For the preparation of the medium-term development plan in terms of water source development, utilization of spring sources was given first priority, with special attention to the development of Level III systems. Groundwater source availability as second priority was presented by municipality with standard specifications of wells, including parameters on well depth, static water level and specific capacity.

For the furtherance to design the concrete specifications of the planned wells, recommendations are made to conduct detailed groundwater investigations entailing the construction of test wells, prior to the detailed design or in the pre-construction stage. The municipalities that fall on this group are Manolo Fortich, Lantapan, Maramag, Don Carlos and Dangcagan. In addition, the investigation on the alternative water source availability for the Malaybalay WD shall be conducted within the hillside of the two volcanoes.

Untapped springs shall also be surveyed to confirm the development possibility in the detailed groundwater investigation. This will include items on the following: i) locations and type of spring sources; ii) fluctuation of discharge rates through the year; iii) distance from spring sources and proposed served areas; and iv) elevation differences between the two points.

7. Future Requirements in Water Supply and Sanitation Improvement

Physical Targets and Service Coverage

Phased requirements for the sector development in the province are assessed to meet the provincial targets established as percentages of beneficiaries or utilities to be served by sub-sector. Targets of service coverage for water supply in Phase I development are established in consideration of about 5% increase from the base year both in urban and rural area as shown in Table 7.1. Sanitation sector target is applied in order to attain sufficiency and balanced distribution of the facilities in urban and rural area as embodied in the PNDP. Sewerage target is set for only part of urban centers in the long-term development, while solid waste management considered the medium-term household requirements. Logistic support is considered as a minimum requirement of LGUs for the implementation of PW4SP. The types and number of well drilling/rehabilitation equipment and supporting vehicle for Level I facilities are identified as reference information. Also, minimum requirements for setting up a provincial laboratory to support drinking water quality surveillance and monitoring activities are described.

Table 7.1 Present Service Coverage and Sector Targets

Sub-Sector	*Area/Type*	*Base Year Service Coverage*	*Provincial Sector Targets*	
			Phase I	*Phase II*
Water Supply	*Urban Area*	*74*	*80*	*95*
	Rural Area	*80*	*85*	*93*
Sanitation	*Urban HH Toilet*	*87*	*93*	*98*
	Rural HH Toilet	*59*	*75*	*93*
	Public School Toilet	*34*	*60*	*90*
	Public Toilet	*97*	*100*	*100*
Sewerage	*Urban Area*	*0*	*Not applicable*	*50*
Solid Waste	*Urban Area*	*75*	*90*	*Not applicable*

Frame values are projected by municipality for respective sub-sectors; future population by urban and rural area, the number of students in public schools and the number of public utilities.

Required Facilities to Meet Target Services

Types of required facilities and their implementation criteria are determined according to service level standards as adopted by the NSMP and NEDA Board Resolutions. Urban population is planned to be served by Level III systems, however, existing Level I and II facilities are to be used during Phase I period. Level I facilities are adopted for rural water supply with limited application of Level II system where houses are clustered and suitable untapped springs are confirmed. However, it does not exclude from being implemented Level I and II facilities in urban area as individual cases in the future as well as Level III systems in rural area. Rehabilitation work is planned only for new deep wells (Level I) to be constructed under PW4SP, considering the difficulty of rehabilitation for existing wells constructed by means of traditional methods. Facilities for the provincial laboratory are determined, taking into account the existing facilities and the exigency to examine the water samples at the right time.

In sanitation sector, pour flush and/or flush type household toilets are planned, while VIP type household toilet and sanitary pit latrine are considered in rural area as an intermediate measure. Sewerage program is planned in Phase II for limited urban area. The study on solid waste considered only the number of required trucks for the year 2000. Additional service coverage of the sector by phase is shown in Table 7.2.

Table 7.2 Additional Service Coverage by Phase

Sub-Sector	*Area/Type*	*Unit*	*Additional Service Coverage*	
			Phase I	*Phase II*
Water Supply	*Urban Area*	*Persons*	*53,763*	*301,317*
	Rural Area	*Persons*	*137,085*	*115,281*
Sanitation	*Urban HH Toilet*	*No. of Households*	*23,999*	*55,184*
	Rural HH Toilet	*No. of Households*	*48,355*	*81,374*
	Public School Toilet	*No. of Public School Students*	*74,654*	*120,404*
	Public Toilet	*No. of Utilities*	*3*	-
Sewerage	*Urban Area*	*Persons*	*Not applicable*	*215,359*
Solid Waste	*Urban Area*	*No. of Households*	*21,513*	*Not applicable*

The necessary water supply facilities for Phase I include 21 deep wells/springs for 10,100 house connections in urban areas and 73 Level II systems with spring sources and 1,205 Level I wells/springs for rural areas. For Phase II, 52 deep wells/springs for additional 75,300 connections and 1,930 Level I wells/springs are required for urban and rural water supplies, respectively. It is assumed that 10% of Level I facilities will be implemented by the LGUs and 30% of these public facilities will be achieved through spring development. Rehabilitation requirements are assumed to be 10% of the total number of deep wells to be constructed under PW4SP. Two (2) sets of water quality test instruments/equipment will be necessary; one (1) set to upgrade the existing provincial laboratory in Malaybalay City, and the other set, for the new laboratory in Maramag Provincial Hospital.

For urban water supply, one Level III system is, in principle, considered for urban area of every municipality. In municipalities with existing Level III system/s, the expansion of the existing system/s was first considered. In case there are no Level III system, a new system was recommended. Existing plan/s on the development of Level III/WD are also taken into account to determine respective system of the municipalities.

Currently, 5 out of the total 22 municipalities/city have no Level III system in their urban areas, namely: Cabanglasan, Damulog, Kadingilan, Kitaotao and San Fernando. At present, there are planned/on-going projects such as the ADB-assisted/LGU urban water supply project, which is coordinated by the DILG. The recipient municipalities/city are Baungon, Impasugong, Lantapan, Libona, Manolo Fortich and Talakag. In addition to this, the WDs of Don Carlos, Kibawe, Malaybalay and Valencia are planning to expand their systems.

Among various untapped spring sources identified during the course of PW4SP preparation, the untapped sources located in the municipalities of Cabanglasan, Dangcagan, Malitbog and Quezon are considered to have favorable conditions for use in Level III services. However,

detailed survey to ensure appropriate developments of spring sources shall be conducted in the implementation of the projects.

Merging of municipal systems (physical arrangement) in the long-term is considered. An integrated management system shall also be sought. The conditions to be studied include; water source availability, willingness by concerned municipalities and technical study on cost recovery/economical construction. The following municipalities may be studied for the integration, both in physical and management systems.

- Kitaotao and Dangcagan

Integration of small Level III systems for the operation and management shall be sought, although these systems are currently managed individually.

Moreover, Phase I sanitation will require 24,000 household toilets, 135 public school toilets and 3 public toilets for urban area. In rural area, 48,400 household toilets and 234 public school toilets are necessary. Solid waste disposal will need 15 refuse collection trucks. For Phase II, urban area will require 55,200 household toilets and 214 public school toilets. In rural area a total of 81,400 household toilets and 862 public school toilets are necessary.

8. Sector Management for Medium-Development Plan

Institutional Framework

To effectively manage the water and sanitation sector, the provincial and municipal governments will have to make adjustments in their current policies and structures. One glaring basic institutional need at the local level is a common vision and mission statement for the sector. A critical mass of people with resources who share in the vision must be identified and harnessed for sector management. Local planners need to focus on the long-term requirements.

The following policy and strategy statements will be adopted by the Provincial Government:

- Facility management with emphasis on sustainability
- Project selection and prioritization based on commitment of the beneficiaries, beneficiaries' willingness to pay, current water and sanitation and health conditions, and potential for growth
- Technologies appropriate to local conditions and resources. Economical facilities, without necessarily insisting on low-cost construction

- An integrated approach to the provision of potable water supply, sanitation, and hygiene education
- Equitable provision of water supply and sanitation between rural and urban areas; between wealthy and depressed areas
- Self cost recovery and rational cost sharing (subsidy)
- Private sector participation
- Seeking potential sources of local and external funds (loans and grants) to finance the capital requirements of the sector
- Broader concern for environmental protection and management in sector development
- Provision of water supply and sanitation services under emergency conditions

In coordination with appropriate national and local agencies, the LGU shall endeavor to set up a coordinated regulatory framework considering, among others, the following: water allocation and water rights policies (conflict resolution); water rate review; association registration; water quality, etc.

It is assumed that national and external funds although diminishing, will continue to be channeled through local offices of central agencies in the medium-term.

In the medium-term, a full-time Provincial Water Supply and Sanitation Unit (PWSU) shall be operational, which may be augmented at the existing Waterworks division. The LGU should ensure that adequate logistics and incentives are provided for the Unit. In the long term, the Unit may be promoted to the same level as the PPDO. The PWSU will continue to implement, assist and monitor all water supply and sanitation services in cooperation with the municipalities. The DILG-PMO shall continue to provide technical and managerial assistance in the formative years of the PWSU.

For institutional arrangements, the formation of BWSAs for Level I systems and RWSAs for Level II and III systems will be a prerequisite. The community, especially the women's sector, shall be involved in all phases of project management (planning, construction and O&M) and in undertaking health and hygiene education programs. To provide the members with the necessary skills, training programs will be implemented by concerned national agencies and by the provincial and municipal governments.

Community Development

To ensure that the full participation of the beneficiary community in sustaining sector projects is realized, it is recommended that the LGUs provide the needed human, financial and

other material resources for community development work to take-off. To institute the linkage among all the actors in sector development, a CD Unit should be established within the proposed Provincial Water Supply and Sanitation Unit. A permanent CD Specialist shall be appointed to take charge of promoting, developing and coordinating CD and IEC programs of the province, even looking into how it can harness the participation of the private sector and train project beneficiaries. It is also recommended that a CD Specialist be assigned to the existing Municipal WATSAN Liaison Task Force to coordinate and implement all CD/CO and IEC work at the municipal level. At the barangay level, it is recommended that each Barangay Development Council (BDC) establish a WATSAN Committee that will coordinate all sector projects in the barangay as well as designate one person who can be trained on CD work.

The power of information, education and communication as a necessary foundation activity for CD has not been fully realized and maximized. It is, therefore, recommended that a comprehensive IEC program be conceptualized and implemented on the national, provincial and municipal levels. The program will promote a better awareness and understanding of the responsibilities of sector planners as well as the benefits due to the project beneficiaries so that the gains of the sector can be sustained on a long-term basis.

It shall be the DILG who shall retain the central role as the national government agency that promotes and develops the capacities of the province and the municipalities in participatory CD approaches and IEC programs for the sector. It shall also encourage and institutionalize the participation of national NGOs, with local networks or offices that specialize in community management program and utilize these to enhance and assist the LGUs in organizing project beneficiaries. Another national agency, the LWUA, shall on the other hand, continue to promote community participation in the formation of LGU-WS into water districts and to provide regular CD assistance particularly in consultation with the community on projects, loans, and water rates adjustments.

The LGUs and the intended beneficiaries can both participate in sector development: Level I – for the planning and implementation of sector projects and in the formation and management of a water supply and sanitation association/cooperative; Level II – for the formation of a water supply and sanitation association/cooperative or a waterworks; while Level III – for the formation of water districts or LGU-operated waterworks. Thus, it is important that the LGUs make the decision on the projects it can afford to implement.

To achieve this, the LGU must encourage active community participation and involvement through four approaches. These are: (1) sharing relevant information on the project with the beneficiaries, (2) consulting with users on all phases of project development; (3) giving ample room to the beneficiaries to make project-related decisions; and (4) providing opportunities to the community to initiate actions for their own benefit.

On the other hand, recommended are four ways that beneficiaries themselves can participate in sector projects, some of which have been tried in the province. These are: (1) the provision of free labor and/or materials by community members; (2) the sharing of costs between project proponent and the users; (3) expressed participation of all parties through MOAs and, (4) the participation through a firm involvement and commitment of the community in the management, operation, maintenance of the system itself.

For Levels I and II, the WATSAN Unit should utilize the recommended Community Development Framework (modified from the UNDP-WATSAN Project) consisting of three phases of activities: Phase 1 is Formation of Organization; Phase 2 is Development of Organization; and, Phase 3 is Consolidation of Organization.

Gender Consideration

Since sustainability of WATSAN services depends on responding to the demands of men and women in the community, LGUs must recognize and give vital emphasis on the role of gender sensitive participation because the use, maintenance and financing of WATSAN systems require the participation of both the men and women. Thus, they should be given equal voice and opportunities in serving the community as well as in the planning, implementation and monitoring and evaluation of sector projects. To ensure the gender responsiveness of WATSAN projects, the LGUs should be trained through a Trainor's Training Program on Gender Responsive Planning as envisioned by the Philippine Plan for Gender Responsive Development (1995-2025).

9. Cost Estimates for Future Sector Development

The investment cost includes direct cost for construction/rehabilitation of required facilities, procurement of vehicle/equipment, construction/upgrading of laboratory, sector management, physical and price contingencies, and value-added tax. The recurrent cost is incurred for operation and maintenance of facilities. Unit construction cost per person/household/ facility was first prepared under contract-out basis in 1997 price level. In this regard, the cost

for procurement and distribution of toilet bowl for pour-flush toilets is only counted for household toilets. Investment cost required by phase for the province is summarized in Table 9.1.

The investment cost for Phase I is estimated at about ₱ 767 million. A total of ₱442 million (in 1997 price level) is required as the construction/rehabilitation cost (including cost for disinfection of well) in Phase I, of which urban water supply and rural water supply share 43% and 27%, respectively. While, the remaining 30% are required for urban and rural sanitation.

Required equipment and vehicle for construction/rehabilitation of Level I facilities and solid waste management are roughly estimated: 1 set/unit each of well drilling equipment and service truck with crane; 1 set/unit each of well rehabilitation equipment and support vehicle; and 15 units of refuse collection truck. The total procurement cost is estimated at approximately ₱58.5 million. Out of the requirements, however, only one set/unit each of well rehabilitation equipment, support vehicle and maintenance tools/water quality testing kits is incorporated in the medium-term investment plan due to budgetary constraints and technical capability of LGUs at present.

Table 9.1 Investment Cost Required by Phase

Unit: 1,000 Pesos

Item	*Component*	*Phase I*	*Phase II*
Construction/ Rehabilitation	***Water Supply***		
	Urban Area	*188,513*	*976,213*
	Rural Area	*121,213*	*65,679*
	Sanitation		
	Household Toilet	*29,752*	*56,609*
	School Toilet	*101,143*	*294,932*
	Public Toilet	*1,032*	*0*
	Disinfection of Well	*348*	*141*
	Urban Sewerage	*N/A*	*1,572,121*
	Sub-Total	***442,000***	***2,965,694***
Procurement of Vehicle/ Equipment/Maintenance Tools	*Well Drilling Rig & Service Truck*	*0*	*26,782*
	Support Vehicle	*590*	*0*
	Well Rehabilitation Equipment	*280*	*0*
	Maintenance Tools	*220*	*0*
	Water Quality Testing Kits	*15*	*0*
	Sub-Total	***1,105***	***26,782***
Water quality Laboratory		*2,032*	*0*
Sector Management	*Engineering Studies*	*53,765*	*175,392*
	Community Development and Training	*32,462*	*121,425*
	Sub-Total	***86,227***	***296,818***
Total Direct Cost		*531,364*	*3,289,293*
Contingencies	*Physical Contingency*	*53,115*	*328,929*
	Price Contingency	*132,754*	*N/A*
	Value-Added Tax (VAT)	*49,868*	*N/A*
Total Investment Cost		***767,101***	***3,618,223***
Total Investment Cost (excluding Price Contingency)		***634,129***	***3,618,223***

Likewise, annual recurrent cost in 1997 price level is estimated at ₱ 36.7 to ₱ 52.1 million/year during Phase I period.

10. Financial Arrangements for Medium-Term Development Plan

Financial arrangements to attain medium-term (Phase I) targets were sought focusing on available Internal Revenue allotment (IRA). The financial shortfall was first identified for this sector and recommendations were made to seek comprehensive logistics in terms of acquisition of various funds, augmentation of current practices in Government assistance to this sector and effective investments and cost recovery.

The projection of IRA to the relevant sector for Phase I period was made covering different administrative levels. Referring to the experience in other provinces, provincial allocation to the relevant sector was assumed to be 5% of total IRA (25% of 20% Development Fund) and the same percentage was applied for the allocation of municipal IRA to the sector. The fund available for this sector for the 5-year implementation period from 1999 to 2003 was calculated as a sum of municipal and provincial allotments.

The combined provincial and municipal IRA to the sector was estimated at ₱ 318.1 million (provincial IRA is 38% of the total IRA). In the overall IRA allocation to the sub-sectors, urban water supply has the largest allotment of 33.2%, followed by rural water supply (29.9%). While, the share of rural sanitation is 26.67%, which is higher than that of urban sanitation of about ₱ 32.4 million.

The shortfall in funding on the current price level was figured out comparing with available fund for the relevant sector (IRA) in the province over the Phase I requirements. IRA can fund only 50.17% of the requirements as a provincial average. Hence, there is a big shortfall of ₱ 315.98 million in funding. It will become ₱381.67 million in consideration of price escalation with annual rate of 7%. In the municipal achievement percentage in finance, Manolo Fortich and Quezon (100%) are the highest among municipalities, followed by Talakag (98%). Others are in the range between 40% and 60% to the requirements, while the provincial average is 50%.

Under the above situation, different levels of funding availability are discussed with reference to service coverage. Alternative countermeasures are also discussed in view of; i) acquisition of external funds, ii) augmentation of sector finance under current arrangements

(IRA and others), iii) introduction of private sector participation to mitigate public investment needs, and iv) effective and economical investments. It is common to all sub-sectors that the service coverage in the year 2003 would not sustain even the present levels in the provision of only projected IRA. Using computer-based programs, these scenarios may be modified by policy makers according to the updated information and policy on available fund and sector targets.

Investment need ranking of the municipalities is discussed to serve as a guide for implementation in order for the provincial government to effectively arrange its financial resources. The ranking for urban water supply is specifically studied and the result is employed for allocation of provincial IRA to the municipalities in the concerned sub-sector. For the provincial fund allocation, as a currently effective arrangement, it is assumed that 60% of the fund for urban water supply from the provincial government is equally distributed to the top fifth ranking municipalities, while the remaining 40% are equally distributed to the rest of the municipalities. In the synthetic investment need ranking of municipalities covering four sub-sectors, the top ranking municipalities are Don Carlos and Damulog which indicate that they are given priority for investments in all sub-sectors, while Valencia is the least priority in terms of investment.

With regard to Level I water supply and sanitation improvement for which GOP may provide possible assistance, the DILG is assumed to be the Executing Agency and the province, the Implementing Agency in the meantime. The project may be merged with those of 1st batch provinces for preparation of the PW4SP. The implementation of a packaged project may be realized in the near future.

Project components including Level I water supply, public/school toilet facilities and distribution of toilet bowls were identified to meet the conditions in provision of GOP-assisted project. There are 4 eligible municipalities (Cabanglasan, Dangcagan, Kadingilan and Sumilao) in terms of 5th and 6th class municipality for Level I water supply in the province, while there are 15 municipalities to meet the condition in sanitation sub-sector. The required services will cover technical and institutional/community development aspects of the project. The overall project cost for the implementation period 1999-2003 was estimated at ₱ 142 million or ₱100 million in 1997 price level.

Two alternatives for the financial arrangements were studied, these are: i) Case 1-Utilization of IRA only; and ii) Case 2-Utilization of IRA and MDF.

For Case 1, GOP shall share 50% of the overall project cost in combination of the foreign assisted loan and government counterpart fund. The remaining 50% shall be shared by the LGUs (47%) and the beneficiaries (3%). Under this case, the IRA to be used by the LGU is about 70% of the available IRA (₱67.9).

For Case 2, the utilization of the MDF is considered in case the LGUs will fail to furnish IRA for the cost to be shared (even if estimated IRA available meets the required cost to be shared by the LGUs). The foreign loan may be availed of at the maximum financing limit of 75% of the overall project cost. GOP will possibly finance up to 75% of the total project cost in the portion of the loan. Out of GOP finance through the loan, 45% of the total project cost shall be granted to the LGUs, aside from the 5% GOP counterpart fund. The remaining 30% of the total project cost shall be utilized for financing the LGUs to secure their budgetary capacity through MDF. Under this case, the IRA to be used by the LGU is about 25% of the available IRA estimated.

Cost recovery and cost sharing shall be promoted to attain the planned target based on the principle that adequate water, sewerage and sanitation facilities should be paid for. For Level I water supply systems, LGUs and beneficiaries are required to share the O & M cost. While users need to pay water charge up to 2% of their monthly income to sustain the system (₱74/HH/month in 2003). For Level II water supply systems, full cost recovery is required for all capital and recurrent cost (₱94HH/month in 2003, less than 2% of monthly income). For Level III water supply systems, a full recovery of capital and O&M cost is required (₱221/HH/month in 2003). Based on the experience that water fee must not exceed 5% of income (average monthly water consumption of 15 m^3), users will be able to pay the amount.

For sanitation, governmental support is limited to the provision of toilet bowl for pour-flush toilets as an incentive to increase the distribution of water-sealed toilets. To expedite the sanitation sector improvement, introduction of specific loans with low interest rate and longer repayment period may be effective. For urban sanitation, to cover the construction cost of sanitary toilets, a linkage with existing housing loan may be established.

11. Monitoring of the Medium-Term Development Plan

The sector monitoring system must support a well-defined and accepted sector development process-model. This will include information collection, tracing the flow of raw data from the field to the central level, information analysis, and data feedback. With the sector moni-

toring system in place, planners should be able to take a fresh objective view of the way current strategies are implemented.

The sector monitoring system should reinforce the linkage between water, sanitation and health. It should be reliable and involve the beneficiaries. It should be accepted by all sectors. It should be practical. It should be followed through with effective feedback. The best monitors are the community members themselves since accurate monitoring reports are in their best interest. A consensus on common and practical definition of terms for monitoring purposes is needed.

A three-phased monitoring system is proposed with each phase progressively increasing the number and complexity of indicators to be used. Detailed implementation of the first phase requirements is presented in this PW4SP, including institutional arrangements. It is envisaged that this will be linked with the national sector monitoring system being developed.

There are existing Project Monitoring Committees (PMCs) at the provincial and municipal levels tasked with the monitoring of local government projects funded by national and local governments. At the provincial level, projects to be monitored will be those implemented and managed at this level with funds directly released to the province as provided under MO 175. The PMC shall be established in the province and it shall consist of representatives from NGOs and the administration.

This PW4SP should be updated at least every five years. Based on the monitoring reports, an annual review of sector accomplishments compared with objectives and efficiency will be done. This will lead to the reformulation of objectives, strategies, new policies and policy revisions, and an updated sector investment program.

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 Bukidnon 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 Bukidnon

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.

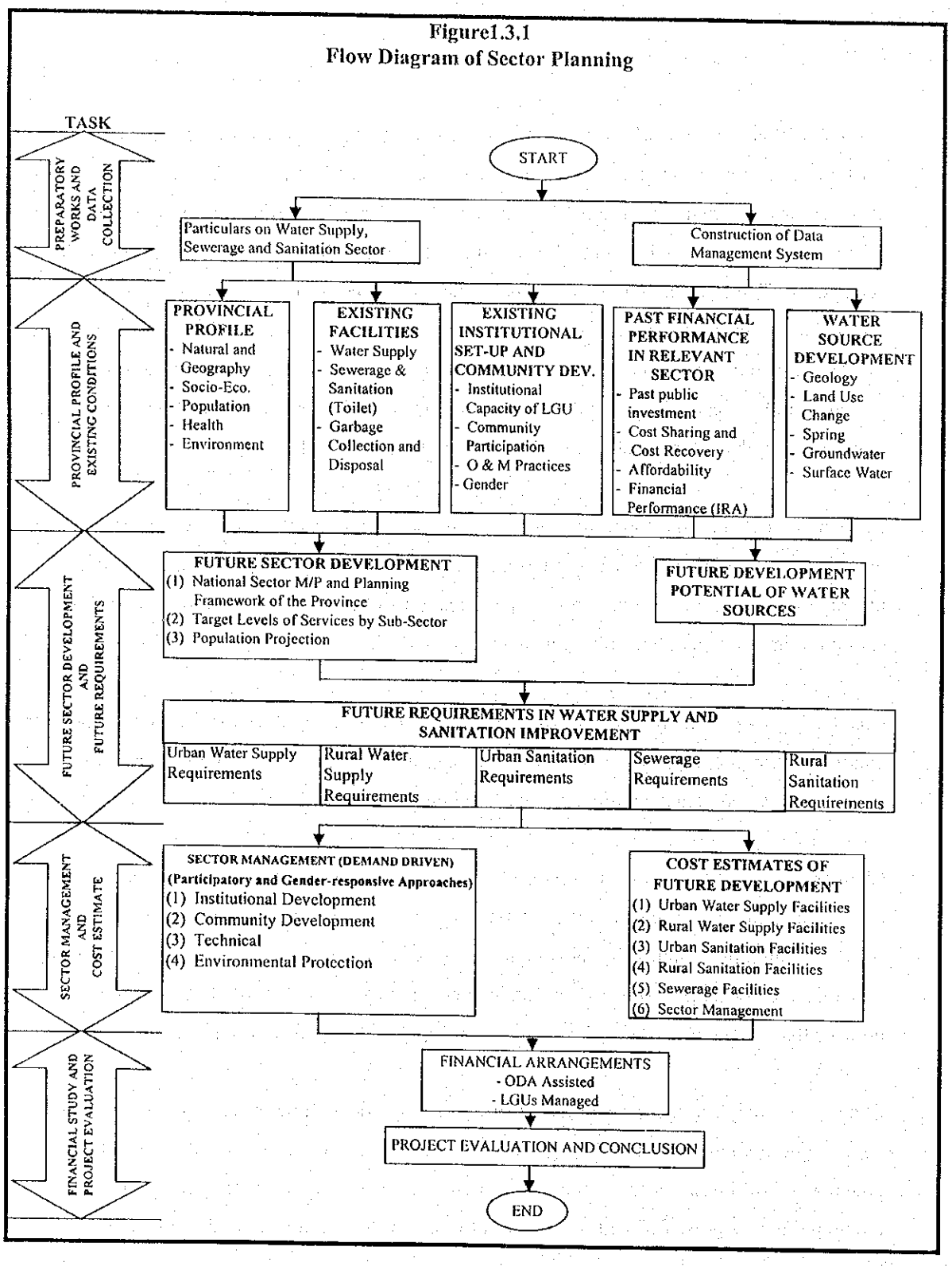
Chapter 3 provides the provincial profile with reference to current sector conditions: natural conditions and geographical features, socio-economic conditions, demographic trends, health status and environmental conditions as the planning environment.

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

Figure1.3.1
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.

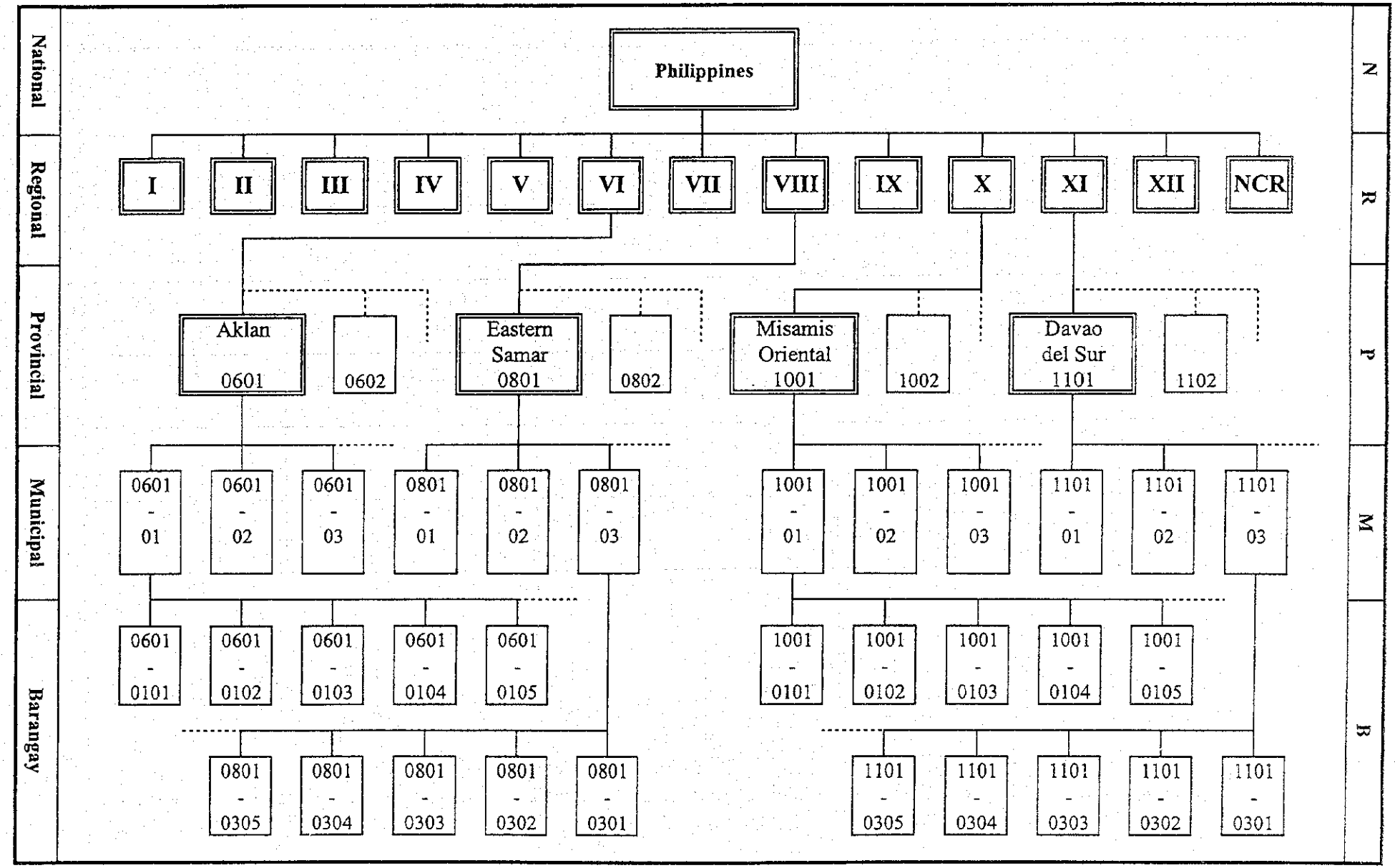


Figure 2.6.1 Institutional Hierarchical System by the NEDA Coding

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

Bukidnon is one of the 4 provinces comprising the Northern Mindanao Region (Region X). The newly established city of Malaybalay, the provincial capital is about 91km south of Cagayan de Oro City, the regional center. Misamis Oriental bounds the province on the north , Agusan del Sur and Davao del Norte on the east, Lanao del Norte and Lanao del Sur on the west, and North Cotabato on the south as shown in the Location Map.

The landlocked province is classified as 1st class and has a total land area of 8,293.87km^2 that is 2.76% of the Philippine total land area of about 300,000km^2. It is composed of 21 municipalities and one component city. Based on the 1995 NSO records, the province has 464 barangays, of which 82 are urban and 382 rural. Provincial total population was 940,403 in 1995. About 70% of the population reside in rural areas, while the remaining 30% in urban areas. At present, there are 5 water districts and 25 LGU/association managed Level III water supply systems operating in the province. Table 3.1.1 presents the breakdown per municipality of land area, population and density, as well as administrative composition.

Table 3.1.1 Outline of Municipalities

Municipality		Land Area (km^2)	1995 Population		Number of Barangay		
Name	Class		Number	Density (person/km^2)	Urban	Rural	Total
Baungon	4th	175.86	22,617	129	2	14	16
Cabanglasan	5th	209.00	29,288	140	1	14	15
Damulog	4th	245.66	15,010	61	1	16	17
Dangcagan	5th	115.15	16,660	145	1	13	14
Don Carlos	3rd	157.02	51,083	325	10	19	29
Impasugong	2nd	1,071.67	25,389	24	1	12	13
Kadingilan	5th	172.06	26,093	152	1	16	17
Kalilangan	4th	153.59	26,973	176	6	8	14
Kibawe	4th	214.35	30,783	144	2	21	23
Kitaotao	4th	150.74	38,404	255	2	33	35
Lantapan	4th	240.76	36,943	153	4	10	14
Libona	4th	244.95	31,897	130	1	13	14
Malaybalay (Capital)	1st	984.38	112,277	114	12	34	46
Malitbog	4th	260.53	16,414	63	1	10	11
Manolo Fortich	2nd	506.64	67,400	133	1	21	22
Maramag	2nd	351.72	62,673	178	12	8	20
Pangantucan	3rd	343.34	38,418	112	8	11	19
Quezon	1st	409.41	74,141	181	2	29	31
San Fernando	3rd	638.63	34,299	54	2	22	24
Sumilao	5th	207.49	15,640	75	3	7	10
Talakag	2nd	833.70	39,378	47	6	23	29
Valencia	1st	607.13	128,623	212	3	28	31
Provincial Total	1st	8,293.78	940,403	113	82	382	464

3.2 Natural Conditions and Geographical Features

3.2.1 Meteorology

The province has 2 types of climate under the Coronas classification: Type III, which is experienced in the northern part and Type IV, in the southern part. Type III is characterized by the absence of a very pronounced maximum rain period with a short dry season lasting only for 1 to 3 months, while Type IV has a rainfall that is more or less evenly distributed throughout the year as reflected in the Location Map. Using the 5 year (1993-1997) rainfall records of the Malaybalay PAGASA station, the average annual rainfall was registered at 2,567.28mm. Maximum rainfall was observed during the month of July, while the minimum was in December.

The average annual temperature is 23.88°C with a range of 17.7°C in January to 30.6°C in November. Because of its altitude, the climate is pleasant the whole year round. The province is located outside the typhoon belt.

3.2.2 Land Use

Remaining forest area constitutes a mere 33% of the total area of the province located mostly in Mt. Kitanglad, Mt. Kalatungan, Mt. Tago and Mt. Tangkulan mountain ranges. Grassland and agricultural land occupy 37% and 30%, respectively. Built-up area is limited to less than 1%. Primary settlements are concentrated along major transport routes. The existing land use pattern as presented in Table 3.2.1 must be enhanced by rehabilitation of watersheds in order to pursue a sustainable growth of the province. The remaining forest cover must be conserved to primarily serve as watershed rather than as source of timber. An efficiently managed watershed collects and regulates flow of water, controls soil erosion and minimizes water pollution. Conversion of the remaining forestland to other uses will restrict its function as a watershed. Correspondingly, a significant increase in agricultural area will result in a high demand of water use.

Table 3.2.1 Current Land Use

Land Use	Area (km^2)	Percentage over Total Land Area
Forest Land	2,712.65	32.71
Grassland	3,058.22	36.87
Built-up	20.18	0.24
Agricultural	2,494.85	30.08
Provincial Total	8,293.78	100

3.2.3 Topography and Drainage

The terrain from the boundary of Misamis Oriental and Bukidnon is characterized by slightly undulating and rolling upland areas. There are 3 tall mountains in the area, which are actually extinct volcanoes. Most parts of the province are rolling hills cut by deep and wide valleys. There are clusters of small volcanoes, which rise abruptly above the plateau, the most dominant of which is Mt. Kitanglad with an elevation of 2,838m, the second highest in the country. Its twin, Mt. Kalatungan, which is 20km southwest away, rises to 2,824m.

Two water resources regions, namely: WRR-X and WRR-XII cover most of the provincial area. In WRR-X, the Tagoloan River with watershed of 1,704km^2 and the Cagayan River with 1,521km^2 are major surface waters in the northern part of the province. The Tagoloan River at Impasugong springs at about 2,000 masl on the south range of Mt. Tago and flows northwest to Macajalar Bay. Tributaries of this river are small creeks in the upstream portion north and east of Mt. Kitanglad. The Cagayan River originates from the northwestern piedmont of Mt. Kitanglad and flows down to Cagayan de Oro City. In WRR-XII, the rivers of Pulangi, Sawaga and Muleta, which are tributaries of Mindanao River, flow southward and have a total watershed of 23,169km^2. These rivers generally originate from the central volcanic mountains of Kitanglad and Kalatungan.

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

Table 3.2.2 Drainage Areas & Flow Rates of Major Rivers

Major Rivers	Drainage Area (km^2)	Flow Rate (m^3/sec)			Water Districts (using river water)
		Peak	Maximum	Minimum	
Tagoloan	1,656	354.4	229.6	45.4	None
Cagayan	1,331	574.8	556.5	55.8	None
Sawaga	327	283.3	113.5	1.6	Malaybalay WD
Pulangi	2,730	817.9	680.8	55.8	None
Muleta	1,333	576.2	486.3	46.8	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

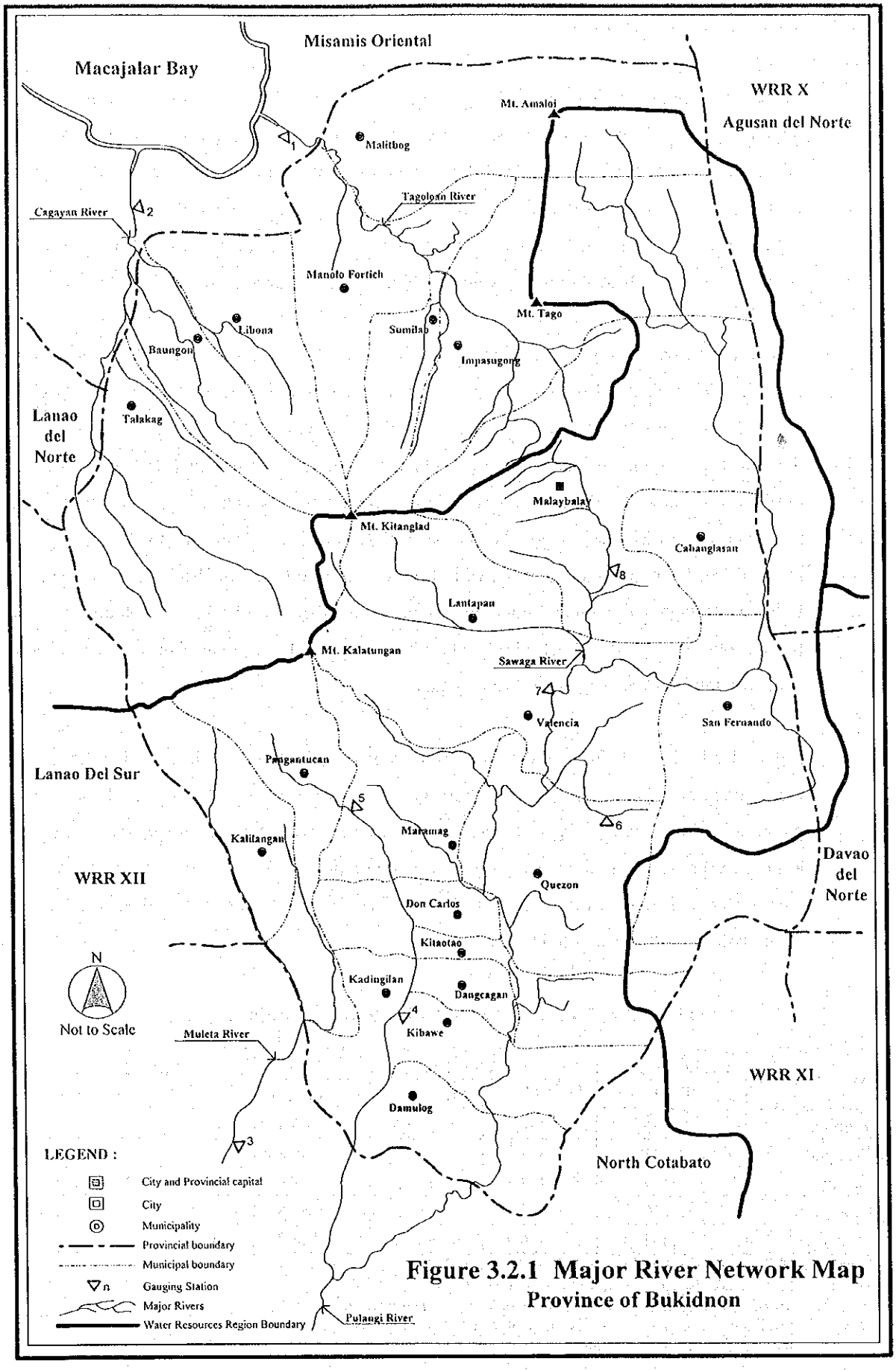


Figure 3.2.1 Major River Network Map
Province of Bukidnon

3.3 Socio-economic Conditions

3.3.1 Economic Activities and Household Income

Bukidnon is basically an agricultural province. The major economic activities are farming and livestock production. Principal crops cultivated are corn and palay. Commercial crops such as sugarcane, pineapple, coffee, rubber, coconut are the other important agricultural commodities. At present, the province is promoting cottage industry and eco-tourism as another income-generating activities.

The NSO Family Income and Expenditures Survey in 1994 showed that the average annual family income of the province was ₱ 52,627 while the expenditure was at ₱ 42,811 or a net saving of ₱ 9,816. 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 greater than the average figures in the region. Based on the established poverty threshold income of ₱ 43,659, in Region X for 1994, about 70% of the total number of families lived within and below the poverty threshold.

As to the number of workers by major industry group, agriculture, fishery and forestry had the dominant share followed by social and personal services (refer to Table 3.3.2, Supporting Report). By class of worker, those who worked without pay in family-owned operated farm/business had the highest share of 41% as shown in Figure 3.3.2.

3.3.2 Basic Infrastructure

All municipalities have electric supply, although the service coverage at household level is quite low at 54%. Telephone service is also available in all municipalities. There are 25 post office in the province. Land transportation is available by means of jeepney, bus, rent-a car and tricycle. There are 3,444 business establishments. Table 3.3.1 presents a provincial outline of public services and Table 3.3.2 reflects the number of public facilities and services by municipality (refer to Table 3.3.1, Data Report).

3.3.3 Education

The province has a total of 762 schools consisting of 646 elementary schools, 96 high schools and 20 tertiary/technical schools. The 1990 NSO census indicated that the province had 90% literacy rate of household population 5 years old and over. 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

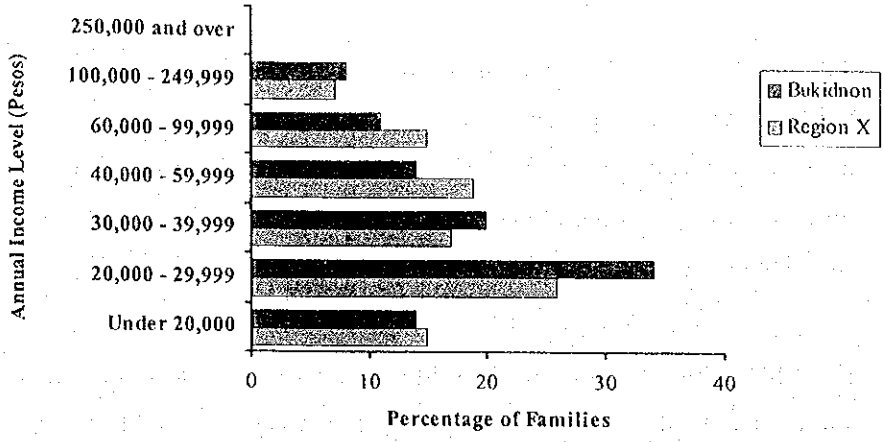


Figure 3.3.2 Employment Distribution by Major Industry and Class of Worker

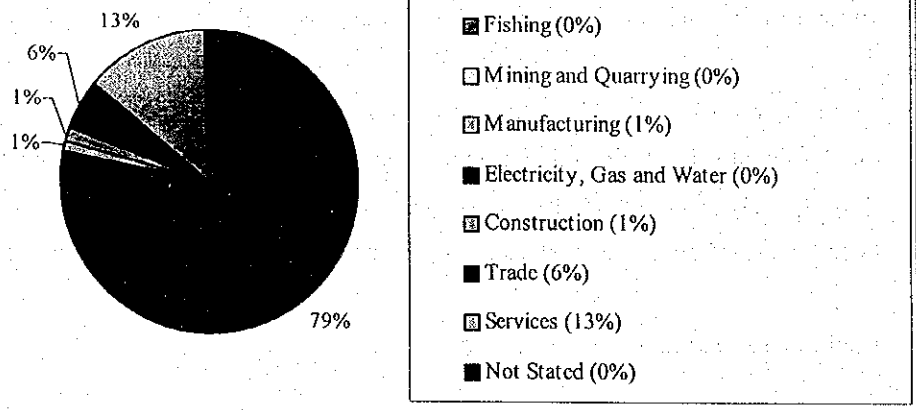


Figure 3.3.3 Population Distribution by Highest Educational Attainment

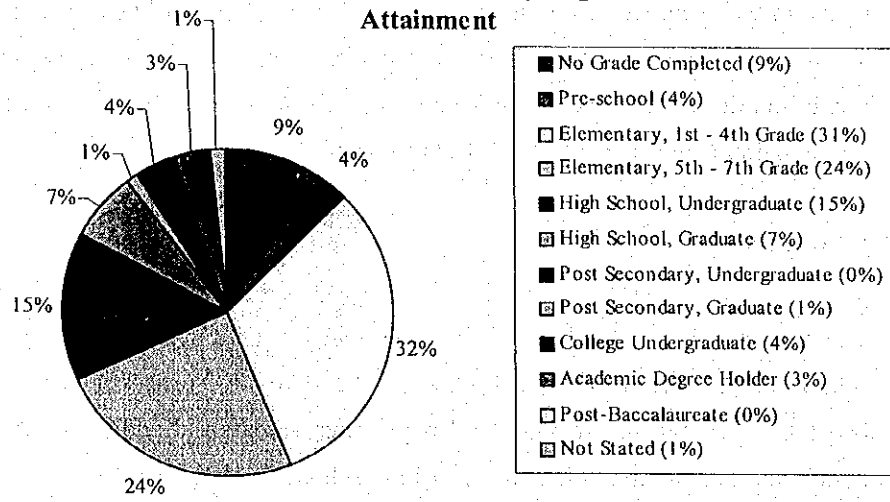


Table 3.3.1 Provincial Outline on Public Services

Item	Unit	Value	Item	Unit	Value
(1) **Roads**			(8) **Tourism facilities**	Number	20
a) Total length	Km	5,153	(Hotel resort, lodges, recreational		
b) Barangay roads	Percent	64	facilities, etc.)		
(2) **Electricity service coverage**			(9) **Schools**		
a) Municipality	Percent	100	a) Elementary level	Number	646
b) Barangay	Percent	72.29	b) Secondary level	Number	96
c) Household	Percent	53.97	c) Tertiary level/Technical	Number	20
(3) **Telecommunication Services**			(10) **Health Facilities**		
a) Availability in municipality	Percent	100	a) Hospital	Number	33
b) Telegraph station	Number	39	b) Main health centers, rural health	Number	291
c) Telephone station	Number	9	units, barangay health center, etc		
(4) **Post Office**	Number	22	(11) **Labor**		
			a) Labor force participation ratio	Percent	80.6
(5) **Transportation services**	Mode	Bus, Jeep,	b) Employment rate	Percent	95
	(ex. Bus,	Taxi,Van,			
	jeep, taxi,.)	Rent-a-Car,	(12) **Average family income**		
		Airstrip	a) Monthly income	Pesos/Month	4,386
(6) **Banking Facilities**	Number	28	b) Monthly expenditure	Pesos/Month	3,568
a) Private bank	(by Private				
b) Public bank	and public)				
(7) **Industrial/business/commercial**					
establishment	Number	3,444			

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

Table 3.3.2 Public Facilities and Services by Municipality

Municipality	High School			Vocational School	College	Hospital	Public Market	Bank and Financing Institution
	Public	Private	Total					
	nos.	nos.	nos.	nos.	nos.	nos.	nos.	nos.
Baungon	1	2	3				1	
Cabanglasan	1	1	2			1	1	
Damulog	1	1	2				1	
Dangcagan		1	1		1		1	
Don Carlos	4	2	6	1		6	1	1
Impasugong	1		1					
Kadingilan		1	1				1	
Kalilangan	3	1	4		1	1	1	1
Kibawe	1	3	4			1	1	1
Kitaotao	2	1	3			1	1	
Lantapan	1	2	3				1	1
Libona	1		1				1	
Malaybalay (Capital)	4	5	9	1	4	4	2	8
Malitbog	2	1	3				1	
Manolo Fortich	3	3	6			1	1	2
Maramag	3	3	6	1	2	3	1	3
Pangantucan	3	2	5			1	1	
Quezon	2	5	7	1	1	3	1	1
San Fernando	1	3	4		1	1		
Sumilao	1	1	2			1	1	
Talakag	1	3	4			1	1	
Valencia	2	17	19	1	5	8	1	10
Provincial Total	38	58	96	5	15	33	21	28

3.4 Population

3.4.1 Previous Population Development

A declining provincial population growth rate had been experienced since the last six (6) census years (1960-1995) as indicated in Figure 3.4.1. From a high average annual growth rate of 7.30% during the period 1960 to 1970, it gradually decreased to 2.05% (1990-1995). A summary of the average annual growth rates of the province is as follows:

Year	Population	Ave. Annual Growth Rate (%)	Period
1970	414,762	7.30	1960 - 1970
1975	532,818	5.14	1970 - 1975
1980	631,634	3.46	1975 - 1980
1990	843,891	2.94	1980 - 1990
1995	940,403	2.05	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 1997 population was estimated to provide the planning base for this Master Plan (refer to Section 8.3.1 Population Projection, Main Report). Table 3.4.1 shows a breakdown of the past population development by municipality from 1948 to 1995.

Figure 3.4.1 Previous Population Development of the Province

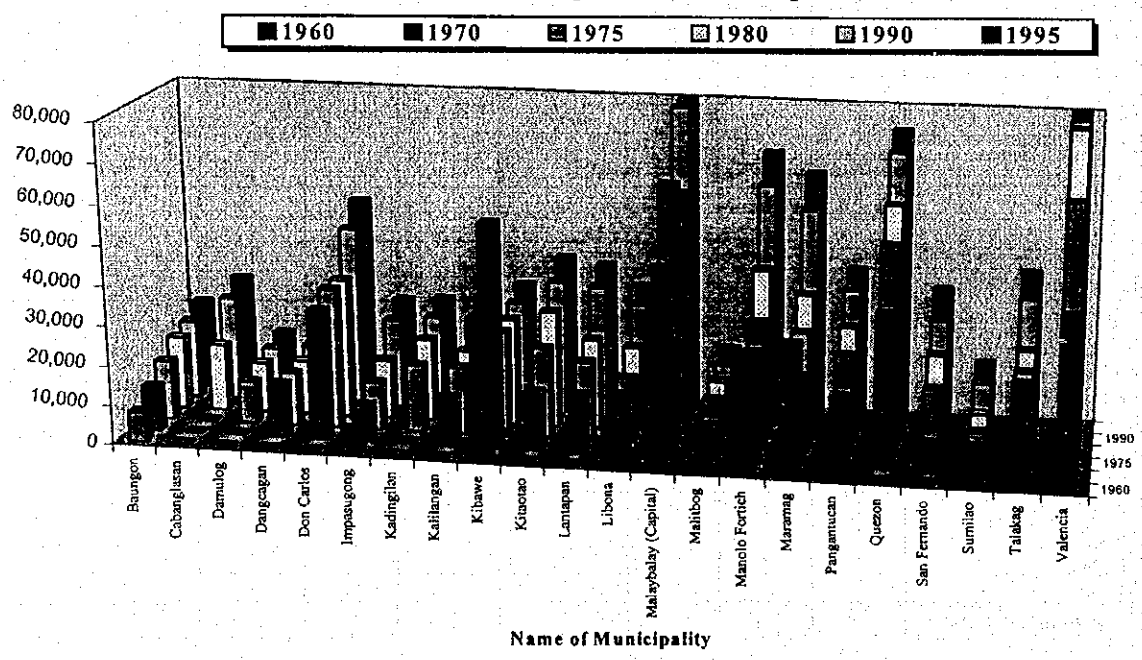


Table 3.4.1 Previous Population Development by Municipality

Municipality/ City	Previous Population						
	1948	1960	1970	1975	1980	1990	1995
Baungon	3,927	7,617	11,251	14,974	18,320	19,774	22,617
Cabanglasan					16,843	26,351	29,288
Damulog				10,594	12,596	13,595	15,010
Dangcagan			13,464	13,386	13,652	14,823	16,660
Don Carlos			32,668	35,252	35,038	45,815	51,083
Impasugong	3,813	6,063	9,169	11,911	14,803	22,629	25,389
Kadingilan				16,977	20,634	23,911	26,093
Kalilangan			12,325	16,893	18,316	23,923	26,973
Kibawe	5,588	35,728	56,239	26,407	26,949	28,608	30,783
Kitaotao			14,708	22,779	29,497	34,472	38,404
Lantapan			14,523	20,006	22,678	33,581	36,943
Libona	4,406	10,653	14,988	16,481	21,229	29,652	31,897
Malaybalay (Capital)	16,458	32,522	47,074	65,198	60,779	94,722	112,277
Malitbog	2,143	5,326	8,230	11,885	13,581	14,934	16,414
Manolo Fortich	9,560	16,833	27,159	31,840	42,493	61,329	67,400
Maramag	4,064	32,654	21,839	29,901	36,734	55,394	62,673
Pangantucan	1,869	12,356	17,458	24,734	29,065	35,777	38,418
Quezon			38,084	52,324	59,819	70,566	74,141
San Fernando			6,698	17,270	23,083	29,052	34,299
Sumilao	1,981	3,712	6,528	6,927	8,635	13,494	15,640
Talakag	9,661	17,006	22,649	22,538	25,055	35,379	39,378
Valencia		13,898	39,708	64,541	81,835	116,110	128,623
Provincial Total	63,470	194,368	414,762	532,818	631,634	843,891	940,403

3.4.2 Classification of Urban and Rural Areas

NSO classifies a barangay as urban when it satisfies any of the following conditions on the economic and social functions.

(1) In their entirety, all cities and municipal jurisdictions having a population density of at least 500 persons per square kilometer.

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

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

1) Street pattern, i.e., network of streets either at parallel or in right angle orientation;
2) At least six establishments (commercial, manufacturing, recreational and/or personal services); and
3) At least three of the following:

a) a town hall, church or chapel with religious services at least once a month;
b) a public plaza, park or cemetery;
c) a market place or building where trading activities are carried on at least once a week; and
d) a public building like school, hospital, health center or library.

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

All areas not falling under the urban classification are defined as rural area. Considering the 1995 NSO classification of urban and rural barangays, there are 82 urban barangays and 382 rural barangays for a total of 464 barangays in 1997. Distribution of the classified areas is shown in Figure 3.4.1, Supporting Report.

3.4.3 Present Population Distribution

From the 1995 NSO census, the 1997 urban-rural population was estimated. Rural population accounts for 70% of the provincial total, while 30% 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.

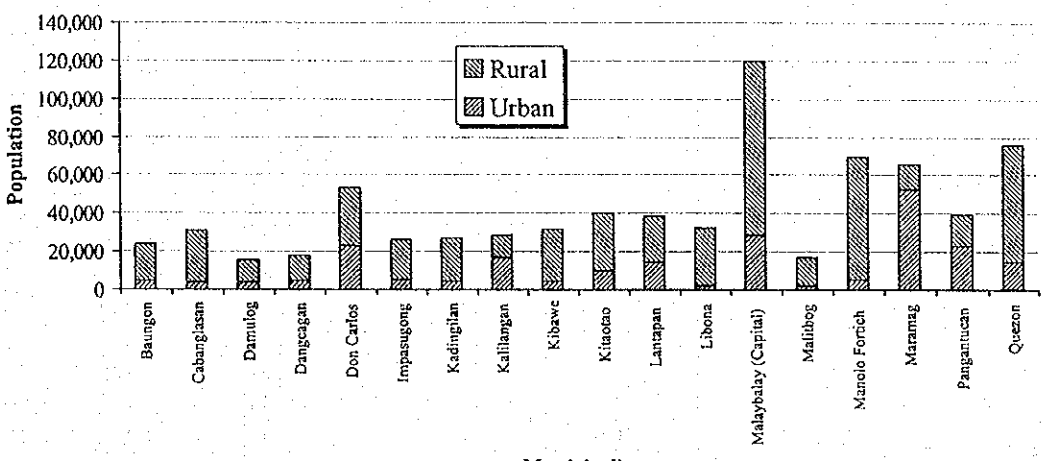
There are 183,059 households with 128,182 residing in rural areas and 54,877 households in urban areas. The average provincial household size is 5.36 persons/household. Table 3.4.3 presents a breakdown per municipality on the number of households and household sizes by urban and rural area.

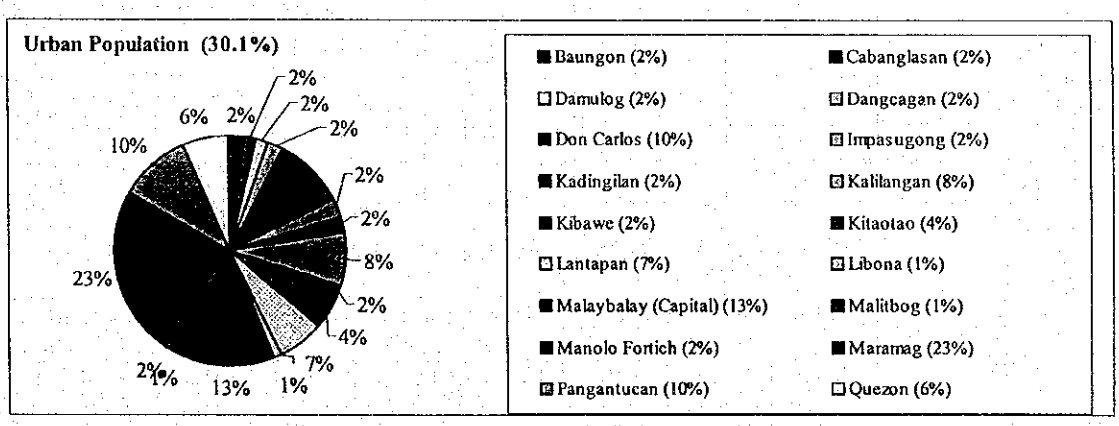
3.5 Health Status

3.5.1 Morbidity, Mortality and Infant Mortality

The number one cause of morbidity in Bukidnon was bronchitis, followed by influenza, pneumonia and diarrhea, a water-borne and water-washed disease. Tuberculosis and chickenpox ranked fifth and sixth, respectively. Regarding mortality, the number one cause was vascular diseases, followed by pneumonia. Tuberculosis and chronic liver disease ranked third and fourth, respectively. Pneumonia, diarrhea and congenital anomalies were the 3 leading causes of infant mortality in the province (refer to Table 3.5.1, Data Report).

Figure 3.4.2 Present Population Distribution





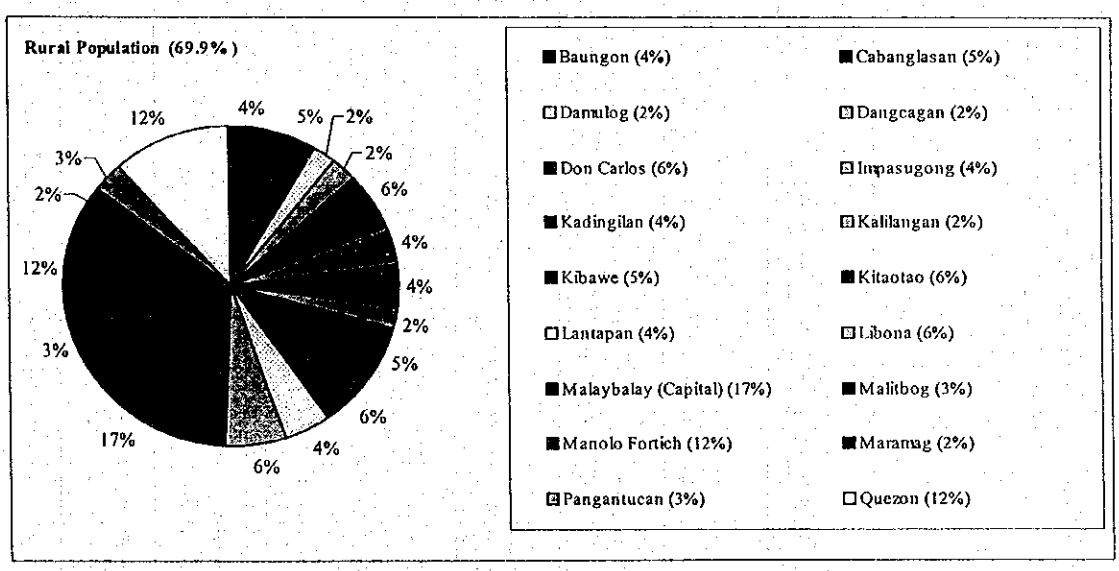


Table 3.4.2 Outline of Urban and Rural Areas in the Province

Municipality/ City	Number of Barangay			Population (1997)		
	Urban	Rural	Total	Urban	Rural	Total
Baungon	2	14	16	4,960	18,906	23,866
Cabanglasan	1	14	15	4,013	26,540	30,553
Damulog	1	16	17	3,870	11,746	15,616
Dangcagan	1	13	14	4,548	12,909	17,457
Don Carlos	10	19	29	23,145	30,211	53,356
Impasugong	1	12	13	5,475	21,110	26,585
Kadingilan	1	16	17	4,794	22,227	27,021
Kalilangan	6	8	14	17,250	11,049	28,299
Kibawe	2	21	23	4,347	27,352	31,699
Kitaotao	2	33	35	9,891	30,209	40,100
Lantapan	4	10	14	14,761	23,619	38,380
Libona	1	13	14	2,317	30,525	32,842
Malaybalay (Capital)	12	34	46	28,759	91,419	120,178
Malitbog	1	10	11	2,704	14,342	17,046
Manolo Fortich	1	21	22	5,512	64,481	69,993
Maramag	12	8	20	52,948	12,898	65,846
Pangantucan	8	11	19	23,078	16,450	39,528
Quezon	2	29	31	14,458	61,163	75,621
San Fernando	2	22	24	13,130	23,524	36,654
Sumilao	3	7	10	10,880	5,711	16,591
Talakag	6	23	29	5,663	35,438	41,101
Valencia	3	28	31	36,445	97,553	133,998
Provincial Total	82	382	464	292,948	689,382	982,330

Table 3.4.3 Household Numbers and Household Size

Municipality/ City	Number of Households (1995)			Number of Households (1997)			1995 Household Size (person/household)		
	Urban	Rural	Total	Urban	Rural	Total	Urban	Rural	Total
Baungon	870	3,377	4,247	919	3,560	4,479	5.40	5.31	5.33
Cabanglasan	682	4,656	5,338	712	4,861	5,573	5.64	5.46	5.49
Damulog	744	2,202	2,946	774	2,290	3,064	5.00	5.13	5.10
Dangcagan	801	2,254	3,055	839	2,360	3,199	5.42	5.47	5.45
Don Carlos	4,232	5,447	9,679	4,417	5,689	10,106	5.24	5.31	5.28
Impasugong	909	3,599	4,508	952	3,770	4,722	5.75	5.60	5.63
Kadingilan	918	4,096	5,014	951	4,242	5,193	5.04	5.24	5.20
Kalilangan	3,043	1,969	5,012	3,194	2,065	5,259	5.40	5.35	5.38
Kibawe	812	5,184	5,996	836	5,342	6,178	5.20	5.12	5.13
Kitaotao	1,952	5,594	7,546	2,039	5,843	7,882	4.85	5.17	5.09
Lantapan	2,521	4,128	6,649	2,617	4,287	6,904	5.64	5.51	5.56
Libona	421	5,365	5,786	434	5,520	5,954	5.34	5.53	5.51
Malaybalay (Capital)	4,932	15,597	20,529	5,277	16,682	21,959	5.45	5.48	5.47
Malitbog	509	2,592	3,101	528	2,691	3,219	5.12	5.33	5.29
Manolo Fortich	1,019	11,162	12,181	1,058	11,597	12,655	5.21	5.56	5.53
Maramag	9,451	2,311	11,762	9,934	2,429	12,363	5.33	5.31	5.33
Pangantucan	4,096	2,961	7,057	4,211	3,046	7,257	5.48	5.40	5.44
Quezon	2,674	11,218	13,892	2,728	11,432	14,160	5.30	5.35	5.34
San Fernando	2,376	4,104	6,480	2,540	4,389	6,929	5.17	5.36	5.29
Sumilao	1,840	978	2,818	1,953	1,036	2,989	5.57	5.51	5.55
Talakag	1,030	6,303	7,333	1,075	6,575	7,650	5.27	5.39	5.37
Valencia	6,609	17,750	24,359	6,889	18,476	25,365	5.29	5.28	5.28
Provincial Total	52,441	122,847	175,288	54,877	128,182	183,059	5.34	5.38	5.36

The general health status of the populace of the province in 1996 was relatively poor compared with the national condition. The incidence of diseases was higher in Bukidnon than the country as a whole. Table 3.5.1 presents a comparative statistics on the ten leading causes of morbidity, mortality and infant mortality of the province as well as of the Philippines.

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

Rate: 1/100,000

	Causes	Bukidnon		Philippines		
		Number	Rate	Number	Rate	Ranking
Morbidity	1. Bronchitis	16,893	1,796.40	903,508	1,349	2
	2. Influenza	16,136	1,715.90	609,471	910	3
	3. Pneumonia	15,346	1,631.90	470,574	703	4
	4. Diarrhea	10,685	1,136.20	1,337,449	1,997	1
	5. Tuberculosis	1,125	119.6	159,049	238.6	
	6. Varicella, Chickenpox	1,085	115.4	71,317	107	9
	7. Schistosomiasis	810	86.1	-	-	-
	8. Measles	680	72.3	85,345	127	8
	9. Skin Diseases	663	70.5	-	-	-
	10. Typhoid/Paratyphoid	428	45.5	-	-	-
Mortality	1. Vascular Diseases	357	38	37,358	56	2
	2. Pneumonia	238	25.3	35,582	53	3
	3. Tuberculosis	150	16	24,580	37	5
	4. Chronic Liver Disease	24	2.6	5,510	8	10
	5. Septicemia	23	2.4			
	6. Diarrhea	17	1.8	5,759	9	9
	7. Kidney/ Nephritis	16	1.7	5,510	8	10
	8. Viral Hepatitis	15	1.6	-	-	-
	9. Typhoid/Paratyphoid	5	0.5	-	-	-
	10. Schistosomiasis	5	0.5	-	-	-
Infant Mortality	1. Pneumonia	91	9.7	7,631	5	1
	2. Diarrhea	24	2.6	1,661	1	4
	3. Congenital Anomalies	17	1.8	2,366	1.4	3
	4. Septicemia	13	1.4	1,252	0.7	5
	5. Measles	6	0.6	765	0.5	7
	6. Meningitis	5	0.5			
	7. Dengue Fever	3	0.3			
	8. Birth Injuries & Difficult Labor	2	0.2	1,190	0.7	5
	9. Viral Hepatitis	1	0.1			
	10. Leukemia	1	0.1			

Water-related diseases in the ten leading causes of morbidity include diarrhea (rank 4th), schistosomiasis (7th), skin disease (9th) and typhoid/paratyphoid (10th). Diarrhea, viral hepatitis, typhoid and schistosomiasis also ranked 6th, 8th, 9th and 10th as the leading causes of mortality. Diarrhea, (rank 2nd), dengue fever (7th) and viral hepatitis (9th) are among the ten leading causes of infant mortality.

3.5.2 Water Related Diseases

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

Water-related diseases reported in the province in 1995 were diarrhea, typhoid, viral hepatitis, cholera, malaria, skin disease, dengue fever, intestinal parasitism and schistosomiasis. Table 3.5.2 presents the reported cases and deaths of notifiable water-related diseases in the province.

Table 3.5.2 Reported Cases and Deaths of Notifiable Water Related Diseases in 1996

Rate: 1/100,000

Diseases	Morbidity		Mortality		Infant Mortality	
	Number	Rate	Number	Rate	Number	Rate
Water-borne						
1. Diarrhea	10,685	1,136.20	17	1.8	24	2.6
2. Viral hepatitis	141	14.99	15	1.6	1	0.11
3. Typhoid/Paratyphoid	428	45.51	5	0.5		
4. Cholera	7	0.74				
Water-based						
1. Schistosomiasis	810	86.13	5	0.5		
Water-washed						
1. Intestinal parasitism	327	34.77				
2. Skin disease	663	70.50				
Water vector						
1. Malaria	271	28.82	3	0.32		
2. Dengue/H-fever	358	38.07	2	0.21	3	0.32

3.5.3 Health Facilities and Practitioners

Present facilities serving the health care of the populace are 32 hospitals, 22 rural health units and 269 barangay health stations. The ratio of the population to these facilities and to the health practitioners are relatively higher as compared to the national average figures (refer to Table 3.5.1 number and ratio of population to health facilities and/or medical practitioners, Supporting Report).

3.6 Environmental Conditions

3.6.1 General

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

3.6.2 Water Pollution

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

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

Mining (non-metallic) and small-scale food processing establishments are identified as potential pollution sources in the province if no control measures are in place. The rivers must be protected and conserved for their intended or beneficial use. However, as of now, the rivers in the province have not been classified as to their usage by the Department of Environment and Natural Resources (refer to general information in Table 3.6.2 DENR Water Quality Criteria/Water Usage and Classification, Supporting Report).

3.6.3 Solid Waste Disposal

Of the 22 municipalities/city, 16 have municipal refuse collection and disposal services as of 1996 (details are referred to Table 3.6.1, Data Report). These municipalities have 1 to 3 units of open dump truck. Baungon, Quezon and Valencia and Malaybalay City have one unit

each of closed type truck. In the province, 22% of the households is served, while the majority (78%) is unserved. Table 3.6.1 reflects the manner of solid waste collection and disposal, and service coverage by municipality in 1996.

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

Table 3.6.1 Municipal Solid Waste Collection and Disposal, and Service Coverage, 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		
Baungon	4,479	1		1	98		98	1,829	1,408	1,144	4,381	2	98
Cabanglasan	5,573							903	2,825	1,845	5,573		100
Damulog	3,064	1		1	548		548	515	1,001	1,000	2,516	18	82
Dangcagan	3,199	1		1	801		801	800	1,398	200	2,398	25	75
Don Carlos	10,106	1		1	1,050		1,050	3,106	3,200	2,750	9,056	10	90
Impasugong	4,722							1,500	1,722	1,500	4,722		100
Kadingilan	5,193	1		1	1,258		1,258	935	1,600	1,400	3,935	24	76
Kalilangan	5,259	1		1	3,320		3,320	503	560	876	1,939	63	37
Kibawe	6,178	1		1	396		396	782	2,000	3,000	5,782	6	94
Kitaotao	7,882	1		1	4,033		4,033	1,000	1,699	1,150	3,849	51	49
Lantapan	6,904							6,141	380	383	6,904		100
Libona	5,954							546	2,511	2,897	5,954		100
Malaybalay (Capital)	21,959	2	1	3	10,000		10,000		6,000	5,959	11,959	46	54
Malitbog	3,219							2,782	35	402	3,219		100
Manolo Fortich	12,655	1		1		450	450	6,204	3,145	2,856	12,205	4	96
Maramag	12,363	2		2	3,208		3,208	1,564	4,567	3,024	9,155	26	74
Pangantucan	7,257	1		1	1,305		1,305	4,137	1,015	800	5,952	18	82
Quezon	14,160	1	1	2		1,114	1,114	5,450	525	7,071	13,046	8	92
San Fernando	6,929	1		1		1,477	1,477		3,211	2,241	5,452	21	79
Sumilao	2,989							1,221	966	802	2,989		100
Talakag	7,650	1		1	3,500		3,500	317	3,000	833	4,150	46	54
Valencia	25,365	3		3	8,410		8,410	3,000	6,748	7,207	16,955	33	67
Provincial Total	183,059	20	2	22	37,927	3,041	40,968	43,235	49,516	49,340	142,091	22	78