Chapter 1

INTRODUCTION

1. INTRODUCTION

1.1 Sector Development in the Philippines

The Government of the Philippines (GOP) has, over the last decade, with the assistance from external donors, made considerable progress in developing the water supply and sanitation sector. Developments have covered physical and institutional framework nationwide.

Nevertheless, infrastructure service delivery including this sector during the period 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.

The GOP has 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 1999-2003 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 Misamis Oriental 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 Misamis Oriental

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.

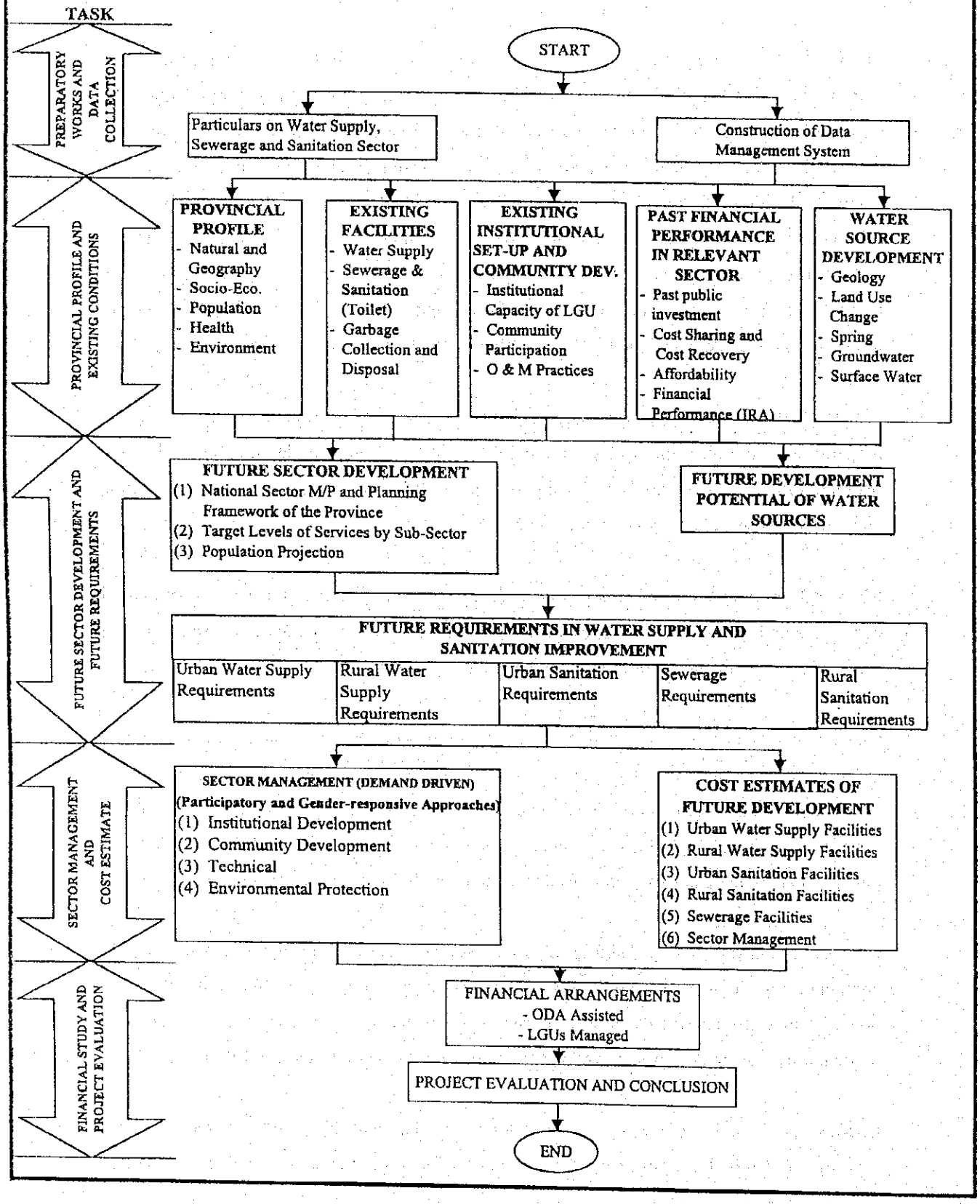
Chapter 3 provides the provincial profile with reference to current sector conditions: natural conditions and geographical features, socio-economic conditions, demographic trends, health status and environmental conditions as the planning environment.

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.

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

Figure 1.3.1
Flow Diagram of Sector Planning



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

2.6.2 Data Management

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

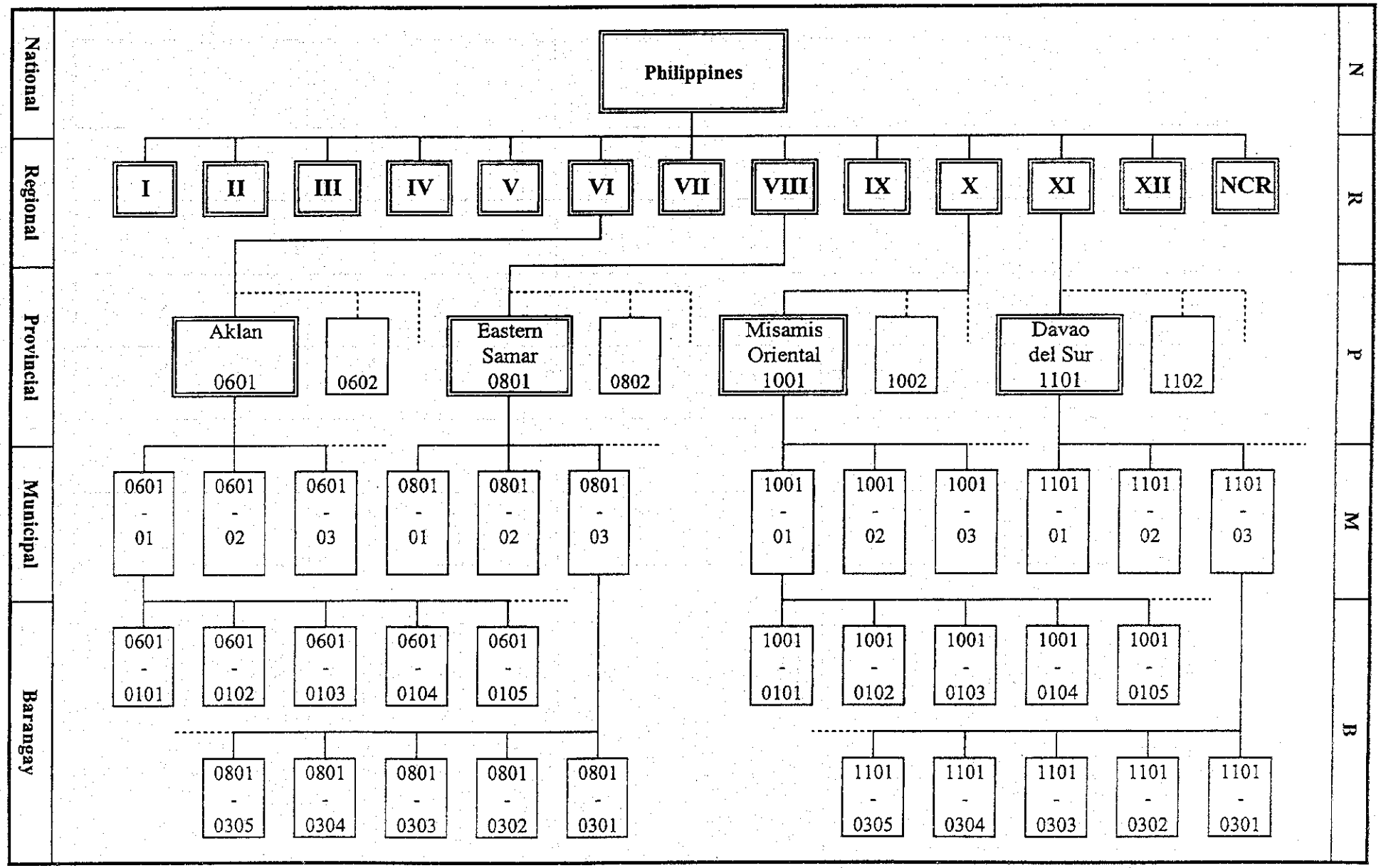


Figure 2.6.1 Institutional Hierarchical System by the NEDA Coding

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			P.6.4.1	M.6.4.1			
			P.6.4.2	M.6.4.2			
			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 Past Annual Investment			P.7.1				
7.2 Project Description			P.7.2				
7.3 Planned Annual Investment			P.7.3.1				
			P.7.3.2				
7.4 Income/Expenditure of LGU			P.7.4				
8. Model Study							
8.1 Barangay Group Information					MS.8.1		
8.2 Key Informant Questionnaire				MS.8.2			
8.3 Community Development, Training, Gender and Development Data Survey			MS.8.3	MS.8.3		MS.8.3	
8.4 Institutional Development Questionnaire			MS.8.4	MS.8.4		MS.8.4	
8.5 Model Study			MS.8.5	MS.8.5		MS.8.5	
8.6 Data/Information Checklist on Beneficiaries Participation and Assistance Extended in the Sector			MS.8.6	MS.8.6	MS.8.6		
8.7 Guide Questions/Pointers for Discussion with Provincial, Municipal and Barangay LGUs			MS.8.7	MS.8.7			

(2) Key Parameters

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

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

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

(3) Data Processing

Collected data are entered into the forms constructed in EXCEL database. The data are consolidated into final forms in application of small programs prepared for this planning. Linked outputs in tables and graphics are prepared in EXCEL spreadsheets for final

analysis and presentation. Key parameters are entered 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

Misamis Oriental province is located on the northern part of Mindanao and belongs to Region X, the Northern Mindanao Region. Cagayan de Oro City, a highly urbanized, independent city is the provincial capital as well as the regional center. The bays of Macajalar and Gingoog bound the province on the north, Agusan del Norte on the east, Iligan Bay on the west, and Bukidnon and Lanao del Norte on the south as shown in the Location Map.

The province is classified as 1st class and has a total land area of 3,570.10sq.km that is 1.19% of the Philippine total land area of about 300,000sq.km. It is composed of 24 municipalities and 2 cities. Based on the 1995 NSO records, there are 502 barangays, of which 170 are urban and 332 rural. Provincial total population was 1,015,865 in 1995. About 74% of the population resided in rural areas and the remaining 26% in urban areas (details are referred to Table 3.1.1). At present, there are 2 water districts operating in the province.

Table 3.1.1 Outline of Municipalities/City

Municipality/City	Class	Land Area (km^2)	1995 Population		Number of Barangay		
			Number	Density (person/km^2)	Urban	Rural	Total
Alubijid	5th	63.00	21,765	345	2	14	16
Balingasag	4th	123.70	46,018	372	8	22	30
Balingoan	5th	57.80	7,548	131	2	7	9
Binuangan	6th	30.00	5,374	179	1	7	8
Claveria	2nd	894.90	39,020	44	7	17	24
El Salvador	4th	136.70	31,500	230	1	14	15
Gingoog City	1st	404.60	87,530	216	30	49	79
Gitagum	5th	37.50	11,327	302	1	10	11
Initao	5th	116.50	23,340	200	1	15	16
Jasaan	3rd	87.20	33,598	385	7	8	15
Kinoguitan	5th	22.10	10,406	471	1	14	15
Lagonglong	5th	56.00	15,258	272	1	9	10
Laguindingan	5th	39.40	16,521	419	1	10	11
Libertad	5th	37.50	9,258	247	1	8	9
Lugait	5th	22.50	13,012	578	1	7	8
Magsaysay	5th	181.00	23,730	131	1	24	25
Manticao	4th	112.60	22,630	201	1	12	13
Medina	4th	126.10	23,319	185	2	17	19
Naawan	5th	88.50	14,578	165	1	9	10
Opol	4th	158.00	23,958	152	3	11	14
Salay	5th	64.80	18,923	292	2	16	18
Sugbongcogon	5th	23.10	6,957	301	2	8	10
Tagoloan	4th	87.20	40,929	469	10		10
Talisayan	5th	137.80	19,742	143	1	17	18
Villanueva	4th	48.80	21,310	437	2	7	9
Cagayan de Oro City*	1st	412.80	428,314	1,038	80		80
Provincial Total	1st	3,570.10	1,015,865	285	170	332	502

Note: Cagayan de Oro City is not included in the PW4SP study area.

3.2 Natural Conditions and Geographical Features

3.2.1 Meteorology

Two (2) types of climate exist in the province of Misamis Oriental based on rainfall distribution. These are Type II and Type III under the modified Corona's classification. Type II occurs in the eastern municipalities of Kinoguitan to Magsaysay and has a very pronounced maximum rainfall from November to January. It is generally wet the whole year. Type III occurs in the central and western part of the province and is relatively dry from November to April and wet during the rest of the year. It covers the municipalities of Sugboncogon in the east down to Lugait in the west. These types of climate are reflected in the Location Map.

The rainiest months generally fall during the middle of the year. High relative humidity usually begins on November and continues until February. The province is located south of the typhoon belt, which is considered as less visited area by typhoon. Tropical cyclones that occur are usually during southwest monsoon.

3.2.2 Land Use

Forest and protected lands constitute 60% of the total land area of the province, located particularly in the mountain ranges of the Mindanao Central Cordillera. Production land that is mostly agricultural comprises about 36%, while Built-up area is limited to about 3%. These settlements are often concentrated along the coasts and highways. The existing land use pattern as presented in Table 3.2.1 depicts a sustainable growth deserving and enhancing its present trend. The forest that still constitutes over half of the land primarily serves as watershed rather than as source of timber. An efficiently managed watershed collects and regulates flow of water, controls soil erosion and minimizes water pollution. Conversion of forestlands to other uses will restrict its function as a watershed. Accordingly, a significant increase in agricultural area will result in a high demand of water for agricultural use.

Table 3.2.1 Current Land Use

Land Use	Area (km^2)	Percentage over Total Land Area
Forest and Protection Land	2,142.060	60.00
Agricultural (Production Land)	1,267.386	35.50
Built-up	0.1213834	3.40
Industrial	0.035701	1.00
Fishpond	0.00357	0.10
Provincial Total	3,570.10	100

3.2.3 Topography and Drainage

The province in general is typical of volcanic regions with towering plateau areas of relatively high elevation averaging less than 1,000 masl. The coverage of the eastern peninsula of the province is the eastern side of Gingoog City until the provincial boundary of Agusan del Norte. This area covers the west half of this peninsula (the other half being occupied by Agusan del Norte). The central peninsula is covered by the Mindanao Central Cordillera, which is serially stretching from the Bagacay Point on the north coast to the Tinaka Point on the south coast in Sarangani. Deep, narrow canyons with precipitous walls usually dissect these volcanic peaks. Principal features of the area consist of narrow coastal plain adjacent to Macajalar Bay, and the highland areas and steep slopes, which separate the highland and lowlands areas. The terrain in the western peninsula is generally rugged and hilly.

The province of Misamis Oriental faces the Mindanao Sea. Several deep and steep river valleys traverse the province. The general draining trend is northward with Odiongan, Mallig, Tagoloan, Cagayan and Iponan rivers as the natural drainage systems. Of these rivers, the Tagoloan River with a watershed of 1,704 km^2 and the Cagayan River with a watershed of 1,521 km^2 are the 2 largest in 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. It is noted that the Cagayan de Oro City WD will supply treated water of 100,000 m^3/day from the Cagayan River to its consumers from year 2002 by BOT scheme.

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	
Odiongan	390	No gauging station present			None
Mallig	200	No gauging station present			None
Tagoloan	1,656	354.4	229.6	45.4	None
Cagayan	1,331	574.8	556.5	55.8	(Cagayan de Oro City WD)
Iponan	351	148.7	69.2	4.3	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

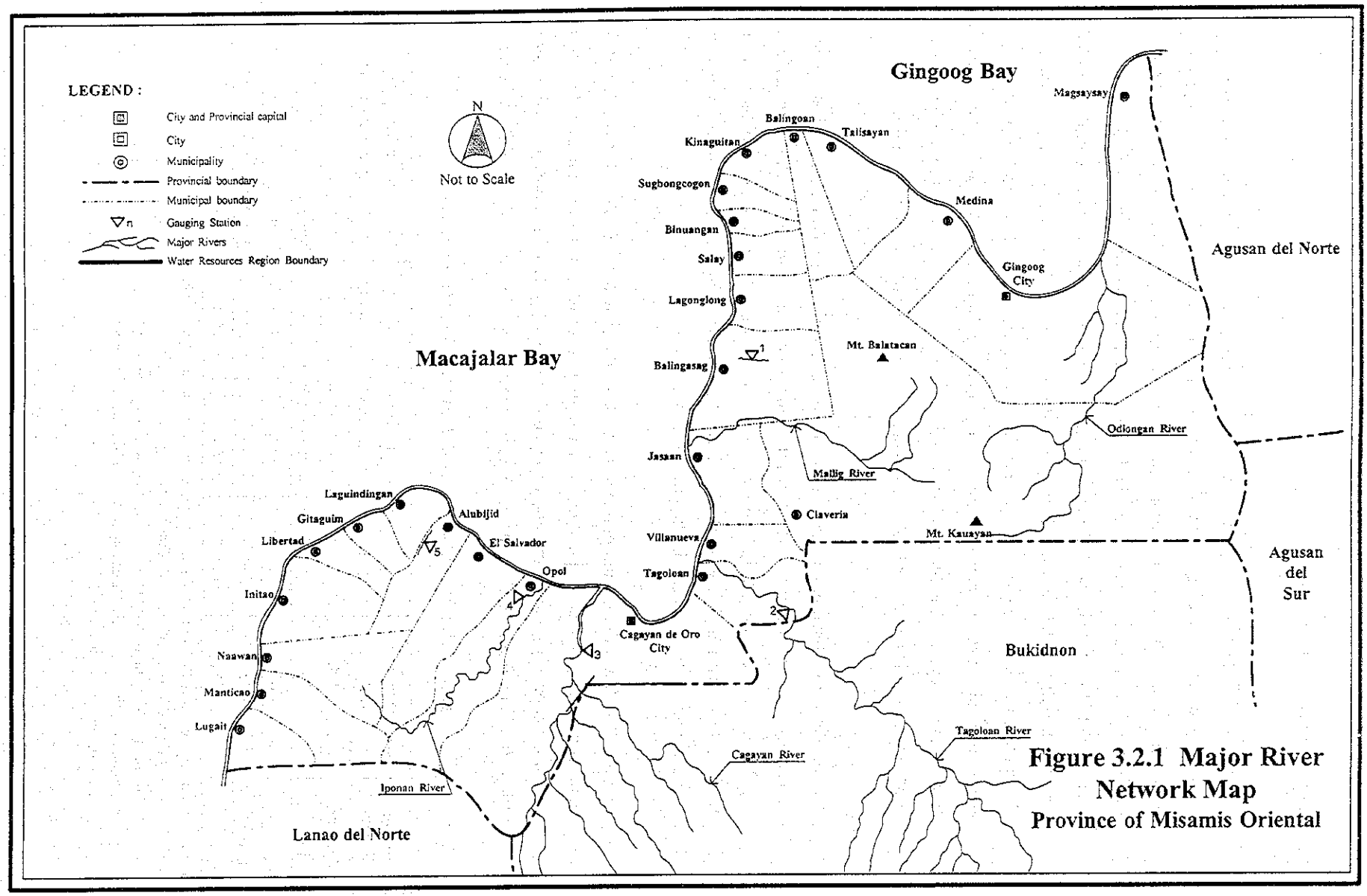


Figure 3.2.1 Major River Network Map
Province of Misamis Oriental

Five (5) typical rivers in the province were selected for water quality examination, namely: Odiongan, Mallig, Tagoloan, Cagayan and Iponan. Analyzed river waters were turbid. Except for Iponan, the examination results showed high Fe and Mg contents probably due to the mineral rich rocks of the volcanoes (refer to 7.5, Data Report).

3.3 Socio-economic Conditions

3.3.1 Economic Activities and Household Income

Misamis Oriental is basically an agricultural province. The major economic activities are farming and fishing. Major crops cultivated are coconut, corn, rice and vegetables. Commercial crops such as coffee, tobacco, abaca, mango, papaya and banana are other important commodities. This province is promoting tourism as another income generating activities.

The National Statistics Office (NSO) Family Income and Expenditures Survey (FIES) in 1994 showed that the average annual family income of the province was ₱ 55,536, while the expenditure was at ₱ 41,591 or an average net saving of ₱ 13,945. Distribution of households by income class in the region and province is shown in Figure 3.3.1 (refer to Table 3.3.1, Supporting Report). Percentages of households of lower income levels were higher with that of the region (Region X). From the established poverty threshold income of ₱43,659 in Region X for 1994, approximately 58% 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 services, and trade (refer to Table 3.3.2, Supporting Report). By class of workers, those who were self-employed without any paid employee had the highest share of 36%, followed by those who worked without pay in family-owned operated farm or business as indicated in Figure 3.3.2.

3.3.2 Basic Infrastructure

Electric supply services have a 100% municipal coverage but only 49% of the households are covered. Telecommunication services are only available to 29% of the municipalities. There are 24 post offices in the province. Land transportation is available by means of tricycles, jeepneys, taxis, minibuses and buses. The province has 1 airport located in Cagayan de Oro City and 1 major seaport. There are 157 business establishments and 99 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.

3.3.3 Education

The province has a total of 473 schools consisting of 381 elementary schools, 71 high schools, and 21 colleges/vocational institutions. 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

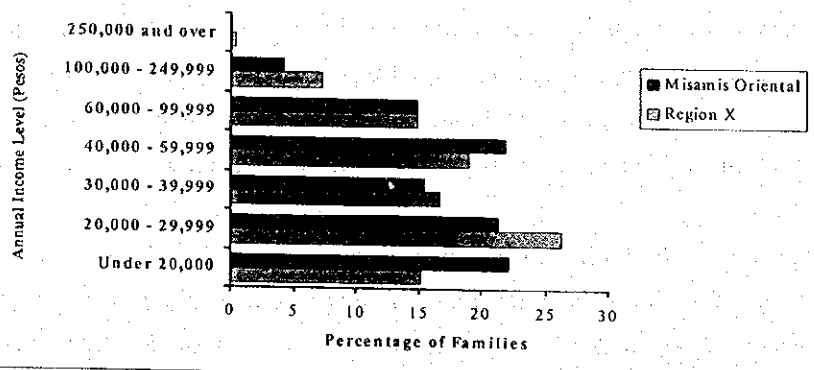


Figure 3.3.2 Employment Distribution by Major Industry and Class of Worker

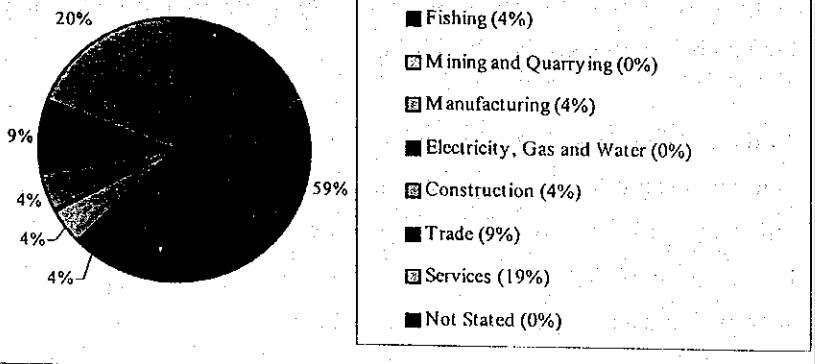


Figure 3.3.3 Population Distribution by Highest Educational Attainment

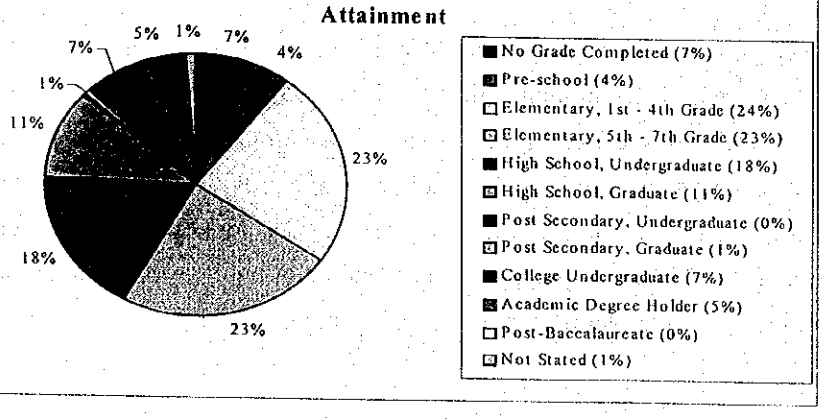


Table 3.3.1 Provincial Outline on Public Services

Items	Unit	Value	Items	Unit	Value
(1) **Roads**			(7) **Industrial/business/commercial**		
a) Total length	Km	501.5	**Establishment**	Number	157
b) Barangay roads	Percent	-			
			(8) **Tourism facilities**	Number	99
(2) **Electricity service coverage**			(Hotel resort, lodges, recreational, etc.)		
a) Municipality	Percent	100			
b) Barangay	Percent	73.58	(9) **Schools**		
c) Household	Percent	49.34	a) Primary level	Number	381
			b) Secondary level	Number	71
(3) **Telecommunication Services**			c) Tertiary level and Technical	Number	21
a) Availability in municipality	Percent	29			
b) Telegraph station	Number	7	(10) **Health Facilities**		
c) Telephone station	Number	7	a) Hospital/clinic	Number	24
			b) Main health center, rural health	Number	205
(4) **Post Office**	Number	24	unit, barangay health center, etc		
(5) **Transportation services**	Mode	Motorcycle	(11) **Labor**		
	(ex. Bus,	Bus, Jeep	a) Labor force participation ratio	Percent	68.83
	jeep, taxi,.)	Taxi, Truck	b) Employment rate	Percent	92.5
(6) **Banking Facilities**	Number	34	(12) **Average family income**		
a) Private bank	(by Private		a) Monthly income	Pesos/Month	4,628
b) Public bank	and public)		b) Monthly expenditure	Pesos/Month	3,466

Sources: PSPT, 1995 Socio-economic Profile, 1995 NSO Population Census, 1994 Family Income and Expenditures Survey by NSO

Table 3.3.2 Public Facilities and Services by Municipality

Municipality/City	High School			Vocational School	College	Hospital	Public Market	Bank and Financing Institution
	Public	Private	Total					
	nos.	nos.	nos.	nos.	nos.	nos.	nos.	nos.
Alubijid	2		2		2		1	1
Balingasag	3	2	5		2	2	2	1
Balingoan	1		1				2	
Binuangan	2		2				2	
Claveria	4		4		1	1	7	1
El Salvador	1	2	3			1	2	1
Gingoog City					4	3	3	
Gitagum	1		1				2	1
Initao	1		1			1	4	1
Jasaan	3	2	5		3	1	3	2
Kinoguitan	1		1		1		2	1
Lagonglong	1	1	2				1	
Laguindingan	2		2				1	1
Libertad	1		1				2	
Lugait	1		1				1	1
Magsaysay	2	2	4		1	1	2	1
Manticao	1	2	3			1	3	1
Medina	3		3		2	1	1	1
Naawan	1		1		2		1	1
Opol	1		1				2	1
Salay	2		2			1	1	
Sugbongcogon	1		1		1		3	
Tagoloan	2		2				1	2
Talisayan	3	1	4		1	1	1	1
Villanueva	2		2				1	1
Provincial Total	42	12	54		20	14	51	20

3.4 Population

3.4.1 Previous Population Development

An increasing provincial population growth rate had been experienced since the last 6 census years (1960-1995) as indicated in Figure 3.4.1. From an average annual growth rate of 2.25% during the period 1960 to 1970, it gradually increased to 4.25% (1975-1980), but decreased during censal year of 1980-1990 (2.29%). It went up again to 3.27% (1990-1995). A summary of the average annual growth rates is as follows:

Year	Population	Ave. Annual Growth Rate (%)	Period
1970	344,437	2.25	1960 - 1970
1975	395,270	3.46	1970 - 1975
1980	462,720	4.25	1975 - 1980
1990	525,453	2.29	1980 - 1990
1995	587,551	3.27	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 present population (1995) was estimated to provide the planning base for the Master Plan (refer to Section 8.3.1, Population Projection, Main Report). Table 3.4.1 shows the breakdown of the past population development by municipality including the 1995 population.

Figure 3.4.1 Previous Population Development of the Province

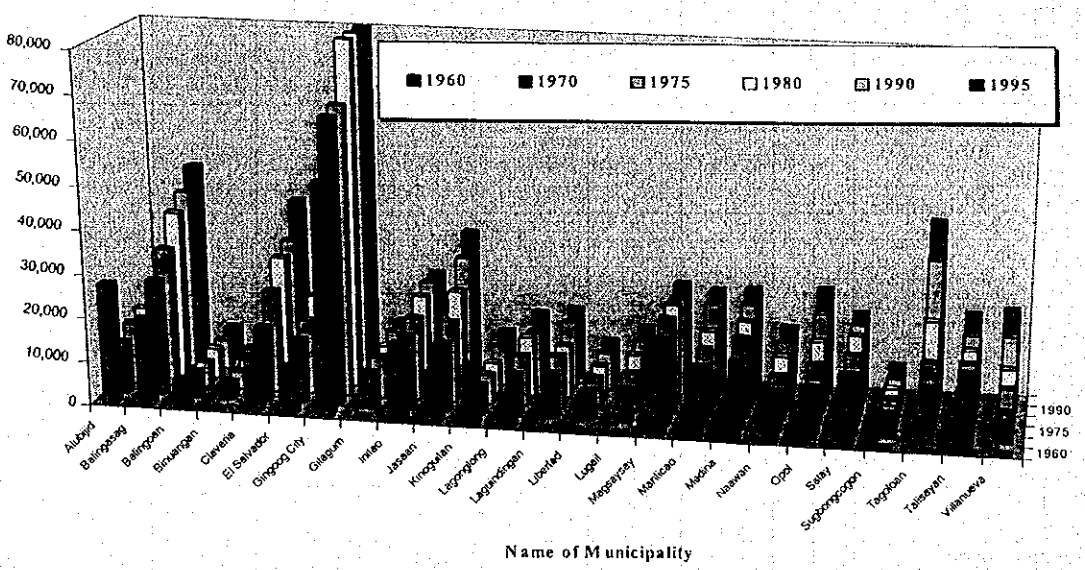


Table 3.4.1 Previous Population Development by Municipality

Municipality/City	Previous Population						
	1948	1960	1970	1975	1980	1990	1995
Alubijid	20,091	27,330	11,720	13,942	15,443	19,531	21,765
Balingasag	26,270	19,715	26,389	31,811	38,364	41,506	46,018
Balingoan		6,136	5,821	5,838	6,596	6,689	7,548
Binuangan			4,045	3,909	4,457	5,090	5,374
Claveria	26,330	14,281	16,816	23,363	29,088	31,130	39,020
El Salvador	16,899	10,521	14,529	16,915	20,446	26,721	31,500
Gingoog City	30,699	52,677	65,522	66,577	79,937	82,582	87,530
Gitagum			8,000	9,288	9,639	10,994	11,327
Initao	39,462	17,272	16,904	18,906	21,842	23,113	23,340
Jasaan	6,035	11,676	15,732	18,486	23,366	29,146	33,598
Kinoguitan	15,670	13,584	6,473	6,724	7,203	8,795	10,406
Lagonglong		6,899	9,332	11,395	13,576	12,705	15,258
Laguindingan			10,292	11,849	12,059	15,503	16,521
Libertad			6,523	7,309	7,770	8,487	9,258
Lugait			7,457	8,787	10,785	11,973	13,012
Magsaysay	8,976	10,893	19,194	21,782	22,830	22,099	23,730
Manticao		15,212	13,503	15,248	17,294	21,443	22,630
Medina	8,893	11,856	15,185	18,441	19,888	21,796	23,319
Naawan		6,305	8,718	10,068	12,215	13,345	14,578
Opol		10,079	10,275	13,023	16,149	20,473	23,958
Salay	13,194	15,769	13,386	15,751	17,945	18,101	18,923
Sugbongcogon			5,276	6,021	6,243	6,175	6,957
Tagoloan	11,045	11,601	11,468	14,958	22,023	33,919	40,929
Talisayan	22,215	13,818	14,988	15,016	15,667	17,015	19,742
Villanueva			6,889	9,863	11,895	17,122	21,310
PW4SP Study Area	245,779	275,624	344,437	395,270	462,720	525,453	587,551

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 1,000 persons per square kilometer.

(2) Poblaciones or central districts of municipalities and cities, which have a population density of at least 500 persons per square kilometer.

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

1) Street pattern, i.e., network of streets either at parallel or in right angle orientation;

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 and fishing.

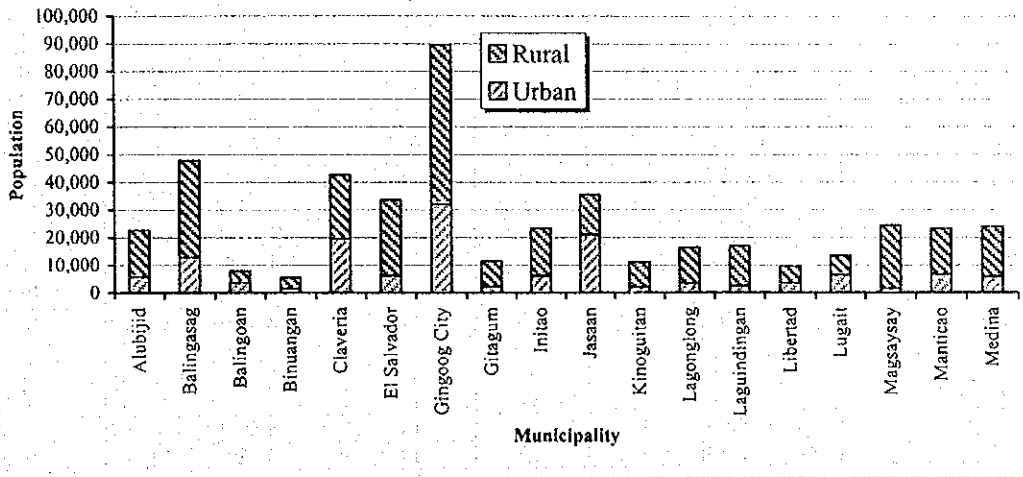
All areas not falling under the urban classification are defined as rural area. Considering the 1995 NSO classification of urban and rural barangays, there are 90 urban barangays and 332 rural barangays for a total of 422 barangays in 1997. Distribution of the classified area is shown in Figure 3.4.1, Supporting Report.

3.4.3 Present Population Distribution

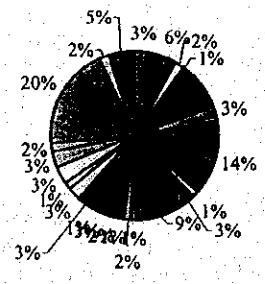
From the 1995 NSO census, the 1997 urban-rural population was estimated. Rural population accounts for 64% of the provincial total, while 36% is urban as reflected in Figure 3.4.2. Table 3.4.2 presents the breakdown of the number of urban and rural barangays by municipality and its corresponding present population distribution.

There are 614,411 households with 64% residing in rural area and 36% households in urban area. The average provincial household size is 5.12 persons/household. Table 3.4.3 presents a breakdown per municipality in the number of households and household sizes by urban and rural area.

Figure 3.4.2 Present Population Distribution

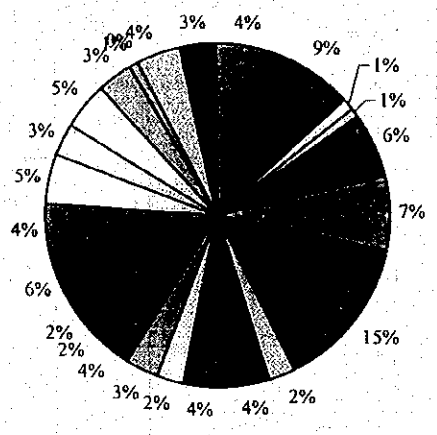


Urban Population (36.2%)



Alubijid (3%) | Balingasag (6%) | Balingoan (2%) | Binuangan (1%)
Claveria (9%) | El Salvador (3%) | Gingoog City (14%) | Gitagum (1%)
Initao (3%) | Jasaan (9%) | Kinoguitan (1%) | Lagonglong (2%)
Laguindingan (1%) | Libertad (2%) | Lugait (3%) | Magsaysay (1%)
Manticao (3%) | Medina (3%) | Naawan (1%) | Opol (3%)
Salay (3%) | Sugbongcogon (2%) | Tagoloan (20%) | Talisayan (2%)
Villanueva (5%)

Rural Population (63.8%)



Alubijid (4%) | Balingasag (9%) | Balingoan (1%)
Binuangan (1%) | Claveria (6%) | El Salvador (7%)
Gingoog City (15%) | Gitagum (2%) | Initao (4%)
Jasaan (4%) | Kinoguitan (2%) | Lagonglong (3%)
Laguindingan (4%) | Libertad (2%) | Lugait (2%)
Magsaysay (6%) | Manticao (4%) | Medina (5%)
Naawan (3%) | Opol (5%) | Salay (3%)
Sugbongcogon (1%) | Tagoloan (0%) | Talisayan (4%)
Villanueva (3%)

Table 3.4.2 Outline of Urban and Rural Areas in the Province

Municipality/City	Land Area (km^2)	Number of Barangay			Population (1997)		
		Urban	Rural	Total	Urban	Rural	Total
Alubijid	180.70	2	14	16	5,714	16,992	22,706
Balingasag	140.20	8	22	30	12,799	35,114	47,913
Balingoan	39.40	2	7	9	3,628	4,286	7,914
Binuangan	13.40	1	7	8	1,533	3,953	5,486
Claveria	1,120.50	7	17	24	19,674	22,991	42,665
El Salvador	139.10	1	14	15	6,207	27,405	33,612
Gingoog City	396.60	30	49	79	32,098	57,401	89,499
Gitagum	35.00	1	10	11	2,214	9,238	11,452
Initao	62.70	1	15	16	6,112	17,298	23,410
Jasaan	95.70	7	8	15	21,071	14,454	35,525
Kinoguitan	42.40	1	14	15	1,968	9,151	11,119
Lagonglong	80.30	1	9	10	3,459	12,942	16,401
Laguindingan	42.00	1	10	11	2,497	14,432	16,929
Libertad	23.30	1	8	9	3,554	6,021	9,575
Lugait	32.00	1	7	8	6,356	7,083	13,439
Magsaysay	140.60	1	24	25	1,546	22,843	24,389
Manticao	94.90	1	12	13	6,601	16,497	23,098
Medina	73.30	2	17	19	5,820	18,113	23,933
Naawan	31.00	1	9	10	3,140	11,946	15,086
Opol	154.40	3	11	14	7,205	18,280	25,485
Salay	56.50	2	16	18	6,861	12,381	19,242
Sugbongcogon	31.40	2	8	10	3,700	3,589	7,289
Tagoloan	40.90	10		10	44,079		44,079
Talisayan	70.90	1	17	18	4,505	16,426	20,931
Villanueva	40.40	2	7	9	10,281	12,953	23,234
PW4SP Study Area	3,177.60	90	332	422	222,622	391,789	614,411

Table 3.4.3 Household Numbers and Household Size

Municipality/City	Number of Household (1995)			Number of Household (1997)			1995 Household Size (person/household)		
	Urban	Rural	Total	Urban	Rural	Total	Urban	Rural	Total
Alubijid	1,149	3,464	4,613	1,199	3,614	4,812	4.77	4.70	4.72
Balingasag	2,316	6,246	8,562	2,411	6,503	8,915	5.31	5.40	5.37
Balingoan	655	793	1,448	687	831	1,518	5.28	5.16	5.21
Binuangan	270	777	1,047	276	793	1,069	5.56	4.98	5.13
Claveria	3,291	3,951	7,242	3,598	4,320	7,919	5.47	5.32	5.39
El Salvador	1,142	5,048	6,190	1,219	5,386	6,605	5.09	5.09	5.09
Gingoog City	6,060	11,076	17,136	6,196	11,325	17,521	5.18	5.07	5.11
Gitagum	446	1,887	2,333	451	1,908	2,359	4.91	4.84	4.86
Initao	1,295	3,586	4,881	1,299	3,597	4,896	4.71	4.81	4.78
Jasaan	3,756	2,584	6,340	3,971	2,732	6,704	5.31	5.29	5.30
Kinoguitan	329	1,583	1,912	352	1,692	2,043	5.60	5.41	5.44
Lagonglong	608	2,262	2,870	654	2,431	3,085	5.29	5.32	5.32
Laguindingan	497	2,917	3,414	509	2,989	3,498	4.90	4.83	4.84
Libertad	700	1,122	1,822	724	1,160	1,884	4.91	5.19	5.08
Lugait	1,242	1,632	2,874	1,283	1,686	2,968	4.95	4.20	4.53
Magsaysay	286	4,275	4,561	294	4,394	4,688	5.26	5.20	5.20
Manticao	1,276	3,238	4,514	1,302	3,305	4,607	5.07	4.99	5.01
Medina	1,081	3,309	4,390	1,109	3,396	4,506	5.25	5.33	5.31
Naawan	610	2,387	2,997	631	2,470	3,101	4.97	4.84	4.86
Opol	1,350	3,441	4,791	1,436	3,660	5,096	5.02	4.99	5.00
Salay	1,326	2,473	3,799	1,348	2,515	3,863	5.09	4.92	4.98
Sugbongcogon	637	613	1,250	667	642	1,310	5.54	5.59	5.57
Tagoloan	7,875		7,875	8,481		8,481	5.20		5.20
Talisayan	777	2,893	3,670	824	3,067	3,891	5.47	5.36	5.38
Villanueva	1,847	2,294	4,141	2,014	2,501	4,515	5.11	5.18	5.15
PW4SP Study Area	40,821	73,851	114,672	42,936	76,918	119,854	5.18	5.09	5.12

3.5 Health Status

3.5.1 Morbidity, Mortality and Infant Mortality

The number one cause of morbidity was pneumonia, followed by diarrhea and influenza. Bronchitis and acute respiratory infection were fourth and fifth, respectively. Other causes of morbidity in descending order were: tuberculosis, varicella, scabies, skin diseases, and measles. Regarding mortality, the number one cause was vascular diseases, followed by pneumonia. Other accidents and malignant neoplasm ranked third and fourth, respectively. Other causes include tuberculosis, heart diseases, kidney/nephritis, chronic liver diseases, septicemia and diabetes mellitus. Pneumonia, prematurity and congenital anomalies were the 3 leading causes of infant mortality in the province.

The general health status of the populace of the province was relatively poor compared with the national condition. The incidence of diseases was higher in Misamis Oriental than the Philippines as a whole except for malaria. 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 (details are referred to Table 3.5.1, Data Report).

Water-related diseases in the ten leading causes of morbidity include diarrhea (rank 2^{nd}), scabies (8^{th}) and skin diseases (10^{th}). Also, diarrhea ranked 2^{nd} as the leading cause of infant mortality.

3.5.2 Water Related Diseases

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

A number of water-related diseases are reported in the province. These are diarrhea, typhoid/paratyphoid, dengue fever, viral hepatitis, malaria, skin diseases and scabies. Table 3.5.2 presents the reported cases and deaths of notifiable water-related diseases in the province.

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

Rate: 1/100,000

	Causes	Misamis Oriental		Philippines		
		Number	Rate	Number	Rate	Ranking
Morbidity	1. Pneumonia	37,850	6,442	470,574	703	4
	2. Diarrhea	27,756	4,724	1,337,449	1,997	1
	3. Influenza	26,945	4,586	609,471	910	3
	4. Bronchitis	13,079	2,226	903,508	1,339	2
	5. ARI	8,208	1,397	-	-	-
	6. Tuberculosis	3,114	530	159,049	238	6
	7. Varicella, Chickenpox	2,239	381	71,317	107	9
	8. Scabies	1,816	309	-	-	-
	9. Skin Diseases	1,063	181	-	-	-
	10. Measles	599	102	85,345	127	8
Mortality	1. Vascular Diseases	2,080	354	37,358	56	2
	2. Pneumonia	1,563	266	35,582	53	1
	3. Other Accidents	999	170	13,477	20	6
	4. Malignant Neoplasms	981	167	25,399	38	4
	5. Tuberculosis	776	132	24,580	37	5
	6. Heart Diseases	635	108	48,582	69	1
	7. Kidney/ Nephritis	347	59	5,510	8	10
	8. Chronic Liver Disease	341	58	-	-	-
	9. Septicemia	165	28	-	-	-
	10. Diabetes Mellitus	135	23	-	-	-
Infant Mortality	1. Pneumonia	159	27	7,631	4.5	1
	2. Pre-maturity	65	11	-	-	-
	3. Congenital Anomalies	47	8	2,366	1.4	-
	4. Diarrhea	18	3	1,661	1	4
	5. Septicemia	18	3	1,252	0.7	5
	6. Nutritional Deficiencies	12	2	925	0.6	6
	7. Meningitis	12	2	-	-	-
	8. Heart Diseases	12	2	-	-	-
	9. Ill-Defined Conditon	12	2	-	-	-
	10. Other Accidents	12	2	-	-	-

Table 3.5.2 Reported Cases and Deaths of Notifiable Water Related Diseases

Diseases	Morbidity		Mortality		Infant Mortality	
	Number	Rate	Number	Rate	Number	Rate
Water-borne						
1. Diarrhea	27,756	6,442	5	0.85	18	3
2. Typhoid/paratyphoid	6	1				
3. Viral hepatitis	40	7				
Water-washed						
1. Skin diseases	1,063	181	1	0.17		
2. Scabies	1,816	309				
Water vector						
1. Dengue fever	72	12	1	0.17	1	0.17
2. Malaria	63	11	3	0.51		

3.5.3 Health Facilities and Practitioners

Present facilities servicing the health care of the population are 14 hospitals/clinics, 25 rural health units, and 175 barangay health stations. The number and ratio to population of health facilities and/or medical practitioners in the province as well as in the Philippines are presented in Table 3.5.1, Supporting Report (details are referred to Table 3.5.2, Data 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/cesspool is also flowing into the streams. The other major pollutant is dumped refuse that finds its way to the river systems during rain or is thrown indiscriminately into the rivers and seashores. In rural areas, natural assimilation may be expected to purify organic substances. However, pollution or contamination is anticipated caused by agricultural activities especially with reference to fertilizers and pesticides.

Large-scale manufacturing establishments located mostly in Cagayan de Oro City, Tagoloan, Villanueva industrial corridor are identified as potential pollution sources in the province if no control measures are in place. As of now, the Department of Environment and Natural Resources has not yet classified the rivers of the province as to their benefi-

cial use (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 25 municipalities/city (except Cagayan de Oro City), only 14 have municipal refuse collection and disposal service. All these municipalities with service have 1 to 2 units of open dump truck, while Gingoog City has 5 units of open/closed type trucks. In the province, only 19% of the households is served, while a large number (81%) is unserved. Table 3.6.1 reflects the breakdown of the manner of solid waste collection and disposal, and service coverage by municipality (details are referred to Table 3.6.1, Data Report).

Open dumping is commonly practiced by the LGUs as a 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 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, 1997

Name of Municipality	Number of Households 1997	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		
Alubijid	4,812	1		1	816		816	1,150	2,800	46	3,996	17	83
Balingasag	8,915	1		1	128		128	4,517	2,547	1,723	8,787	1	99
Balingoan	1,518							573	923	22	1,518		100
Binuangan	1,069							197	862	10	1,069		100
Claveria	7,919	1		1	442		442	2,190	4,409	878	7,477	6	94
El Salvador	6,605	1		1	781		781	1,481	4,021	322	5,824	12	88
Gingoog City	17,521	4	1	5	13,708		13,708	1,758	342	1,713	3,813	78	22
Gitagum	2,359							273	2,048	38	2,359		100
Initao	4,896	1		1	73		73	1,311	2,972	540	4,823	1	99
Jasaan	6,704	2		2	1,486		1,486	2,755	2,463		5,218	22	78
Kinoguitan	2,043							1,873	150	20	2,043		100
Lagonglong	3,085	1		1	230		230	601	1,030	1,224	2,855	7	93
Laguindingan	3,498							316	3,169	13	3,498		100
Libertad	1,884							538	1,329	17	1,884		100
Lugait	2,968	1		1	1,432		1,432		1,511	25	1,536	48	52
Magsaysay	4,688	1		1	212		212	2,317	1,927	232	4,476	5	95
Manticao	4,607	1		1	831		831	493	2,843	440	3,776	18	82
Medina	4,506							3,154	1,352		4,506		100
Naawan	3,101	1		1	339		339	339	2,276	147	2,762	11	89
Opol	5,096	1		1	1,714		1,714	600	2,629	153	3,382	34	66
Salay	3,863							495	2,270	1,098	3,863		100
Sugbongcogon	1,310							447	224	639	1,310		100
Tagoloan	8,481							3,859	2,570	2,052	8,481		100
Talisayan	3,891							1,233	2,520	138	3,891		100
Villanueva	4,515	1		1	575		575	562	3,343	35	3,940	13	87
Provincial Total	**119,854**	18	1	19	**22,767**		**22,767**	**33,032**	**52,530**	**11,525**	**97,087**	19	81

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 1998 and regarded as a figure in 1997). 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 1997.

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 77% of the present population (of which 36% in urban area and 64% in rural area) is considered as adequately served (refer to 4.1, Supporting Report for the detailed study). Under the area classification, 87% of urban population and 72% of rural population have access to safe water sources/facilities, while the rest is underserved or unserved. About 199,000 persons or 42% of the served population depend on Level I facilities, while about 275,400 persons or 58% 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 25 Level III systems in the province operated under different kinds of ownership (authority or association) as shown in Table 4.1.2 together with their service coverage in 1997 (details are referred to in Table 4.1.1, Supporting Report).
These are:

- 2 Water Districts in the municipality of Claveria and Gingoog City;
- 13 Municipal waterworks in the municipalities of El Salvador, Gitagum, Initao, Kinoguitan, Lagonglong, Laguindingan, Libertad, Lugait, Medina, Naawan, Sugbongcogon, Tagoloan and Villanueva;
- 1 provincial waterworks in the municipality of Manticao;
- 8 systems operated by RWSA in the municipalities of Alubijid, Balingoan, El Salvador, Jasaan (2 systems), Laguindingan, Salay and Villanueva; and
- Municipality of Opol (served by Cagayan de Oro City Water District).

Tagoloan waterworks is the largest system in the province, covering 8 urban barangays in the municipality of Tagoloan. It has a served population of 39,200 using spring sources. Presently, the waterworks covers 89% of the urban area.

Following Tagoloan waterworks is the Claveria WD, the second largest system in the province. The WD covers 1 urban and 17 rural barangays with a served population of 28,100. Water source is a spring with sufficient discharge.

In the municipality of Alubijid, there is 1 waterworks that is operated by RWSA under the supervision of the provincial government. This waterworks covers 1 urban barangay with a served population of 3,050. Water source is a combination of spring (RWSA-owned) and deep well (municipal government-owned) with a total capacity of 700 cu.m/day.

In the municipality of Balingoan, 1 Level III system being operated by the RWSA is supplying to 1 urban barangay using a spring source with a pumping system due to topographical condition. Current served population is 1,700 which, corresponds to 50 % of the urban population. Rehabilitation/improvement of the pipe systems is a requisite.

Table 4.1.2 Information on Existing Level III System

Name of Municipality	Name of Operating Body	Water Consumption			Service Coverage								
		Type of Water Source	Water Consumption (cu.m/day)	Domestic Supply (%)	No. of Brgys. Served			No. of Household Served			No. of Population Served		
					Urban	Rural	Total	Urban	Rural	Total	Urban	Rural	Total
Alubijid	Alubijid RWSA	DW/SP			1		1	505		505	3,050		3,050
Balingoan	Balingoan RWSA	SP	136	97	2		2	264		264	1,720		1,720
Claveria	Claveria WD	SP			1	17	18	1,420	3,505	4,925	7,100	21,027	28,127
El Salvador	El Salvador WWS	DW			1		1	1,142		1,142	5,817		5,817
	Molugan WWS	DW				1	1		250	250		1,100	1,100
	Municipal Total	DW			1	1	2	1,142	250	1,392	5,817	1,100	6,917
Gingoog City	Gingoog WD	DW	1,962	91	50		50	2,342		2,342	11,710	4,365	16,075
Gitagum	Gitagum WS	DW/SP			1		1	299		299	2,040		2,040
Initao	Initao LGU WWS	DW			1		1	1,295		1,295	6,094		6,094
Jasaan	Jasaan RWSA	SP			2	6	8	957	1,301	2,258	4,785	6,205	10,990
	Kimaya RWSA					1	1		267	267		1,635	1,635
	Municipal Total	SP			2	7	9	957	1,568	2,525	4,785	7,840	12,625
Kinoguitan	KRWASA	DW			1		1	236		236	1,280		1,280
Lagonglong	Lagonglong LGU WS	SP			1	3	4	300	604	904	1,520	1,800	3,320
Laguindingan	Mun. Water Sys.	DW/SP			1		1	276		276	1,652		1,652
	Sinai RWSA	SP			1	3	4	141	524	665	845	4,086	4,931
	Municipal Total	DW			2	3	5	417	524	941	2,497	4,086	6,583
Libertad	Libertad WWA	DW	56	100	1		1	356		356	1,780		1,780
Lugait	Mun. of Lugait	DW/SP			1	1	2	1,332	158	1,490	6,172	756	6,928
Manticao	Prov'l. Gov't.	SP	9		1	1	2	610	56	666	3,660		3,660
Medina	Medina RWSA	DW/SP	1,000	100	2	3	5	1,130	92	1,222	5,650	460	6,110
Naawan	LGU-Naawan		87		3		3	352		352	1,760		1,760
Opol	Cagayan del Oro				1		1	100		100	510		510
Sugbongcogon	Sugbongcogon LGU WS	SP			1	4	5	194	87	281	970	522	1,492
Tagoloan	Tagoloan	SP	186	70	8		8	6,530		6,530	39,230		39,230
Villanueva	Napopong LGU WS	SP				1	1		140	140		2,009	2,009
	Soligao-Lagtak WS	SP			2	1	3	1,400	200	1,600	7,154	1,984	9,138
	Municipal Total	DW			2	2	4	1,400	340	1,740	7,154	3,993	11,147
Provincial Total			3,435	91	83	42	125	21,181	7,184	28,365	114,499	45,949	160,448

Note: 1. Type of Water Source: *DW* - Deep Well, *Surf.* - Surface Water (River), *SP* - Spring
2. No data available for Level III in Salay.

In the municipality of El Salvador, there are 2 waterworks operated by the municipal government and the RWSA. The municipal waterworks is supplying water to 1 urban barangay with a served population of 5,800 corresponding to 94% of urban population. The other one covers 1 rural barangay with a served population of 1,100. Water sources of both waterworks are deep wells.

In Gingoog City, there is a Water District covering 50 urban barangays and 1 rural barangay with a total served population of 16,100. Service coverage in urban and rural area is 36% and 8%, respectively. Water source is a deep well (3,800 cu.m/day), which is considered sufficient at present. System expansion is a requisite.

In the municipality of Initao, a waterworks operated by the municipality covers 1 urban barangay with a served population of 6,100 (100% service coverage of urban population). Water sources are deep wells.

In the municipality of Jasaan, there are two waterworks operated by RWSAs. Jasaan RWSA is supplying water to 2 urban and 6 rural barangays in provision of spring source. Total served population is 11,000 persons (4,800 in urban and 6,200 in rural area). Other one covers one rural barangay with served population of 1,600. Water sources are springs.

In Kinoguitan, 1 waterworks operated by the municipal government covers 1 urban barangay using a deep well source. Current served population is 1,200 corresponding to 65% of urban population. Water source is deep well (80 cu.m/day). Scheduled water supply is practiced due to insufficient water source and inadequate facility capacity (constructed in 1970s). Augmentation and expansion of the system are required.

In Lagonglong, 1 waterworks operated by the municipality covers 1 urban and 3 rural barangays. Current served population is 3,300 (44% of urban and 14% of rural population). Water source is spring using a pumping system.

In Laguindingan, there are 2 waterworks operated by the municipal government and the RWSA. The municipal waterworks covers 1 urban barangay with a served populatin of 1,650 using a deep well source. The other waterworks covers 1 urban and 3 rural barangays with a served population of 4,900 using a spring source. In these waterworks, scheduled water supply is practiced (4 hours a day). Rehabilitation/augmentation of the system is required.

In Libertad, 1 waterworks operated by RWSA covers 1 urban barangay with a served population of 1,800 (50% of urban population) using a deep well source (50 cu.m/day). Scheduled water supply is practiced (4 hours a day).

In Lugait, a waterworks operated by the municipality covers 1 urban and 1 rural barangays with a served population of 6,900 (97% in urban and 11% in rural area). Water source is a combination of spring and deep well.

In Manticao, there is a waterworks supervised by the provincial government. The waterworks covers 1 urban and 1 rural barangays with a total served population of 3,700. Although the current spring source is sufficient (1,300 cu.m/day), inappropriate pipe arrangements cause problems such as inadequate water supply.

In Medina, 1 waterworks operated by RWSA serves 3urban barangays. Total population served is 6,100 (97% of urban and 3% of rural population). The main water source is a spring and supplemented by a deep well source.

In Naawan, 1 waterworks operated by the municipality serves 1,800 of the urban population (56% of urban population). The water source is a deep well. Chlorination is not practiced properly.

In Opol, the Cagayan de Oro City WD serves 1 urban barangay with a served population of 500 (9% of urban population). The other people rely on Level I and II systems.

In Sugbongcogan, 1 waterworks operated by the municipal government covers 1 urban and 4 rural barangays with a served population of 1,500. Water source is a spring (140 cu.m/day).

In Villanueva, there are 2 waterworks operated by the municipal government and the RWSA. The municipal waterworks covers 1 rural barangay with a served population of 2,000. The other one covers 2 urban and one rural barangays with a served total population of 9,100. Both systems utilize spring sources.

The other 6 municipalities of the province such as Balingasag, Binuangan, Magsaysay, Salay and Talisayan have no Level III system in both urban and rural area at present.

Table 4.1.3 Information on Water District

Name of Water District	Number of Connection						Production (cu. m/mon)	Accounted for Water (cu. m/mon)
	Domestic	Institutional	Commercial	Industrial	Total	Metered		
Claveria WD	4,869		56		4,925	4,925	3,456	
Gingoog WD	2,342		192		2,534	2,534	114,048	58,854

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) and usually promote the use of spring sources. These are operated by either the LGUs or by the RWSAs.

There are total of 77 Level II systems in all municipalities/city in the province. Of these, 45 systems are utilizing spring sources, while 32 systems are using deep wells (details are referred to in Table 4.1.2, Supporting Report). The municipality of Alubijid has the largest

number, 16 systems or 21% of the total as shown in Table 4.1.4 together with their service coverage in 1997. More than 50% of the waterworks using deep wells have limited water supply (less than 6 hours per day) due to insufficient capacity of facility and inability to fully pay the electric charges. Likewise, a considerable number of waterworks systems using spring source have limited water supply (less than 12 hours a day) due to insufficient capacity of water source and facility. Among these, the systems in the municipality of Kiniguitan, Lagonglong, Laguindingan, Libertad and Medina, in particular, have encountered supply interruption caused by power failure, pump break down and bursting of pipes.

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

(1) Management practice

There was no information available from the questionnaire in this PW4SP preparation on water charge. It seems that some of these systems collect water fees on a flat rate basis. Regarding repair works, they resort to requesting assistance from the MEO/CEO as needed. This fact shows that management practice is very minimal in any waterworks. Such a situation 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, and moreover, cost recovery by the operating bodies is a prerequisite in sector management.

To attain financial and managerial sustainability, reinforcement of RWSA or other operating bodies 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.

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
Alubiiid	Baybay WWS		1	1		40	40		200	200
	Benigwayan WWS		1	1		55	55		275	275
	Calatcat WWS I		1	1		40	40		200	200
	Calatcat WWS II					15	15		75	75
	Dumanog WWS	1		1	40		40	200		200
	Kiikog WWS		1	1		25	25		125	125
	Lagtang WWS		1	1		30	30		150	150
	Loguilo WWS		1	1		60	60		300	300
	Lumbo WWS		1	1		60	60		300	300
	Quiabo Sampatulog WWS		1	1		42	42		210	210
	Sampatulog WS					75	75		375	375
	Talaba WWS		1	1		60	60		300	300
	Talabang Gamay WS					53	53		265	265
	Taparak WWS		1	1		20	20		100	100
	Tugasnon WWS		1	1		101	101		504	504
	Tula WS		1	1		37	37		189	189
	Municipal Total	1	12	13	40	713	753	200	3,568	3,768
Balingasag	San Juan-Linabu WWS		3	3		175	175		875	875
Balingoan	Upper Brgy. WWS	1	4	5	20	80	100	100	400	500
Binuangan	Binuangan WS	1	5	6	143	507	650	715	2,535	3,250
Claveria	Hinaplanan WWS	1		1	30		30	150		150
	Mat-I Brgy. WWS	1		1	30		30	150		150
	Municipal Total	2		2	60		60	300		300
El Salvador	Amoros WWS		1	1		20	20		120	120
	Cogon WWS		1	1		67	67		400	400
	Himaya WWS		1	1		125	125		750	750
	Pedro Sa. Baculio WWS		1	1		80	80		450	450
	Quibonbon		1	1		20	20		120	120
	Sambulawan WWS		1	1		30	30		180	180
	Sinaloc WWS		1	1		140	140		840	840
	Taytay WWS		1	1		70	70		480	480
	Municipal Total		8	8		552	552		3,340	3,340
Gingoog City	Gingoog	1	42	43	534	8,701	9,235	2,766	41,102	43,868
Gitagum	Gitagum WS		6	6		425	425		2,550	2,550
Initao	Initao WWS		1	1		375	375		1,838	1,838
Jasaan	Corrales Brgy. WP		1	1		81	81		413	413
	Kimaya Rural WW	1		1	291		291	1,571		1,571
	Luz Banzon Brgy. WP	1		1	135		135	810		810
	Natubo Brgy. WP		1	1		50	50		300	300
	San Isidro Brgy. WP		1	1		23	23		118	118
	San Nicolas Brgy. WP		1	1		58	58		313	313
	SORWASCO	1		1	117		117	607		607
	Municipal Total	3	4	7	543	212	755	2,988	1,144	4,132
Kinoguitan	Bolisong WWS		1	1		113	113		731	731
	Calubo WWS		1	1		305	305		1,613	1,613
	Kinoguitan Mun. WWS	1	2	3	23	47	70	116	234	350
	Salicapawan WWS		1	1		77	77		416	416
	Suarez WS		1	1		88	88		462	462
	Municipal Total	1	6	7	23	630	653	116	3,456	3,572
Lagonglong	Lagonglong WS	1	1	2	304	73	377	1,520	365	1,885
Laguindingan	Aromahon WS		1	1		123	123		733	733
	Gasi WS		1	1		10	10		60	60
	Moog Centro WSA		1	1		165	165		990	990
	Sambulawan WS		1	1		79	79		474	474
	San Isidro WS		1	1		45	45		270	270
	Municipal Total		5	5		422	422		2,527	2,527
	Kibanay WS		1	1		210	210		1,157	1,157
	Kulasihan WS		1	1		35	35		197	197
	Victory WS		1	1		72	72		397	397
	Municipal Total		9	9		914	914		5,055	5,055
Libertad	Gimaylan WWSA		1	1		150	150		600	600
	Libertad RWSA	1		1	115	115	230	690		690
	Panimugsalan WWS		1	1		20	20		120	120
	Small Sequijor WWS		1	1		18	18		108	108
	Municipal Total	1	3	4	115	303	418	690	828	1,518
Lugait	Aya-aya WWS		1	1		136	136		816	816
	Betahon WWS		1	1		69	69		414	414
	Kaluknayan WWS		1	1		112	112		672	672

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
Lugait	Lower Talacogon WWS		1	1		80	80		480	480
	Upper Talacogon WWS		1	1		126	126		756	756
	Municipal Total		5	5		523	523		3,138	3,138
Magsaysay	Poblacion WS	1		1	271		271	1,353		1,353
Manticao	Punta Silum WWS		1	1		20	20		120	120
Medina	Bangbang WS		1	1		151	151		755	755
	Bulwa BWSA		1	1		200	200		1,000	1,000
	Mananum Bag-o WWS		1	1		70	70		350	350
	Mananum Daan-San		1	1		227	227		1,242	1,242
	Nomawa WS		1	1		135	135		675	675
	San Vicente WWS		1	1		100	100		500	500
	Municipal Total		6	6		883	883		4,522	4,522
Naawan	Linangkayan WS		1	1		52	52		311	311
	Mat-i WS		1	1		34	34		205	205
	Tagbalogo WS		1	1		32	32		192	192
	Municipal Total		3	3		118	118		708	708
Opol	Opol Mun. WS	3		3	75		75	450		450
Salay	Salay Rural WWSS	2	1	3	1,326	394	1,720	6,747	2,077	8,824
Sugbongcogon	Sugbongcogon Mun.	2	3	5	228	102	330	1,139	510	1,649
Talisayan	Mimbilisan-Pob. WS	1	3	4	250	351	601	1,250	1,755	3,005
	Poblacion-Mintabon WS	1	1	2	100	15	115	500	75	575
	Talisayan WS	1	1	2	300	80	380	1,500	400	1,900
	Municipal Total	3	5	8	650	446	1,096	3,250	2,230	5,480
Villanueva	Kimaya WWS		1	1		20	20		100	100
Provincial Total		23	125	148	4,332	15,674	20,006	22,334	77,933	100,267

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

4.1.5 Level I Facilities

Level I facilities (point source) are common in rural barangays, mostly 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 1997 is also estimated as shown in the same table.

Of the 3,097 operational Level I facilities, 43% are shallow wells. According to the data from PHO, as the provincial average, 50% of the shallow wells are estimated to be unsafe. In the other hand, all deep wells, covered/improved dug wells and developed springs are regarded as safe water sources. By applying the unsafe percentage to the number of shallow wells for each municipality, 1,717 Level I facilities are classified as safe sources, while 1,380 facilities belong to unsafe sources.

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
Alubijid	36	25		19	80	25				25	349	1,987	2,337	1,666	9,344	11,010
Balingasag	68	36		16	120	36	56			92	1,590	3,416	5,005	8,438	18,443	26,881
Balingoan	10	2		8	20	2				2	234	635	869	1,236	3,273	4,510
Binuangan	5	1		8	14	1				1	82	197	279	454	983	1,437
Claveria	40	3		20	63	3	14		6	23	1,530		1,530	8,363		8,363
El Salvador	93	18		3	114	18	32			50		3,275	3,275		16,662	16,662
Gingoog City	123	35		6	164	35				35	2,182	428	2,611	11,304	2,171	13,475
Gitagum	11			2	13		9		3	12		929	929		4,499	4,499
Initao	85	49		1	135	49	68		2	119	1	2,085	2,086	5	10,028	10,032
Jasaan		3		13	16	3				3	2,158	615	2,773	11,449	3,254	14,704
Kinoguitan	8	4		8	20	4	6		2	12	1	767	768	4	4,149	4,153
Lagonglong	9	23		7	39	23				23	177	1,067	1,243	935	5,678	6,613
Laguindingan	39	1		4	44	1				1		1,208	1,208		5,835	5,835
Libertad	14	20		3	37	20	60		13	93	110	305	415	539	1,582	2,121
Lugait	13	72		28	113	72		7		79		146	146		612	612
Magsaysay	20	104		19	143	104	91		10	205	8	1,993	2,001	41	10,361	10,402
Manticao	14	9		23	46	9	22			31	364	2,140	2,504	1,845	10,680	12,525
Medina	28	25		22	75	25	22			47		1,125	1,125		6,002	6,002
Naawan	19	32		4	55	32	8			40	153	1,359	1,512	762	6,572	7,334
Opol	107	42		10	159	42	170		23	235	389	1,703	2,092	1,950	8,504	10,454
Salay	1	6		11	18	6				6	17	1,370	1,387	86	6,746	6,832
Sugbongcogon	3			16	19							170	170		952	952
Tagoloan	18	106		6	130	106	37			143						
Talisayan	5	20		13	38	20	6		4	30	79	1,527	1,606	431	8,176	8,608
Villanueva	7	37		5	49	37	18		25	80	284	610	894	1,452	3,157	4,609
Provincial Total	**776**	**666**		**275**	**1,717**	**666**	**619**	**7**	**88**	**1,380**	**9,706**	**29,057**	**38,763**	**50,959**	**147,664**	**198,623**

Percentage shares between public and private Level I facilities for rural water supply is 57% and 43%, respectively. The share of developed springs in public facilities is 18% (details are referred to Supporting Report).

Problem areas observed on Level I facilities and the necessary countermeasures for the improvement are summarized in terms of potability and functionality.

(1) Unsafe water sources

Most of the sources declared as unsafe sources are driven shallow wells that are unprotected against seepage of surface water and are 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 many non-functioning public wells in the province as shown in Table 4.1.6.

Table 4.1.6 Operating Status of Existing Wells in the Province

Operating Status	Unit	Public Facility		Private Facility		Total
		Deep Well	Shallow Well	Deep Well	Shallow Well	
Functioning	No.	651	732	125	600	2,108
	Percent	76%	72%	92%	100%	81%
Non-Functioning	No.	203	290	11		504
	Percent	24%	28%	8%		19%
Total Number		854	1,022	136	600	2,612

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

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

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 1997, base year for planning purpose, was estimated referring to the NSO population census results (1980, 1990 and 1995), the 1995 Census-based National and Regional Population projection prepared by NSO and the Provincial Physical Framework Plan/Comprehensive Provincial Land Use Plan. However, the population distribution in 1995 census by urban and rural barangays prepared by NSO was adjusted to reflect actual conditions in the classification of barangays. Details are referred to Section 8.3.1 Population Projection.

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

- Service percentage/population by Level III and Level II systems was estimated based on the questionnaire survey results.
- Unserved population was estimated using the percentages of unserved households to the total number of households by urban and rural area based on questionnaire survey results and the 1990 population census data on "Households by Main Source of Drinking Water and City/Municipality" with some modification.
- The rest of the population was considered served by Level I facilities, assuming that 50% of private facilities were shared by neighbors to supplement insufficiency of public facilities.

The average number of households sharing at each Level I public/private facility was calculated at an average of 19 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, 77% of the population is adequately served (87% of urban population and 72% of rural population).

The percentage of underserved population is estimated at 14% of the total population (6% of urban population and 19% 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 a predominant service coverage in almost all of the municipalities/city in the province.

Percentage shares of population coverage by Level I public and private facilities in rural water supply are estimated at 89% and 11%, respectively (details are referred to in Supporting Report).

Level III systems take a major share of service coverage in urban water supply in limited municipalities, such as El Salvador (100% of urban population), Gitagum (92%), Initao (100%), Laguindingan (100%), Lugait (97%), Medina (97%), Tagoloan (89%) and Villanueva (70%).

Likewise, Level II system assumes on the majority of service coverage in the municipalities of Lugaito (66% of rural population), Salay (98% of urban population), Sugbongcogon (74% of urban and 58% of rural population) and Talisayan (72% of urban population).

Taking into account the municipal service coverage, of the 25 municipalities/city of the province, 16 are above the average provincial service coverage of 77%. The highest coverage is seen in Sugbongcogon and Tagoloan at 100% followed by Laguindingan (98%), Lugait (92%), Jasaan (88%), Balingoan (86%) and Claveria (86%).

In contrast to the above, 9 municipalities/city are below the provincial average. The lowest is Opol at 45%, followed by Magsaysay (48%), Libertad (57%) and Balingasag (58%). The low coverage of these municipalities is greatly affected by the lack or low service coverage of Level III/II system in the respective municipality.

Table 4.1.7 Water Supply Service Coverage by Municipality

Name of Municipality	Area	Population (1997)	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
Alubijid	Urban	5,714	3,050	200	1,666	4,916	366	433	798	53	4	29	86	6	8	14
	Rural	16,992		3,568	9,344	12,912	3,104	976	4,080		21	55	76	18	6	24
	Total	22,706	3,050	3,768	11,010	17,828	3,469	1,409	4,878	13	17	48	79	15	6	21
Balingasag	Urban	12,799			8,438	8,438	2,480	1,882	4,361			66	66	19	15	34
	Rural	35,114		875	18,443	19,318	11,405	4,391	15,796		2	53	55	32	13	45
	Total	47,913		875	26,881	27,756	13,884	6,272	20,157		2	56	58	29	13	42
Balingoan	Urban	3,628	1,720	210	1,236	3,166	251	210	462	47	6	34	87	7	6	13
	Rural	4,286		400	3,273	3,673	142	470	613		9	76	86	3	11	14
	Total	7,914	1,720	610	4,510	6,840	393	681	1,074	22	8	57	86	5	9	14
Binuangan	Urban	1,533		715	454	1,169	151	213	364		47	30	76	10	14	24
	Rural	3,953		2,535	983	3,518		435	435		64	25	89		11	11
	Total	5,486		3,250	1,437	4,687	151	648	799		59	26	85	3	12	15
Claveria	Urban	19,674	7,100	300	8,363	15,763	602	3,309	3,911	36	2	43	80	3	17	20
	Rural	22,991	21,027			21,027		1,964	1,964	91			91		9	9
	Total	42,665	28,127	300	8,363	36,790	602	5,273	5,875	66	1	20	86	1	12	14
El Salvador	Urban	6,207	5,817			5,817		390	390	94			94		6	6
	Rural	27,405	1,100	3,340	16,662	21,102	5,180	1,124	6,303	4	12	61	77	19	4	23
	Total	33,612	6,917	3,340	16,662	26,919	5,180	1,514	6,693	21	10	50	80	15	5	20
Gingoog City	Urban	32,098	11,710	2,766	11,304	25,780	2,171	4,147	6,318	36	9	35	80	7	13	20
	Rural	57,401	4,365	41,102	2,171	47,638	453	9,310	9,763	8	72	4	83	1	16	17
	Total	89,499	16,075	43,868	13,475	73,418	2,623	13,458	16,081	18	49	15	82	3	15	18
Gitagum	Urban	2,214	2,040			2,040		174	174	92			92		8	8
	Rural	9,238		2,550	4,499	7,049	2,076	113	2,189		28	49	76	22	1	24
	Total	11,452	2,040	2,550	4,499	9,089	2,076	287	2,363	18	22	39	79	18	3	21
Initao	Urban	6,112	6,094		5	6,099	13		13	100		0	100	0		0
	Rural	17,298		1,838	10,028	11,866	5,131	301	5,432		11	58	69	30	2	31
	Total	23,410	6,094	1,838	10,032	17,964	5,144	301	5,446	26	8	43	77	22	1	23
Jasaan	Urban	21,071	4,785	2,988	11,449	19,222	1,038	811	1,849	23	14	54	91	5	4	9
	Rural	14,454	7,840	1,144	3,254	12,238	359	1,857	2,216	54	8	23	85	2	13	15
	Total	35,525	12,625	4,132	14,704	31,461	1,397	2,668	4,064	36	12	41	89	4	8	11
Kinoguitan	Urban	1,968	1,280	678	4	1,962	6		6	65	34	0	100	0		0
	Rural	9,151		3,456	4,149	7,605	976	569	1,546		38	45	83	11	6	17
	Total	11,119	1,280	4,134	4,153	9,567	983	569	1,552	12	37	37	86	9	5	14
Lagonglong	Urban	3,459	1,520		935	2,455	674	330	1,004	44		27	71	19	10	29
	Rural	12,942	1,800	1,800	5,678	9,278	2,906	758	3,664	14	14	44	72	22	6	28
	Total	16,401	3,320	1,800	6,613	11,733	3,580	1,088	4,668	20	11	40	72	22	7	28
Laguindingan	Urban	2,497	2,497			2,497				100			100			
	Rural	14,432	4,086	4,122	5,835	14,043	80	309	389	28	29	40	97	1	2	3
	Total	16,929	6,583	4,122	5,835	16,540	80	309	389	39	24	34	98	0	2	2
Libertad	Urban	3,554	1,780	690	539	3,009	458	86	545	50	19	15	85	13	2	15
	Rural	6,021		828	1,582	2,410	3,134	478	3,611		14	26	40	52	8	60
	Total	9,575	1,780	1,518	2,121	5,419	3,592	564	4,156	19	16	22	57	38	6	43
Lugait	Urban	6,356	6,172	100		6,272		84	84	97	2		99		1	1
	Rural	7,083	756	4,685	612	6,053	351	679	1,030	11	66	9	85	5	10	15
	Total	13,439	6,928	4,785	612	12,325	351	763	1,114	52	36	5	92	3	6	8
Magsaysay	Urban	1,546		1,353	41	1,394	152		152		88	3	90	10		10
	Rural	22,843			10,361	10,361	9,220	3,262	12,482			45	45	40	14	55
	Total	24,389		1,353	10,402	11,755	9,372	3,262	12,634		6	43	48	38	13	52
Manticao	Urban	6,601	3,660		1,845	5,505	615	481	1,096	55		28	83	9	7	17
	Rural	16,497		120	10,680	10,800	4,612	1,085	5,697		1	65	65	28	7	35
	Total	23,098	3,660	120	12,525	16,305	5,227	1,566	6,793	16	1	54	71	23	7	29
Medina	Urban	5,820	5,650			5,650		170	170	97			97		3	3
	Rural	18,113	460	7,407	6,002	13,869	2,747	1,497	4,244	3	41	33	77	15	8	23
	Total	23,933	6,110	7,407	6,002	19,519	2,747	1,667	4,414	26	31	25	82	11	7	18
Naawan	Urban	3,140	1,760		762	2,522	381	237	618	56		24	80	12	8	20
	Rural	11,946		708	6,572	7,280	4,135	530	4,666		6	55	61	35	4	39
	Total	15,086	1,760	708	7,334	9,802	4,516	767	5,284	12	5	49	65	30	5	35
Opol	Urban	7,205	510	450	1,950	2,910	3,268	1,027	4,295	7	6	27	40	45	14	60
	Rural	18,280			8,504	8,504	7,430	2,345	9,776			47	47	41	13	53
	Total	25,485	510	450	10,454	11,414	10,698	3,373	14,071	2	2	41	45	42	13	55
Salay	Urban	6,861	*	6,747	86	6,833	29		29		98	1	100	0		0
	Rural	12,381	*	2,077	6,746	8,823	2,053	1,504	3,558		17	54	71	17	12	29
	Total	19,242	*	8,824	6,832	15,656	2,082	1,504	3,586		46	36	81	11	8	19
Sugbongcogon	Urban	3,700	970	2,730		3,700				26	74		100			
	Rural	3,589	522	2,086	952	3,560		29	29	15	58	27	99		1	1
	Total	7,289	1,492	4,816	952	7,260		29	29	20	66	13	100		0	0
Tagoloan	Urban	44,079	39,230	4,849		44,079				89	11		100			
	Rural															
	Total	44,079	39,230	4,849		44,079				89	11		100			
Talisayan	Urban	4,505		3,250	431	3,681	345	478	824		72	10	82	8	11	18
	Rural	16,426		2,230	8,176	10,406	4,944	1,076	6,020		14	50	63	30	7	37
	Total	20,931		5,480	8,608	14,088	5,289	1,554	6,843		26	41	67	25	7	33
Villanueva	Urban	10,281	7,154		1,452	8,606	1,258	417	1,675	70		14	84	12	4	16
	Rural	12,953	3,993	100	3,157	7,250	4,729	974	5,703	31	1	24	56	37	8	44
	Total	23,234	11,147	100	4,609	15,856	5,987	1,391	7,378	48	0	20	68	26	6	32
Provincial Total	Urban	222,622	114,499	28,026	50,959	193,484	14,258	14,880	29,138	51	13	23	87	6	7	13
	Rural	391,789	45,949	86,971	147,664	280,584	75,167	36,039	111,205	12	22	38	72	19	9	28
	Total	614,411	160,448	114,997	198,623	474,068	89,424	50,919	140,343	26	19	32	77	15	8	23

Note: * - No data available.

Figure 4.1.1 Water Supply Coverage of the Province