 7,600m^3/d. The KWD is currently undertaking a project including expansion of its system to Banga and New Washington by the year 2005 with the assistance of LWUA.

Following Kalibo WD is the Numancia WD, the second largest system in the province. The WD covers a total of 17 urban and 20 rural barangays of Lezo, Makato and Numancia with a total served population of 9,800 in provision of deep well source. In the municipality of Numancia, there is another Level III system operated by a cooperative, aside from the WD.

In the municipality of Ibajay, there are three (3) systems. Ibajay WD covers 2 rural barangays with served population of 1,400 in provision of deep well source. MCRWSA covers 2 rural barangays with served population of 1,100. Rizal WWs using spring source covers 3 rural barangays with served population of 5,600.

Other municipalities such as Altavas, Batan, Libacao, Madalag and Malinao have Level III systems managed by WDs/LGUs/cooperative, with their population served ranging from 200 to 2,700 in provision of deep well sources.

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 Lezo, Makato and Numancia. Lack of due consideration in D/D stage for expansion of the system was also observed.

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

The other 7 municipalities such as Balete, Banga, Buruanga, Malay, Nabas, New Washington and Tangalan have no Level III system/s both in urban and rural area at present. However, the Philippine Tourism Authority is now constructing a new system installing a submarine transmission pipe between Boracay Island (Malay) and main island.

Table 4.1.2 Information on Existing Level III System

Name of Municipality	Name of Operating Body	Water Consumption			Service Coverage								
					No. of Brgys. Served			No. of Household Served			No. of Population Served		
		Type of Water Source	Water Consumption (cu.m/day)	Domestic Supply (%)	Urban	Rural	Total	Urban	Rural	Total	Urban	Rural	Total
Altavas	Altavas	DW	20	N.A.	1		1	35		35	200		200
Batan	Batan RWW	DW	174	N.A.	1	3	4	245	102	347	1,225	510	1,735
Ibajay	Ibajay WD	DW	2,322	72		2	2		270	270		1,350	1,350
	MCRWSA	DW	60	98		2	2		228	228		1,140	1,140
	Rizal WW	SP	562	97		3	3		1,124	1,124		5,618	5,618
	Municipal Total	DW/SP	2,944	87		7	7		1,622	1,622		8,108	8,108
Kalibo	Kalibo WD	DW	4,946	85	30		30	5,865		5,865	30,205		30,205
Lezo	Numancia WD (a)	DW	336	99	1	5	6	139	259	398	1,295	829	2,124
Libacao	Libacao WD	DW	156	100		1	1		318	318		2,695	2,695
Madalag	Madalag WW	DW/SP	70	100	1		1	116		116	696		696
Makato	Numancia WD (b)	DW	178	96	1	2	3	251	102	353	1,506	612	2,118
Malinao	Malinao WD	DW	218	100	1	4	5	300	137	437	1,500	684	2,184
Numancia	CBCP	DW	164	99		5	5		327	327		1,635	1,635
	Numancia WD (c)	DW	921	96	1	10	11	130	791	921	780	4,746	5,526
	Municipal Total	DW	1,085	87	1	15	16	130	1,118	1,248	780	6,381	7,161
Provincial Total			8,919	10,127	37	37	74	7,081	3,658	10,739	37,407	19,819	57,226

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		
Ibajay WD	270		106		376	376	6,480	69,660
Kalibo WD	5,865		819		6,684	6,684		148,380
Numancia WD	1,660	25	35		1,720	1,719	71,550	43,050
Libacao WD	320				320	318	5,940	4,680
Malinao WD	364				364	364	6,480	

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 61 Level II systems in 13 municipalities in the province. The majority is utilizing spring sources (56 systems), while 5 systems use shallow/deep wells (details are referred to in Table 4.1.2, Supporting Report). The municipality of Nabas has the largest number, 12 systems or 21% of the total as shown in Table 4.1.4 together with service coverage in 1998. One system in Libacao is managed by Water District.

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

With regard to water tariff, some waterworks using spring source impose a flat rate water charge of mostly 10 to 20 Pesos/HH/month and the rest supplies water free of charge. While five (5) systems using electric pump collect water charge, however, detailed information was not available except for Libacao WD during the course of PW4SP preparation. Regarding repair works, some waterworks collect money from beneficiaries and hire local contractor and others, request for assistance of MEO, as required. 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

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

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 has not been conducted sufficiently.

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

Table 4.1.4 Information on Existing Level II System

Name of Municipality	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
Altavas	Cabangila WS		1	1		35	35		175	175
	Catmon WS		1	1		35	35		175	175
	Linayasan WW		1	1		50	50		250	250
	Tibao WS	1	3	4	5	15	20	25	75	100
	Tibiao SDA		1	1		15	15		75	75
	Municipal Total	1	7	8	5	150	155	25	750	775
Balete	Aranas		1	1		25	25		125	125
	Balete WD	1	2	3	15	25	40	75	125	200
	Calizo		1	1		25	25		125	125
	Municipal Total	1	4	5	15	75	90	75	375	450
Banga	Daguitan		1	1		70	70		350	350
	Pagsanghan		1	1		65	65		325	325
	Sibalew		1	1		150	150		750	750
	Sigcay		1	1		85	85		425	425
	Municipal Total		4	4		370	370		1,850	1,850
Batan	Caiyang		1	1		25	25		125	125
	Magubahay		1	1		20	20		100	100
	Municipal Total		2	2		45	45		225	225
Buruanga	Bagongbayan		1	1		65	65		325	325
	Bel-is		1	1		20	20		100	100
	Habana		1	1		75	75		375	375
	Lindero		1	1		45	45		225	225
	Nazareth		1	1		140	140		700	700
	Poblacion	1	2	3	50	105	155	250	525	775
	Santander		1	1		95	95		475	475
	Municipal Total	1	8	9	50	545	595	250	2,725	2,975
Ibajay	Agbago SDS		1	1		25	25		125	125
	Antipolo SDS		1	1		55	55		275	275
	Mabusao SDS		1	1		25	25		125	125
	Regador WWA		1	1		35	35		175	175
	Municipal Total		4	4		140	140		700	700
Libacao	Agmailig		1	1		45	45		225	225
	Guadalupe BWSA		1	1		125	125		625	625
	Libacao WD		1	1		60	60		300	300
	Municipal Total		3	3		230	230		1,150	1,150
Madalag	Napnot SDA		1	1		80	80		400	400
	Paningayan SDA		1	1		40	40		200	200
	Municipal Total		2	2		120	120		600	600
Makato	Bag-ong Barrio		1	1		65	65		325	325
	Castillo (DPWH)		1	1		25	25		125	125
	Castillo (JICA)		1	1		255	255		1,275	1,275
	Castillo BWSA		1	1		25	25		125	125
	Libang		1	1		125	125		625	625
	Municipal Total		5	5		495	495		2,475	2,475
Malay	Argao WS		1	1		125	125		625	625
	Cogon WS		1	1		50	50		250	250
	Dumlog and Naasog		2	2		105	105		525	525
	Kabulihan WS		1	1		50	50		250	250
	Nabaóy WS		1	1		150	150		750	750
	Municipal Total		6	6		480	480		2,400	2,400

Table 4.1.4 Information on Existing Level II System

(contd)

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
Malinao	Bulabud		1	1		25	25		125	125
	Cabayugan		1	1		40	40		200	200
	San Dimas		1	1		35	35		175	175
	Tambu-an		1	1		45	45		225	225
	Tigpalas		1	1		20	20		100	100
	Municipal Total		5	5		165	165		825	825
Nabas	Buenafortuna CWS		1	1		50	50		250	250
	Gibon CWS	1		1		100	100		500	500
	Habana CWS		1	1		20	20		100	100
	Laserna CWS		1	1		50	50		250	250
	Liberty SCWS		1	1		75	75		375	375
	Magallanes CWS		1	1		45	45		225	225
	Matabana CWS		1	1		80	80		400	400
	Pinatuad CWS		1	1		50	50		250	250
	Solido WS		1	1		60	60		300	300
	Tagororoc (PCHO)		1	1		25	25		125	125
	Tagororoc CWS		1	1		125	125		625	625
	Unidos CWS		1	1		100	100		500	500
Nabas	Municipal Total	1	11	12		780	780		3,900	3,900
Tangalan	Jawili		1	1		125	125		625	625
	Lanipga SWA		1	1		20	20		100	100
	Pudiot BWSA		3	3		40	40		200	200
	Tagas		1	1		60	60		300	300
	Municipal Total		6	6		245	245		1,225	1,225
Provincial Total		4	67	71	70	3840	3910	350	19200	19550

4.1.5 Level I Facilities

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

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

Of the 21,462 operational Level I facilities, 60% are shallow wells. According to the study on safe/unsafe percentage for shallow well, 40% 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, 9,793 Level I facilities are classified as safe sources, while 9,559 facilities are under unsafe sources.

Percentage shares between public and private Level I facilities for rural water supply is 15% and 85%, respectively. The share of developed springs in public facilities is 7% (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 a barangay resolution of request for the repair to the municipal government. The municipal government assists them in case t 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 4.1.5 Information on Existing Level I Facilities

Name of Municipality	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
Altavas	72	169	1	3	245	113	149		20	282	272	1,621	1,894	1,480	8,464	9,944
Balete	7	37	5	2	51	25	778			803	170	211	380	852	1,066	1,918
Banga		108		2	110	72			20	92	400	2,773	3,172	2,044	14,159	16,203
Batan	34	175	45	2	256	116	802		98	1,016	1	1,622	1,623	5	8,059	8,065
Buruanga	11	69		11	91	46				46	102	956	1,058	536	4,753	5,289
Ibajay	301	1,423	116	62	1,902	949	86		9	1,044	416	3,267	3,683	2,147	15,956	18,103
Kalibo (Capital)	18	734			752	489				489	3,616		3,616	18,614		18,614
Lezo	28	247			275	165	87		26	278	74	1,118	1,192	351	5,576	5,927
Libacao	676	228	362	52	1,318	152	308		50	510	421	1,845	2,265	2,231	10,213	12,444
Madalag	32	115	4	13	164	76	256		453	785	39	487	526	227	2,828	3,056
Makato	53	538	56	4	651	358	71		7	436	153	1,861	2,014	800	10,139	10,939
Malay	8	190	20	7	225	127	52		91	270	538	1,137	1,674	2,933	5,967	8,900
Malinao	1,315	183		7	1,505	122	982			1,104	9	2,274	2,283	44	12,017	12,061
Nabas		1,285		15	1,300	856				856	465	1,747	2,212	2,331	8,934	11,266
New Washington		320	804		1,124	214				214	896	4,707	5,602	4,759	24,549	29,307
Numancia	13	1,511	3		1,527	1,008	71		16	1,095	336	2,266	2,602	1,829	11,816	13,645
Tangalan	33	361		11	405	240				240	306	1,329	1,635	1,658	7,299	8,957
Provincial Total	2,601	7,693	1,416	191	11,901	5,128	3,642		790	9,560	8,213	29,220	37,432	42,843	151,793	194,635

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.	572	1,771	2,029	11,050	15,422
	Percent	43	23	88	94	66
Non-Functioning	No.	767	6,069	283	755	7,874
	Percent	57	77	12	6	34
Total Number		1,339	7,840	2,312	11,805	23,296

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 affected by surrounding environmental conditions and the simple construction method applied (driving well point) that makes rehabilitation works difficult.

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

4.1.6 Water Supply Service Coverage

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

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

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

- Service percentage/population by Level III and Level II systems was estimated based on the questionnaire survey results.
- Unserved population was estimated using the percentages of unserved households to the total number of households by urban and rural area based on questionnaire and the 1990 population census data; "Households by Main Source of Drinking Water and City/Municipality" with modifying maximum 20% in consideration of current situation.
- 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 (75% of urban population and 59% of rural population).

The percentage of underserved population is estimated at 26% of the total population (16% of urban population and 29% of rural population) who are depending on unsafe sources/facilities.

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

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

Percentage shares of population coverage by Level I public and private facilities in rural water supply are estimated at 48% and 52%, 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 Malinao (97% of urban population), Batan (78%), Makato (51%), Kalibo (48%) and Lezo (48%).

With regard to Level II system in rural areas, 2 to 24% of service coverage were observed in some municipalities. However, piped system including Level III systems have not been fully developed in the entire province (3% for Level II and 13% for Level III systems) at present.

Taking into account the municipal service coverage, of the 17 municipalities/city of the province, 10 are above the average provincial service coverage of 63% in terms of served population. The highest coverage is seen in New Washington at 88% (93% for urban and 87% for rural area with Level I), followed by Numancia at 86% (82% for urban and 87% for rural area), Kalibo at 78% and Ibajay at 75% (78% for urban and 75% for rural area).

In contrast to the above, 7 municipalities/city are below the provincial average. The lowest is Balete at 12%, followed by Madalag (25%) and Batan (37%). The low coverage of these municipalities is considered to arise from a large number of underserved population (about 40 - 70%) using unsafe water sources.

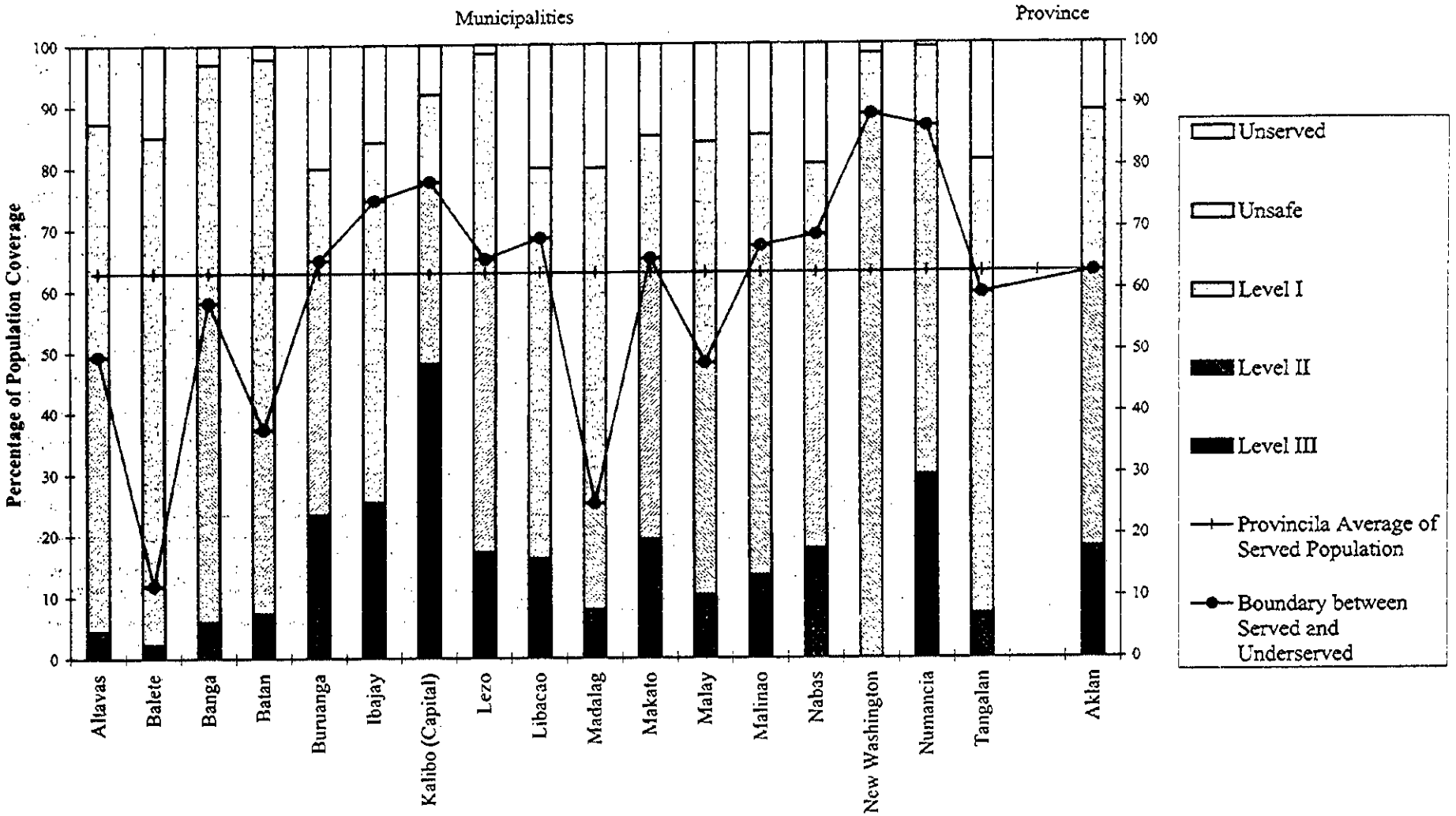
Table 4.1.7 Water Supply Service Coverage by Municipality

Name of Municipality	Area	Population (1998)	Population Coverage							Percentage of Population Coverage						
			Served by Safe Source				Underseved/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
Altavas	Urban	2,829	200	25	1,480	1,705	788	336	1,124	7	1	52	60	28	12	40
	Rural	19,311		750	8,464	9,214	7,643	2,454	10,097		4	44	48	40	13	52
	Total	22,140	200	775	9,944	10,919	8,431	2,790	11,221	1	4	45	49	38	13	51
Balete	Urban	1,727		75	852	927	455	344	800		4	49	54	26	20	46
	Rural	18,392		375	1,066	1,441	14,294	2,657	16,951		2	6	8	78	14	92
	Total	20,119		450	1,918	2,368	14,749	3,002	17,751		2	10	12	73	15	88
Banga	Urban	2,155			2,044	2,044		111	111			95	95		5	5
	Rural	28,914		1,850	14,159	16,009	12,061	844	12,905		6	49	55	42	3	45
	Total	31,069		1,850	16,203	18,053	12,061	955	13,016		6	52	58	39	3	42
Batan	Urban	1,569	1,225		5	1,230	279	59	339	78		0	78	18	4	22
	Rural	25,377	510	225	8,059	8,794	16,056	527	16,583	2	1	32	35	63	2	65
	Total	26,946	1,735	225	8,065	10,025	16,335	587	16,921	6	1	30	37	61	2	63
Buruanga	Urban	1,181		250	536	786	157	238	395		21	45	67	13	20	33
	Rural	11,535		2,725	4,753	7,478	1,751	2,306	4,057		24	41	65	15	20	35
	Total	12,716		2,975	5,289	8,264	1,908	2,544	4,452		23	42	65	15	20	35
Ibajay	Urban	2,738			2,147	2,147	41	550	591			78	78	2	20	22
	Rural	33,926	8,108	1,200	15,956	25,264	3,427	5,235	8,662	24	4	47	74	10	15	26
	Total	36,664	8,108	1,200	18,103	27,411	3,468	5,785	9,253	22	3	49	75	9	16	25
Kalibo (Capital)	Urban	62,774	30,205		18,614	48,819	8,858	5,097	13,955	48		30	78	14	8	22
	Rural															
	Total	62,774	30,205		18,614	48,819	8,858	5,097	13,955	48		30	78	14	8	22
Lezo	Urban	1,969	1,295		351	1,646	303	20	323	66		18	84	15	1	16
	Rural	10,393	829		5,576	6,405	3,828	160	3,988	8		54	62	37	2	38
	Total	12,362	2,124		5,927	8,051	4,130	181	4,311	17		48	65	33	1	35
Libacao	Urban	2,808			2,231	2,231	13	564	577			79	79	0	20	21
	Rural	20,959	2,695	1,150	10,213	14,058	2,708	4,193	6,901	13	5	49	67	13	20	33
	Total	23,767	2,695	1,150	12,444	16,289	2,721	4,757	7,478	11	5	52	69	11	20	31
Madalag	Urban	1,657	696	100	227	1,023	301	333	634	42	6	14	62	18	20	38
	Rural	16,032		600	2,828	3,428	9,395	3,209	12,604		4	18	21	59	20	79
	Total	17,689	696	700	3,056	4,452	9,696	3,542	13,237	4	4	17	25	55	20	75

Table 4.1.7 Water Supply Service Coverage by Municipality

Name of Municipality	Area	Population (1998)	Population Coverage							Percentage of Population Coverage						
			Served by Safe Source				Underseved/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
Makato	Urban	2,928	1,506		800	2,306	223	399	622	51		27	79	8	14	21
	Rural	20,926	612	2,475	10,139	13,226	4,546	3,154	7,700	3	12	48	63	22	15	37
	Total	23,854	2,118	2,475	10,939	15,532	4,769	3,553	8,322	9	10	46	65	20	15	35
Malay	Urban	6,484			2,933	2,933	3,102	449	3,551			45	45	48	7	55
	Rural	17,000		2,400	5,967	8,367	5,343	3,291	8,633		14	35	49	31	19	51
	Total	23,484		2,400	8,900	11,300	8,444	3,740	12,184		10	38	48	36	16	52
Malinao	Urban	1,544	1,500		44	1,544				97		3	100			
	Rural	20,893	684	825	12,017	13,526	4,039	3,329	7,367	3	4	58	65	19	16	35
	Total	22,437	2,184	825	12,061	15,070	4,039	3,329	7,367	10	4	54	67	18	15	33
Nabas	Urban	3,899			2,331	2,331	790	778	1,568			60	60	20	20	40
	Rural	18,098		3,900	8,934	12,834	1,750	3,513	5,264		22	49	71	10	19	29
	Total	21,997		3,900	11,266	15,166	2,540	4,291	6,831		18	51	69	12	20	31
New Washington	Urban	5,139			4,759	4,759	314	66	380			93	93	6	1	7
	Rural	28,002			24,549	24,549	2,965	488	3,453			88	88	11	2	12
	Total	33,141			29,307	29,307	3,280	554	3,834			88	88	10	2	12
Numancia	Urban	3,154	780		1,829	2,609	528	18	545	25		58	83	17	1	17
	Rural	20,910	6,381		11,816	18,197	2,578	135	2,713	31		57	87	12	1	13
	Total	24,064	7,161		13,645	20,806	3,106	152	3,258	30		57	86	13	1	14
Tangalan	Urban	2,834			1,658	1,658	773	402	1,176			59	59	27	14	41
	Rural	14,301		1,225	7,299	8,524	2,915	2,863	5,777		9	51	60	20	20	40
	Total	17,135		1,225	8,957	10,182	3,688	3,265	6,953		7	52	59	22	19	41
Provincial Total	Urban	107,389	37,407	450	42,843	80,700	16,925	9,764	26,689	35	0	40	75	16	9	25
	Rural	324,969	19,819	19,700	151,793	191,312	95,299	38,359	133,657	6	6	47	59	29	12	41
	Total	432,358	57,226	20,150	194,635	272,011	112,224	48,123	160,347	13	5	45	63	26	11	37

Figure 4.1.1 Water Supply Coverage of the Province



4.2 Sanitation and Sewerage

4.2.1 General

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

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

The Code on Sanitation of the Philippines provides the minimum standards for services dealing with public health. Specifically, Chapter XVII on Sewage Collection and Disposal, Excreta Disposal and Drainage (Implementing Rules and Regulations, 1995) defines alternatives for on-site sanitation and sewage collection and disposal. At present, the development of sewerage systems, even in the urban centers of the province is not given priority because of the huge investment cost it entails.

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

4.2.2 Types of Facilities and Definition of Service Level Standard

As set forth in the above-mentioned Resolution, the types of household toilet facilities commonly used are categorized into: 1) sanitary toilets - approved types of toilet facilities include water-sealed pour flush or flush-type toilets either with receiving pit or septic tanks/vaults, and ventilated improved pit latrines and sanitary pit privy (dry type) considering its low construction cost especially in rural areas and in areas where water is scarce; and 2) unsanitary facilities - include the types of facilities used for receiving and disposing human waste which do not fall under the category of approved types of toilet facilities such as open pit privy and

over-hung latrines (refer to Figure 4.2.1 DOH standard structure of a household toilet that meets the minimum requirements of a sanitary facility, Supporting Report).

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

Service level standard for both elementary and secondary school toilets is translated in terms of: 1) served students - students who are adequately covered by the DECS standard ratio of one (1) unit per 40 students with access to sanitary toilets (number of sanitary toilet units multiplied by 40); and (2) underserved or unserved students - those with unsanitary and without toilet facilities, and students unserved (based on the standard ratio) even though they have access to sanitary toilets. Service coverage of adequately served students was estimated both for public and private schools by municipality. Figure 4.2.2, Supporting Report shows a standard structure of a school toilet facility adopted by the DOH through the JICA-DPWH and DOH Rural Environmental Sanitation Project.

For public toilets, the service level is classified into: 1) served - utilities that have at least one (1) sanitary toilet, and 2) underserved or unserved - utilities that have unsanitary or without toilet facilities. Service coverage of public utilities was estimated as a percentage of sanitary facilities to the total number of utilities. Figure 4.2.3, Supporting Report shows a standard structure of a public toilet facility adopted by the DOH.

4.2.3 Sanitation Facilities and Service Coverage

(1) Household Toilets

The service coverage of sanitary toilets in the province is 70% of the total number of households. The rest is underserved or unserved. Of this, about 42% is without toilet facility (refer to 4.2.1, Supporting Report and 4.2.3, Sanitation Facilities and Service Coverage, Data Report).

Municipalities that have higher or equal service coverage from the provincial average of 70% are Kalibo and Makato (86%), Lezo and Nabas (84%), Malinao (76%), Malay and New Washington (75%), Banga (74%), and Numancia (70%). On the other hand, the

first 5 municipalities that registered the lowest service coverage are Buruanga (42%), Balete (45%), Madalag (52%), Batan (59%) and Altavas (60%). It was observed that in municipalities/city that have high water supply service coverage (Kalibo, New Washington, Numancia), high sanitation coverage occurs and correspondingly, in low water supply service coverage (Balete, Madalag), low sanitation coverage occurs. This can be attributed by the fact that the development of water supply almost always follows the upgrading of the household sanitation facilities because of access to water.

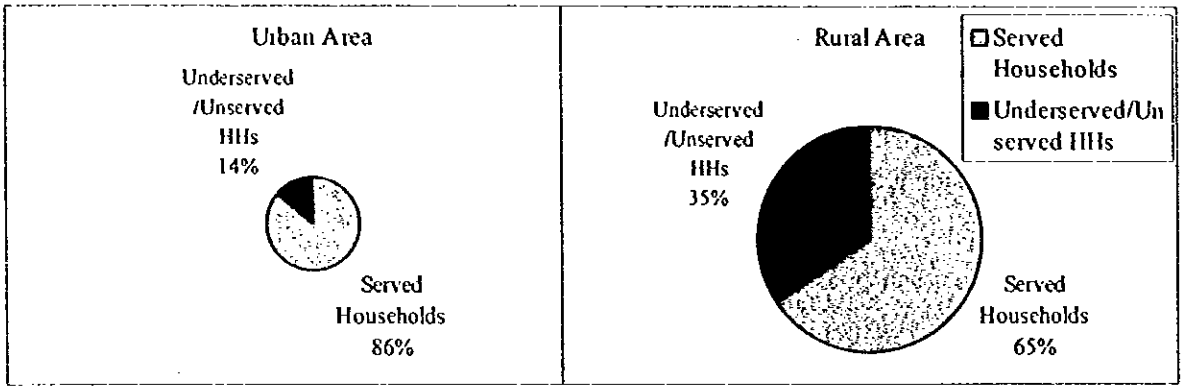
In urban areas, about 86% of the total households are served. A lower served household of 65% exists in rural area. Table 4.2.1 shows the municipal breakdown in the number of urban and rural household toilets by category, and service coverage. Figure 4.2.1 reflects the provincial service coverage of household toilet facilities for urban and rural areas.

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

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

Municipality	No. of Households, 1998			Household Toilet Facilities and Service Coverage											
				Urban				Rural				Municipal Total			
	Urban	Rural	Total	HHs Served by Sanitary Toilets		Underserved/ Unserved HHs		HHs Served by Sanitary Toilets		Underserved/ Unserved HHs		HHs Served by Sanitary Toilets		Underserved/ Unserved HHs	
				Number	% of HHs	Number	% of HHs	Number	% of HHs	Number	% of HHs	Number	% of HHs	Number	% of HHs
Altavas	521	3,699	4,220	396	76	125	24	2,145	58	1,554	42	2,541	60	1,679	40
Balete	344	3,640	3,983	344	100			1,433	39	2,207	61	1,777	45	2,207	55
Banga	421	5,662	6,083	400	95	21	5	4,084	72	1,578	28	4,484	74	1,599	26
Batan	346	5,107	5,452	329	95	17	5	2,910	57	2,197	43	3,239	59	2,214	41
Buruanga	224	2,320	2,544	204	91	20	9	866	37	1,454	63	1,070	42	1,474	58
Ibajay	530	6,947	7,477	360	68	170	32	4,400	63	2,547	37	4,760	64	2,717	36
Kalibo (Capital)	12,196		12,196	10,495	86	1,701	14					10,495	86	1,701	14
Lezo	416	2,083	2,499	391	94	25	6	1,700	82	383	18	2,091	84	408	16
Libacao	529	3,786	4,315	423	80	106	20	2,196	58	1,590	42	2,619	61	1,696	39
Madalag	286	2,759	3,044	218	76	68	24	1,357	49	1,402	51	1,575	52	1,470	48
Makato	558	3,842	4,400	549	98	9	2	3,231	84	611	16	3,780	86	620	14
Malay	1,188	3,238	4,427	1,088	92	100	8	2,244	69	994	31	3,332	75	1,094	25
Malinao	316	3,955	4,271	278	88	38	12	2,968	75	987	25	3,246	76	1,025	24
Nabas	778	3,539	4,317	738	95	40	5	2,897	82	642	18	3,635	84	682	16
New Washington	967	5,369	6,336	815	84	152	16	3,929	73	1,440	27	4,744	75	1,592	25
Numancia	580	4,010	4,590	501	86	79	14	2,726	68	1,284	32	3,227	70	1,363	30
Tangalan	522	2,604	3,127	396	76	126	24	1,695	65	909	35	2,091	67	1,035	33
Provincial Total	20,723	62,558	83,281	17,925	86	2,797	14	40,781	65	21,779	35	58,706	70	24,576	30

Figure 4.2.1 Provincial Service Coverage of Household Toilet Facilities, 1998



(2) School and Public Toilets

Toilet facilities in elementary and secondary schools for both public and private schools were investigated. The province has a total of 1,585 toilet units found in 352 schools. Sanitary toilets adequately serve 55% of the students. The rest, 45% is underserved or unserved. Meanwhile, sanitary toilets adequately serve 57% of the public school students. Table 4.2.2 provides the number and service coverage of school toilet facilities.

The number of sanitary school toilets is low to meet the service level standard of 40 students per sanitary facility. At present, the average ratio is about 70 students per sanitary toilet, which is almost double the standard level. A number of school toilets are not being used due to lack of water supply, destroyed plumbing fixtures and water tank seepage. Proper operation and maintenance are not usually done. In some areas, this problem is compounded when access to the sanitary facility is limited to only the teachers and guests.

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

There are 86 public toilets found in public markets, bus/jeepney terminals and parks/playgrounds in the province. About 98% of these public toilets are sanitary, while only 2% are considered unsanitary. Table 4.2.3 shows the number and service coverage of public utilities.

Public toilets at markets, bus/jeepney terminals and parks/playgrounds, although culturally acceptable, are improperly used and maintained resulting to unsanitary conditions. In most cases, no specific arrangements are made for the operation and maintenance and for the collection of fees to cover such costs. Although considered as sanitary because of the structure, most of the facilities have unsanitary conditions due to inadequate/lack of water supply and destroyed appurtenances because of vandalism.

Table 4.2.2 School Toilet Service Coverage by Municipality

Municipality		Number of School	Total No. of Student	Number of Toilet		Service Coverage			
				Sanitary	Unsanitary	Served	%	Unserved	%
Altavas	Public	20	6,636	74		2,960	45	3,676	55
	Private	4	177					177	100
	Total	24	6,813	74		2,960	43	3,853	57
Balete	Public	17	5,012	81		3,240	65	1,772	35
	Private	1	485	3		120	25	365	75
	Total	18	5,497	84		3,360	61	2,137	39
Banga	Public	31	4,373	117		4,373	100		
	Private	3	354					354	100
	Total	34	4,727	117		4,373	93	354	7
Batan	Public	20	7,278	46		1,840	25	5,438	75
	Private	1	215					215	100
	Total	21	7,493	46		1,840	25	5,653	75
Buruanga	Public	15	3,545	21		840	24	2,705	76
	Private	1	123	2		80	65	43	35
	Total	16	3,668	23		920	25	2,748	75
Ibajay	Public	16	3,929	55	6	2,200	56	1,729	44
	Private	2	1,112	8		320	29	792	71
	Total	18	5,041	63	6	2,520	50	2,521	50
Kalibo (Capital)	Public	19	13,792	287		11,480	83	2,312	17
	Private	12	7,279	88		3,520	48	3,759	52
	Total	31	21,071	375		15,000	71	6,071	29
Lezo	Public	12	3,110	58	4	2,320	75	790	25
	Private	1	256					256	100
	Total	13	3,366	58	4	2,320	69	1,046	31
Libacao	Public	21	5,705	83	5	3,320	58	2,385	42
	Private								
	Total	21	5,705	83	5	3,320	58	2,385	42
Madalag	Public	22	5,861	58	8	2,320	40	3,541	60
	Private	1	456					456	100
	Total	23	6,317	58	8	2,320	37	3,997	63
Makato	Public	18	5,362	66		2,640	49	2,722	51
	Private	1	403	4		160	40	243	60
	Total	19	5,765	70		2,800	49	2,965	51
Malay	Public	14	4,989	68	8	2,720	55	2,269	45
	Private	2	67	4		67	100		
	Total	16	5,056	72	8	2,787	55	2,269	45
Malinao	Public	26	5,700	96		3,840	67	1,860	33
	Private	1	329	3		120	36	209	64
	Total	27	6,029	99		3,960	66	2,069	34
Nabas	Public	23	6,655	80		3,200	48	3,455	52
	Private	1	552					552	100
	Total	24	7,207	80		3,200	44	4,007	56
New Washington	Public	19	6,444	70		2,800	43	3,644	57
	Private								
	Total	19	6,444	70		2,800	43	3,644	57
Numancia	Public	12	4,402	26		1,040	24	3,362	76
	Private	1	472	45		472	100		
	Total	13	4,874	71		1,512	31	3,362	69
Tangalan	Public	15	4,402	109		4,360	99	42	1
	Private			2					
	Total	15	4,402	111		4,360	99	42	1
Provincial Total	Public	320	97,195	1,395	31	55,493	57	41,702	43
	Private	32	12,280	159		4,859	40	7,421	60
	Total	352	109,475	1,554	31	60,352	55	49,123	45

Table 4.2.3 Public Toilet Facilities and Service Coverage in 1998

Municipality	Number of Sanitary Toilet			Number of Unsanitary Toilet			Total Number of PU Toilet	Served		Underserved	
	Public Market	Bus/Jeepney Terminal	Parks/ Playground	Public Market	Bus/Jeepney Terminal	Park/ Play-ground		Number of Sanitary Toilet	%	Number of Unsanitary Toilet	%
Altavas	4						4	4	100		
Balete	2						2	2	100		
Banga	4						4	4	100		
Batan	2	2	2				6	6	100		
Buruanga	2						2	2	100		
Ibajay	2	2					4	4	100		
Kalibo (Capital)	9	6	5				20	20	100		
Lezo	2	2					4	4	100		
Libacao	2						2	2	100		
Madalag	2	2					4	4	100		
Makato	2						2	2	100		
Malay	2		2	2			6	4	67	2	33
Malinao	2						2	2	100		
Nabas	8						8	8	100		
New Washington	4	2					6	6	100		
Numancia	2	4					6	6	100		
Tangalan	4						4	4	100		
Provincial Total	55	20	9	2			86	84	98	2	2

4.2.4 Sewerage Facilities

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